COLLEGE OF ENGINEERING AND TECHNOLOGY,
BAMBHORI POST BOX NO. 94, JALGAON – 425001. (M.S.)

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Mandatory Disclosure

Part-II

November 2009

NORTH MAHARASHTRA UNIVERSITY, JALGAON
STRUCTURE OF TEACHING AND EVALUATION
S.E .(CIVIL ENGINEERING)
First term

Sr. No.	Subject	Teaching Scheme Hours/week			Examination Scheme				
		Lectures	Tutorial	Practical	Paper Duration Hours	Paper	TW	PR	OR
1	Strength of Material	4	1	--	3	100	25	--	--
2	Surveying-I	4	--	2	3	100	25	50	--
3	Building Construction and Materials	4	--	4	3	100	25	--	25
4	Concrete Technology	4	--	2	3	100	25	--	25
5	Engineering Mathematics-III	4	1	--	3	100	25	--	--
6	Computer Graphics	--	--	2			25		
	Total	**20**	**2**	**10**	**--**	**500**	**150**	**50**	**50**
	Grand Total	**32**			**750**				

SECOND TERM

Sr. No.	Subject	Teaching Scheme Hours/week			Examination Scheme				
		Lectures	Tutorial	Practical	Paper Duration Hours	Paper	TW	PR	OR
1	Theory of Structures-I	4	1	--	3	100	25	--	--
2	Surveying-II	4	--	2	3	100	25	50	--
3	Building Design and Drawing	4	--	4	4	100	50	--	25
4	Fluid Mechanics-I	4	1	2	3	100	25	--	25
5	Engineering Geology	4	--	2	3	100	25	--	--
	Total	**20**	**2**	**10**	**--**	**500**	**150**	**50**	**50**
	Grand Total	**32**			**750**				

NORTH MAHARASHTRA UNIVERSITY, JALGAON.

SYLLABUS OF SECOND YEAR (CIVIL)

TERM-IST (w.e.f. 2006-07)

STRENGTH OF MATERIALS

Teaching Scheme:	**Examination Scheme:**
Lectures: 4 Hours/Week	Theory Paper: 100 Marks(3 Hrs)
Tutorials: 1 Hour/Week	Term Work: 25 Marks

UNIT-I: **(11 Hrs., 20 marks)**

Normal stress & strain, Hooke's law. Axial force diagrams. Deformation in prismatic, stepped, linearly varying & composite members under concentrated load & self-weight. Stress & strain in indeterminate members. Temperature stresses.

UNIT-II: **(9 Hrs., 20 marks)**

[A] Shear stress & strain. Modulus of rigidity. Poison's ratio, relation between E & G. Generalized Hooke's law. Bulk modulus, stress strain diagram, working stress, factor of safety.

[B] Thin cylindrical & spherical shells.

[C] Stresses due to impact load using strain energy method.

UNIT-III: **(10 Hrs., 20 marks)**

[A] Shear force & bending moment. Relation between SF, BM & loading. SFD & BMD for determinate beams viz. cantilever, simply supported, overhanging and compound beams under various loads viz. concentrated, uniformly distributed & varying, couples etc. Determination of critical SF & BM and points of contra-flexure. Construction of loading diagrams from shear force & beading moment diagram.

[B] Bending stresses in beams. Theory of bending. Flexural formula. Section modulus. Moment of resistance.

UNIT-IV: **(10 Hrs., 20 marks)**

[A] Shear stresses in beams. Shear stress formula, shear stress determination in symmetrical section.

[B] Shear stresses in shafts due to torsion. Stress, strain & deformation in determinate & indeterminate shafts of hollow or solid cross-sections. Composite shafts.

[C] Axially loaded columns. Buckling effect. Euler's formula. Various end conditions & concept of equivalent length. Rankine's formula. Limitations of formulae.

UNIT-V: **(10 Hrs., 20 marks)**

[A] Direct & bending stresses in short columns & other structural components due to eccentric or lateral loads. Core of section.

[B] Principle stresses & strain. Stresses on inclined plane. Graphical method. Theories of Failure.

[C] Stresses due to combined bending and torque in shafts.

TERM WORK:-

It shall consist of at least two assignments for each unit of above syllabus.

REFERENCE BOOKS:-

1) E.P.Popov - Mechanics of Solids
2)Timoshenko - Strength of Materials
3) V.L.Shah - Strength of Materials
4) Ramamrutham - Strength of Materials

SURVEYING -I

Teaching Scheme:	**Examination Scheme:**
Lectures: 4 Hours/Week	Theory Paper: 100 Marks(3 Hrs)
Practical: 2 Hour/Week	Term Work: 25 Marks
	Practical: 50 Marks

UNIT-I **(10 Hrs., 20 marks)**

LEVELLING:

a. Instruments used in levelling, Dumpy level, Automatic Level, Types of levelling staves.
b. Principal axes of Dumpy level. Testing and adjustments of Axis of Bubble tube, a line of collimation of dumpy level.
c. Reciprocal levelling , curvature and refraction correction, Distance to the visible horizon .
d. Profile levelling : L - section and cross -sections.

ROUTE SURVEY:

Reconnaissance survey; Locating obligatory points, preliminary Survey, fixing gradients, paper and field location survey, Plotting L -section and cross -section, construction survey.

UNIT-II **(10 Hrs., 20 marks)**

THEODOLITE:

a. Principal axes and permanent adjustments of transit theodolite.
b. Uses of theodolite : measurement of horizontal angles , vertical Angles, magnetic bearings, prolonging a line, lining in, measuring deflection angles, setting out the angles.
c. Theodolite Traversing: Computation of consecutive and independent co-ordinates, Adjustments of closed traverse, Gales Traverse by co-ordinate method, omitted measurements.

UNIT-III **(10 Hrs., 20 marks)**

TACHEOMETRY:

a. Principle of stadia method, fixed hair method with vertical staff to determine horizontal distances and elevations of the points.
b. Use of Tacheometry in surveying, Tacheometric contour survey, use of tacheometric tables.

UNIT-IV **(10 Hrs., 20 marks)**

CURVES:

a. Horizontal and vertical curves and their purposes.
b. Simple circular curves - Elements and setting out by linear & angular methods.
c. Compound curves -Elements and setting out of compound curves.
d. Introduction to reverse curves (No numerical problem to be asked). Elements, Location and uses.
e. Transition curves -Types and uses, Length of transition curves, Elements of cubic parabola, Length of combined curve, setting out the combined curve by deflection angle method.

(No numerical problem to be asked).

UNIT-V **(10 Hrs., 20 marks)**

PLANE TABLE SURVEY:

a. Objective and equipment required for plane table survey.
b. Methods of plane tabling - Radiation, Intersection, Traversing and Resection .

c. Two point & Three point problems and their solutions by different methods, strength of fix.
d. Advantages, disadvantages, limitations and errors of plane Table surveying.

Minor Instruments:

Study and use of Abney Level, Box sextant, Indian pattern clinometer and pantagraph

TERM WORK:

Details of practical Exercises and projects:

1. Measurements of horizontal and vertical angles by transit Theodolite,
2. Measurements of horizontal angles of a triangle by repetition method.

Project-1

3 Theodolite Traverse survey project of a closed traverse with at least four sides.

4 Computation of horizontal distances and elevations by Tracheometry for horizontal and inclined sights.

Project-2

5 Tacheometric contouring project with at least two instrument stations at 60 m apart.

6 Radiation and intersection method in plane Table survey.

Project-3

7 Plane table survey project of a closed traverse of minimum four sides.

8 Solution of three - Point problem in plane tabling.

9 Use of box sextant and Abney level.

10 Study and use of Indian pattern clinometer and pantagraph.

Project-4

11 Road project for minimum length of 500m, including fixing of alignment, profile leveling, and cross sectioning.

Note: The Term Work will consist of:

(i) Field book containing record of all exercises and projects listed above.

(ii) File of full imperial size drawing sheets as mentioned below

1) Theodolite Traverse survey project. 1 sheet
2) Tacheometric contouring project………..1 sheet
3) Plane Table Traverse survey project…..1 sheet
4) Solution of three -point problem………… 1 sheet
5) Road project showing L- section, plan of road and Typical cross -section ……………………………………….Min -1 sheet

REFERENCES BOOKS

1) Prof. T.P. Kanetkar and prof. S.V.Kulkarni. - Surveying and leveling Vol. I & II
2) Prof. B.C. Punmia - Surveying vol. I & II
3) Late David clark. - Plane and Geodetic Surveying for Engineers, Vol. I
4) Cliver and clendening - Principles of surveying
5) P.B. Shahani - Advance surveying , Vol.I & II

Handbook

S.P.Collins - A handbook of accurate surveying methods .

BUILDING CONSTRUCTION & MATERIALS

Teaching Scheme:	**Examination Scheme:**
Lectures: 4 Hours/Week	Theory Paper: 100 Marks(3 Hrs)
Practical: 4 Hour/Week	Term Work: 25 Marks
	Oral/Sketches: 25 Marks

UNIT I **(10 Hours, 20 marks)**

a) Types of building, load bearing , framed structure, steel structure, timber structure, composite structure. Various parts of building- sub structure & super structure. Plinth & plinth level, sill & sill level, lintel & lintel level, floor & floor level, roof & roof level, plinth height, plinth protection, cornice, coping etc. function of each.

b) Foundation- purposes & classification (detailed) , advantages & disadvantages of each & circumstances under which each is used. Factors considered for selection of foundation.
Design considerations for spread footing(load bearing structure) Design of wall footing.

c) Bearing capacity of soil, safe B.C. of soil, factor of safety, methods of improvement of B.C. of soil, types of soil & bearing capacity of each type of soil.

UNIT II **(10 Hours, 20 marks)**

a) Masonry:- Principles of masonry construction, types of masonry, types of walls i.e. load bearing, partition and retaining walls, various types of partition walls such as brick partition , timber partition, glass partition etc.

b) Stone masonry:- types of stone masonry & construction method, Dressing and bonding , precast stone masonry, through stone, proportions of mortars used for stone masonry.

c) Brick and Block Masonry:- various types of bonds in brick masonry, reinforced brick masonry, precautions to be taken in masonry constructions, composite masonry , solid & hollow blocks used for masonry , methods of preparation of blocks, cavity wall & cavity wall construction.

d) form and formwork: function of forms, form erection, oiling and stripping of form, requirement of form and form work, form work for various civil engineering structures, materials used for form work.

UNIT III **(10 Hours, 20 marks)**

Super Structure

a) Types of lintels and arches, stability consideration for arches, laying of arch, detailing of R.C.C. lintel and chajja.

b) Doors and windows: types of each and circumstance under which each is used, minimum area of windows openings for different climatic conditions, various materials used for doors and windows, fixtures and fastenings used. I.S. notations for doors & windows.

Special flooring: marble, Granite, kota, ceramic tiles, artificial granite, acid proof floors.

c) Circulation:- Horizontal & vertical , stair and staircase planning & design , types of staircases as per shape and material used. Design of staircase.

Details of ramps, ladders, lifts & escalators used for vertical circulation.

d) Floor and Roof:- ground floor, upper floors, mezzanine floor, design & construction requirements, various types of floor finishes used, advantages & disadvantages & circumstances under which each is used. Damp proof construction of floors, walls & finishes.

Types of roof & roof covering, flat roof & its drainage, water proofing, false ceiling & method of fixing.

Different types of shell structures, barrel arch, cone, hyperbolic, parabolic, folded plate, space frame, & their uses.

UNIT IV **(10 Hours, 20 marks)**

a) Steel trusses, various sections used for steel work method of connections i.e. riveted, bolted & welded, types of trusses & their uses, roofs, covering materials & method of fixing tubular structures.
b) Building finishes, objective & processes, pointing, plastering & painting, white wash & co lour wash, distempering etc, on old & new surfaces, repairs & maintenance.
c) Scaffolding, shoring, under pinning & strutting, types, purposes & precautions.
d) R.C.C. framed structure, column, beam, footing, slab & their connections, general requirement and details.

Industrialization of Building:-

Modular co-ordination: modular planning & recommendation, modular tolerances, prefabrication, advantages of prefabrication, prefabrication systems, principles of design of prefabrication, components of precast construction, Ferro cement & Ferro concrete construction.

UNIT- V **(10 Hours, 20 marks)**

a)Stone :- natural bed of stones, stone quarrying uses of stones, qualities of good building stone ,test on stone, preservation of stone.

b)Bricks:- composition of good brick earth, classification of burnt brick, manufacture of bricks, uses of bricks, qualities of good bricks, tests of bricks.

c)Timber:- properties and uses, testing, conversion and sawing, defects. in timbers,

d)Artificial timber, Veneers, Plywood and Block board.

Aluminum, Glass. Heat insulating materials, Sound absorbent materials.

TERMWORK:- shall consist of sketch book having 1/4 imperial size sheets showing following details.

1) Free hand sketching practice: different type of lines, squares, rectangle, circles, plans of buildings.
2) Lettering 6 mm, 4mm , 2mm with technical terms regarding construction.
3) Different types of lines, method of dimensioning as per I.S. code
4) Symbols & conventional sign of materials.
5) Orthographic, isometric, oblique & axonometric views.
   Sketches after actual measurements (6 to 9) on drawing sheets.
6) C.C.T.W. paneled door: plan, elevation, section.
7) Flush door: plan, elevation, section.
8) Arches in stone & brick.
9) Stone masonry: U.C.R, C.R., Ashlar.
10) Bonds in brick work with isometric view for one bond for one brick.
11) Different types of roofs.
12) Steel trusses, shells, folded plate, space frames etc. orthographic and three dimensional sketches.
13) Types of stairs.
14) Report regarding visits to the construction sites.(minimum two visits)
15) Materials & their rates.

REFERENCES BOOKS:

1. Rangwala - Building construction
2. Sushil kumar - Building construction
3. Bindra and arora - Building construction
4. Punmia - Building construction

5. Rangwala - Engineering Materials
6. Dr.S.V.Deodhar - Civil Engineering Materials

CONCRETE TECHNOLOGY

Teaching Scheme:
Lectures: 4 Hours/Week
Practical: 2 Hour/Week

Examination Scheme:
Theory Paper: 100 Marks(3 Hrs)
Term Work: 25 Marks

UNIT-I **(10 Hours 20 marks)**

A) Cement: - Manufacture of cement, chemical composition, setting and hydration of cement. Types of cement, properties and testing of cement.

B) Aggregates – Classification, properties, grading and testing of aggregates, requirements of aggregate for mortar and concrete, impurities in aggregates and its effect on strength of concrete.

C) Water:- Characteristics of water, suitability to be used in concrete, tests on water, mixing of water, Seawater

UNIT-II **(10 Hours 20 marks)**

Concrete:

A) Fresh Concrete:- Definition and its ingredients, grades of concrete, concreting process, significance of water cement ratio. Properties of fresh concrete, form work for good concreting, Tests on fresh concrete.

B) Hardened Concrete:

Various properties of hardened concrete, factors affecting various properties, micro cracking, and stress - strain relation, testing of hardened concrete, creep and shrinkage of concrete.

C) Quality control during concreting.

UNIT-III **(10 Hours 20 marks)**

A) Admixtures, classification and their effects on various properties of concrete.

B) Types of Concrete: -

Light weight concrete, polymer concrete, fiber reinforced concrete, ready mixed concrete, self compacting and high performance concrete, Ferro cement.

C) Special concreting techniques:

Pipe Crete concrete, under water concreting, concreting in extreme weather conditions.

UNIT-IV **(10 Hours 20 marks)**

Concrete mix design

A) Introduction, object of mix design, factors to be considered, statistical quality control. introduction to different methods of mix design.

B) Concrete mix design by I.S. method and IRC method., High strength concrete mix design.

UNIT-V **(10 Hours 20 marks)**

A) Introduction to Non-destructive testing of concrete, rebound hammer, ultrasonic pulse velocity, pull out test, impact echo test.

B) Deterioration of concrete, Permeability, Durability, Chemical attack, Carbonation of concrete , corrosion of reinforcement.

C) Repair – Symptoms and diagnosis of distress, Evaluation of cracks, common types of repair, shotcrete.

D) Introduction to lime & lime concrete.

LIST OF EXPERIMENTS:-

1. Testing of Cement - a). Fineness of cement
   b) Setting time
   c) Compressive strength
   d) Soundness
2. Testing of aggregate -

a) Fineness modulus and sieve analysis,
b) Crushing value
c) Impact value
d) moisture content
e) Abrasion test,
f) shape test,
g) specific gravity

3. Testing of concrete –

a) Workability of concrete (Slump cone and compaction factor)
b) Compressive strength (Cubes and cylinders),
c) Split test ie tensile test of cylinders
d) Modulus of rupture (flexural strength)
e) Concrete mix design by I.S. method

TEXT BOOKS:-

Concrete Technology by

1. M.S.Shetty (S Chand Publication)
2. M.L.Gambhir (T M H Publication)
3. S.V.Deodhar (Central Techno Publication)

REFERENCE BOOKS:-

1. A.N. Neville, J.J. Brooks - Concrete Technology - Addition Weslley
2. R.S. Varshney - Concrete Technology - Oxford & I B H.
3. P Kumar Mehta - Concrete - Gujrat Ambuja

ENGINEERING MATHEMATICS – III

Teaching Scheme:	**Examination Scheme:**
Lectures: 4 Hours/Week	Theory Paper: 100 Marks(3 Hrs)
Tutorials: 1 Hour/Week	Term Work: 25 Marks

UNIT-I **(10 Hours, 20 marks)**

Linear Differential Equations:

Linear Differential equation of order n, Solution of LDE with constant coefficient, method of variation of parameters, equations reducible to linear form with constant co-efficients, Cauchy's linear equation, Legendre's linear equation. Applications of linear differential equations to cantilever, loaded beams, whriling of shafts.

UNIT-II **(10 Hours, 20 marks)**

A. Simultaneous linear differential equations of the forms:
   (i) $f_1(D)\, x + \Phi_1(D)\, y = \psi_1(t)$
       $f_2(D)\, x + \Phi_2(D)\, y = \psi_2(t)$, where $D \equiv d/dt$
   (ii) $\frac{dx}{P} = \frac{dy}{Q} = \frac{dz}{R}$ (Symmetrical form)
B. Differential equation of 1^{st} order, and higher degree (Clauriats form)
C. Applications of Partial Differential equations to:
   (i) Vibration of strings or wave equations:
   $$\frac{\partial^2 y}{\partial t^2} = a^2 \frac{\partial^2 y}{\partial x^2}$$
   (ii) One dimensional heat flow equation
   $$\frac{\partial u}{\partial t} = a^2 \frac{\partial^2 u}{\partial x^2}$$
   (iii) Laplace equation Two dimensional heat flow equation.
   $$\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial x^2} = 0$$
   by separating variables only.
   Applications of partial Differential equations to problems of civil and allied engineering.

UNIT-III: **(10 Hours, 20 marks)**

Statistics: Mean, Mode, Median standard deviation, Variance, co-efficient of variation, Moments, Skewness and kurtosis, Bivariate distribution, Correlation and Regression, Rediability of Regression estimates.

UNIT-IV **(10 Hours, 20 marks)**

Probability:Theorems on Probability, Binominal Distribution, Poisson distribution , Normal distribution, Beta distribution, Gamma distribution, Chi-Square distribution.

UNIT-V **(10 Hours, 20 marks)**

Theory of Sampling: Sampling, Types of sampling, Sampling distribution, Testing Hypothesis, Null Hypothesis level of Significance, Test of significance, Test of Significance of large sample. Decision quality control.

TEXT BOOKS:

1. H.K. Dass - Advanced Engineering Mathematics 5^{th} Revised Edition 2006 (S. Chand Publication) New Delhi.
2. Erwin Kreyszig - Advanced Engineering Mathematics (Wiley Eastern Ltd.)
3. B.S. Grewal - Higher Engineering Mathematics, Khanna Publication, Delhi

REFERENCE BOOKS:

1. Wylie C.R. & Barrett - Advanced Engineering Mathematics - Mc Graw Hill
2. B.V. Raman - Engineering Mathematics - Tata Mc- Graw – Hill.
3. P.N. Wartikar & J.N. Wartikar - Applied Mathematics (Volume I & II) - (Pune Viduarthi Griha Prakashan, Pune)
4. Thomas L. Harman James - Advance Engineering Mathematics with MATLAB 2e - (Thomson Learing)
5. Dr. Gokhale, Dr. Chaudhari & Dr. Singh - Engineering Mathematics – III

COMPUTER GRAPHICS

Teaching Scheme:	**Examination Scheme:**
Practical : 2 Hours/Week	Term Work: 25 Marks

Study of any computer drafting software. Using Various Drawing and editing menu commands. Inserting / editing text, arrows & dimensions.

TW shall consist of drawings on A4 size sheets of the following

1) One sheet each showing use of commands viz array, arc, rotate, mirror, offset, etc.
2) A plan of 2 BHK house.
3) Typical Reinforcement details of beam & column

N O R T H   M A H A R A S H T R A   U N I V E R S I T Y ,   J A L G A O N .

SYLLABUS OF SECOND YEAR (CIVIL)

TERM-IIND (w.e.f. 2006-07)

THEORY OF STRUCTURE - I

Teaching Scheme:	**Examination Scheme:**
Lectures: 4 Hours/Week	Theory Paper: 100 Marks(3 Hrs)
Tutorials: 1 Hour/Week	Term Work: 25 Marks

UNIT-I

a) Deflection of Beams.: - **(11 Hours, 20 marks)**
Relation between BM, slope and defection , determinate beams by double integration method. Concept of moment area method, Mohr's theorem. Use of moment area method to calculate deflections of beams such as simply supported, over hanging and of uniform cross sections and different cross sections. Conjugate beam method. Application of conjugate beam method to simply supported, overhanging and compound beams. Propped cantilevers.

b) Energy methods for deflection:-
Concept of strain energy, Maxwell's reciprocal theorem of deflection. Castiglino's theorm . Use of strain energy and unit load methods for finding out of deflections for beams & bends.

UNIT-II

a) Deflection of trusses:- **(10 Hours, 20 marks)**
Deflection of statically determinate plane trusses by Castigliano's first theorem

b) Analysis of redundant trusses by Castiglino's second theorem, lack of fit and temperature changes in members, sinking of supports (degree of indeterminacy maximum upto 2 only).

UNIT-III **(10 Hours, 20 marks)**

a) Fixed Beams:- Concept, advantages and disadvantages. Nature of B.M. Diagrams. Fixed end moment due to various types of loads such as point, uniformly distributed, Uniformly varying, couples for beams of uniform c/s and stepped cross sections. Effect of sinking of support. B.M.D & S.F.D.

b) Continuous Beams:- Concept , Nature of B.M. diagrams, Clapyeron's theorem of three moments for beams due to concentrated load, UDL, couples etc. Effect of sinking of supports, plotting of B.M.& S.F. diagrams.

UNIT-IV **(9 Hours, 20 marks)**

b) Three hinged arch:- Concept of three hinged arch as a haunched beam, support reactions. B.M., S.F. and axial thrust diagrams for circular and parabolic three hinged arches. Influence lines for B.M., S.F. and axial thrust. Maximum B.M., S.F. and axial thrust due to point load & UDL.

b) Two hinged arches :-
Horizontal thrust at supports. Shear, normal thrust and BM at a point, BM diagrams for concentrated load and udl, parabolic and semicircular arches.

UNIT-V **(10 Hours, 20 marks)**

a) Influence lines:- Basic concepts , influence line for reactions, B.M.& S.F. for simply supported, overhanging, & compound beams. Influence lines for members of statically determinate plane trusses.

Calculations for S.F & B.M for beam and for force in the truss member using influence lines.

b) Moving loads:- Introduction, conditions for maximum BM and maximum S.F. at a section due to moving point loads, UDL longer or shorter than span and train of moving loads. Absolute maximum B.M. & S.F., Construction of Max. B.M. diagram.

TERM WORK:-

Term work shall consist of ten assignments given on the syllabus given above.

REFERENCE BOOKS:-

1) Junnarkar and shah - Mechanics of structures Vol – II.

2) V.N.Vazirani & M.M.Ratwani - Analysis of structures (Volume - I & II)

3) S. Rammamrutham - Theory of structures

4) C.S.Reddy - Basic structural analysis.

5) C.K.Wang - Indererminate structures

SURVEYING- II

Teaching Scheme:
Lectures: 4 Hours/Week
Practical: 2Hour/Week

Examination Scheme:
Theory Paper: 100 Marks(3 Hrs)
Term Work: 25 Marks
Practical : 50 Marks

UNIT-I **(10 Hrs., 20 marks)**

Geodetic Surveying:

Objects ; methods in geodetic surveying , Triangulation figures; Strength of figure; Classification of trangulation systems; Selection of stations ; intervisibility and height of stations, towers, signals and their classification ;phase of signals ; measurement of angles; instruments used , methods of observation of angles ; satellite station and Reduction to centre ; Eccentricity of signals ; Base line measurement , Apparatus used, Base net; equipment used for base line measurement , field work and corrections ; Reduction to mean sea level; Exetension of a base.

UNIT-II **(10 Hrs., 20 marks)**

Triangulation Adjustments :kinds of errors; laws of weights, determination of the most probable values of quantities; The method of least squares; Indirect observations on independent quantities; normal equation; conditioned quantities ; The probable error and its determination ; distribution of error to the field measurements , method of correlates, station adjustment and figure adjustment; adjustment of a geodetic triangle , figure adjustment of a triangle ; calculation of spherical triangle ; adjustment of geodetic quadrilateral, Adjustment of a quadrilateral with a central station by method of least squares .

UNIT-III **(10 Hrs., 20 marks)**

Photogrammetry: Objects ; application to various fields, terrestrial photogrammetry (only general idea) and aerial photogrammetry ; Aerial camera; comparison of map and vertical photograph ; Vertical tilted and oblique Photographs ; Concept of principal point nadir point, isocentre, horizon point and principal plane, Scale of vertical photograph; computation of length and height from the photograph; relief displacement on vertical photograph; flight planning; ground control ; radial line method; Binocular vision and stereoscopic fusion , mirror and lens Stereoscopes, parallax equation ; measurement of parallax and determining deference of elevation, Stereometers; general idea of stereoscopic plotting instruments.

UNIT-IV **(10 Hrs., 20 marks)**

Remote Sensing :-

Basic principles, importance, scope, signatures in remote sensing, electromagnetic radiation, Atmospheric effects in radiation, interaction of electromagnetic radiation with matter, electromagnetic spectrum, atmospheric windows, sensors used in remote sensing, classification of sensors, remote sensing platforms, data products, multi concept in acquiring remote sensing data, imageries, interpretation techniques, image processing. Applications of remote sensing to Civil Engineering.

UNIT-V **(10 Hrs., 20 marks)**

Hydrographic Surveying :-

Objects; establishing controls; shore line survey, river surveys; soundings, tide gauges, Equipment for taking soundings; signals. The nautical sextant; measuring horizontal and vertical angles with the nautical sextant, sounding party, ranges making the soundings, methods of locating the soundings ;reduction of soundings , the three point problem and methods of solution.

Tunnel Surveying :- Instruments used; Laying of centre line on ground, Transfer of centre line, underground checks for deviation of tunnel driving from original centre.

Mine Surveying:- Special conditions confronted; Equipment for mine surveys; Correction for side telescope horizontal angles and top telescope vertical angle; The stations and station markers; measurement of distance and difference in elevation .

Use of Electronics in Surveys:- Electromagnetic waves and their properties, phase comparison, modulation, types of EDM Instruments, the geodemeter; the tellurometer; the distomat.

LIST OF EXPERIMENTS:-

1. One Second Theodolite :-
   i)Measurement of horizontal and vertical angles.
   ii)Measurement of horizontal angles by reiteration method.
2. Hydrographic survey (Any two exercises)
   i)Study and use of nautical sextant for measurement of angles.
   ii)Plotting the cross-section of the river by sounding method
   iii)Solution of three point problem.
3. Photogrammetry (Any two exercises):
   i)To find out the scale of the photograph .
   ii)Study and use of mirror stereoscope and finding out the air base distance.
   iii)Radial line method of plotting (photo triangulation).
   iv)Use of parallax bar for measuring parallax of two points and finding out the difference of elevation between them.
4. Adjustment of Geodetic quadrilateral by any one method .
5. Study and use of E.D.M. and its principle .

Note : The practical examination will be based on the above exercises.

TERM WORK

The term work shall consists of the record of the above exercises in a journal.

REFERENCE BOOKS –

1) T.P. Kanitkar, & S.V. Kulkarni - Surveying and leveling (vol-II)
2) B.C.Punmia - Surveying Vol. II and Vol .III.
3) P.Somand , B.N.Ghosh - Advance surveying
4) Norman Thomas - Surveying
5) Wolf - Photogrammetry
6) Clarks - Surveying
7) A.N. Patel, Surendra Singh - Principles of remote sensing

BUILDING DESIGN AND DRAWING

Teaching Scheme:	**Examination Scheme:**
Lectures: 4 Hours/Week	Theory Paper: 100 Marks(4 Hrs)
Practical: 4Hour/Week	Term Work: 50 Marks
	Oral /Sketches:25 Marks

UNIT-I **(10 Hrs., 20 marks)**

a) Introduction :-Building definition and types of building as per occupancy, principles of planning of building, plan sanctioning, Tracing and ammonia print.

b) Building bylaws :- necessity of bye laws, plot size, width of road, open spaces, floor area ratio, marginal distances, building line and control line, height regulation, room sizes, types of area calculation- built-up area, floor area, carpet area, rules for ventilation, lighting, drainage, sanitation and parking of vehicles.

c) Ventilation and air conditioning of building :-
Ventilation: -necessity of ventilation, functional requirements, systems of ventilation and their choice movement of wind through building, wind effect, stack effect.
Air conditioning:- classification, comfort and comfort conditions, principles and system of comfort, object and necessity of air conditioning.

c) Fire protection :- Fire load, fire safety, grading of occupancy by fire load , considerations in fire protection, fire resistant construction of walls ,columns, roof, floor. wall openings, fire escape elements.

UNIT-II **(10 Hrs., 20 marks)**

a) Thermal insulation of buildings:-
Climate, thermal comfort, heat exchange of buildings, general principles and means of thermal insulation, structural control ,heat insulation of exposed walls, roof openings, use of sun breakers, chajja and insulating glass.

b) Noise and acoustics:-
Noise : effects of noise, types, noise control and noise insulation of structures, air borne and structural borne noise, transmission of noise, acceptable noise level.
Acoustics:- reverberation, Sabine’s formula, acoustical defects, conditions of good acoustics, acoustics for various types of building.

c) Lighting: Natural and artificial, design of windows for clear daylight, sky daylight factor, necessity of artificial light, maximum light required at working table.

d) Building services: importance of building services, constructional requirements for different building services-electrical, tale communication and entertainment service, plumbing services –layout of water supply and drainage system, one pipe and two pipe system, storage disposal arrangement, septic tank, garbage disposal arrangements, solar water heater.

UNIT-III **(10 Hrs., 30 marks)**

a) Planning of residential building:-
Load bearing/ frame structure- bungalows, row houses, and apartments.

b) Working drawings :- importance of working drawings, use of working drawings.

UNIT-IV

a) Planning of public building (frame structure)- functional requirement of public buildings, following types of public buildings may be considered for planning :
Primary or secondary school building , hostel building, lodge building, hotel building, primary health center, factory building, bus stand, library building, commercial complex building, bank building ,post office building , marriage hall.

(13 Hrs., 20 marks)

b) Perspective drawings **(5 Hrs., 10 marks)**

One point and two point perspective drawings .

Note: 1) Theory questions shall be asked on Units I ,II.

2) Only drawing questions shall be asked to draw on drawing sheets from unit III and IV .

TERM WORK

A . Drawing file (full imperial sheets)

a) Planning of a small bungalows from given data load bearing or framed structure plan showing furniture arrangement, front elevation ,two sectional elevations, site plan, built up area calculation and schedules.
scale for all views (1:50) except site plan.
for site plan it is (1: 100) or suitable. (sheet no.1)

b) perspective of sheet no- 1 with suitable scale. (sheet no -2)

c) Tracing and ammonia print for (sheet no-1).

d) Drawings:-Plan and elevation using computer drafting software on A4 size sheet for (sheet no-1)

Project work

Project work shall consist of preparation of working drawings after planning and designing buildings mentioned in unit No.III-part (a) and unit No IV-part (a). Every student shall select different type mentioned.

Drawing for project work shall consist of following drawings at Scale 1:50 or suitable.

i) lay-out plan of project building showing different types of buildings, internal roads , compound walls, entrance gate ,garden ,electrical poles, free plantation etc. (project sheet no -1)

ii) Plan/typical floor plan . (Project sheet no- 2.)

iii) Car parking plan. /Terrace plan. (Project sheet no- 3.)

iv) Foundation plan. (Project sheet no-4)

v) Structural plan : (Project sheet no-5)

vi) Front elevation. : (Project sheet no-6)

vii) Sectional elevations.: (Project sheet no-7)

viii) Lay-out plan showing water supply and drainage arrangement.:(Project sheet no -8)

ix) Axonometric view . (project sheet no-9)

x) Drawings:- Layout plan and elevation using computer drafting software on A4 size sheet.

B. File work shall consist of

a) project work.
i) Data given for project work.
ii) Planning of different units of project building.
iii) Approximate cost of project building.(Cost per m^{2}.).

b) Report regarding visit to construction sites , preferably visit to the type of buildings given for the project. (Minimum two)

REFERENCE BOOKS:-

1) M.G. Shah, C.M. Kale, S.Y. Patki - Building Drawing.

2) Y.S.Sane - planning & Designing Building

3) Dr S.V.Deodhar - Civil Engineering Drawing .

FLUID MECHANICS - I

Teaching Scheme:
Lectures: 4 Hours/Week
Practical: 2Hour/Week

Examination Scheme:
Theory Paper: 100 Marks(3 Hrs)
Term Work: 25 Marks
Oral---------:25 Marks

UNIT-I **(13 Hrs., 20 marks)**

a) Introduction :- Scope and application of fluid mechanics, Newton's law of viscosity, classification of fluids: Newtonian and non-Newtonian fluids, ideal and real fluids. Physical properties of fluids – density, specific weight, specific volume, specific gravity, dynamic and kinematics viscosity, compressibility, surface tension, capillarity , vapour pressure.
b) Fluid statics – fluid pressure, pressure head, measurement of pressure, manometers, introduction to mechanical gauges. Civil engineering applications of pressure forces on plane and curved surfaces and buoyancy and flotation.

UNIT-II **(11 Hrs., 20 marks)**

a) Kinematics of fluid flow- types of fluid flow – steady and unsteady: uniform and non-uniform: laminar and turbulent: one, two, three dimensional flows: rotational and irrational flows, velocity & acceleration of fluid particles, stream lines and equipotential lines and flow net.
   Equation of continuity for one-dimensional and three-dimensional flows. Electrical analogy method of drawing flow net related to civil engineering.
b) Dynamics of fluid flow – Forces acting on fluids in motion. Mention of various equations of motion, Euler's equation of motion, Bernoulli's theorem, simple applications of continuity and Bernoulli's equation such as Pitot tube, Venturimeter. orificemeter. Introduction to linear momentum principle.

UNIT-III **(9 Hrs., 20 marks)**

a) Dimensional analysis and Hydraulic similitude – Dimensions of physical quantities, dimensional homogeneity, Buckingham pi-theorem, important dimensionless parameters and their significance.
   Model analysis: geometric, kinematics and dynamic similitude. Model laws: Reynold's and Froude's model laws. Application of dimensional and model analysis to fluid flow problems.
b) Laminar flow – Flow through pipes, flow between parallel plates, Stoke's law, various methods of measurement of viscosity, Darcy's law, Reynold's experiment. Transition from laminar to turbulent flow.

UNIT-IV **(9 Hrs., 20 marks)**

a) Flow through opening – Orifices: types, coefficients of velocity, contraction and discharge, small and large orifices, submerged orifices.
   Mouthpieces: types, external cylindrical mouthpiece.
b) Flows over notches and weirs – Rectangular, triangular and trapezoidal notches and weirs, Cipolleti weir, empirical formulae for discharge over rectangular weirs, corrections for velocity of approach and end contractions, broad crested weirs.

UNIT-V **(8 Hrs., 20 marks)**

Open Channel flow – Classification of open channels, geometric elements, steady and unsteady flows, uniform and nonuniform flows, continuity and energy and momentum equations, kinetic energy and momentum correction factors.

Uniform flow: Chezy’s and Manning’s equations, roughness coefficients, concept of normal depth, calculation of normal depth for triangular & wide rectangular channels. Hydraulically efficient section.

Critical flow: Specific energy, specific energy diagrams, conditions for critical depth in rectangular and triangular channels.

LIST OF EXPERIMENTS:-

Experiments will be based on the critical portion as detailed below.

1. Measurement of viscosity.
2. Study of simple and differential manometers.
3. Buoyancy: metacentric height of ship model.
4. Study of Bernoulli’s theorem.
5. Calibration of Venturimeter / Orificementre.
6. Electrical analogy method.
7. Study of laminar flow/ Heleshaw’s apparatus.
8. Coefficients of Orifice / Mouthpiece / notches.
9. Study of Impact of jet.
10. Study of uniform flow formulae in open channel (Chezy’s & Manning’s formulae) / velocity distribution in open channel.
11. Specific energy and specific force.

TERM WORK: Termwork will consist of a journal giving details of experiments performed. Minimum eight experiments should be performed.

ORAL:- Oral shall be based on term work.

REFERECNE BOOKS

1) Dr. A.K.Jain - Fluid Mechanics
2) Dr. P.N.Modi , Dr. S.M. Seth - Hydraulic and Fluid Mechanics
3) R.K.Bansal - Hydraulic and Fluid Mechanics.
4) Dr. K. Subramanya. - Flow in Open channels
5) Dr. K. Subramanya - Theory and applications of Fluid Mechanics.
6) Ramamurthum - Hydraulic , Fluid Mechanics and Fluid Mechanics.
7) Dr.Garde and Mirajgaokar. - Fluid Mechanics
8) Som and Biswas - Fluid Mechanics
9) Streeter and Wylie - Fluid Mechanics

ENGINEERING GEOLOGY

Teaching Scheme:	**Examination Scheme:**
Lectures: 4 Hours/Week	Theory Paper: 100 Marks(3 Hrs)
Practical: 2Hour/Week	Term Work: 25 Marks

UNIT-I **(10 Hrs., 20 marks)**

Introduction :- Objects, scope, and subdivisions.

Rock and minerals :- Rock forming minerals, primary and secondary minerals.

Igneous Rocks:- Mineral composition, felsic and mafic minerals. Textures, reasons for textural variation, crystalline matter and glass; dependence of degree of crystallization and shape and size of crystals. conditions of cooling. Conditions of cooling of plutonic, hypabyssal and volcanic rocks, classification.

Study of common rock types prescribed in practical work.

Secondary Rocks:- Rock Weathering, decomposition and disintegration, favourable conditions, processes and products of decomposition and disintegration. transport and deposition.

Classification:- Residual, sedimentary, Chemical and organic deposits.

Sedimentary deposits:- Agents of transport. Textural characteristics of aqueous, aeolian and glacial deposits , clastic texture, stratification and lamination, current bedding, consolidation by welding and cementation, grain size classification, study of common rocks prescribed in practical work.

UNIT-II **(10 Hrs., 20 marks)**

Structural Geology :- Outcrop, Dip and strike, conformable series, unconformity and overlap, Different type of faults and folds in rocks, modes of occurrence of igneous rocks, joints.

Physical Geology :- Geological action of running water, river valley development, waterfalls, ox-bow lakes, flood plain deposits, deltas, rejuvenation and resulting features such as canyons, river terraces and incised meanders.

UNIT-III **(10 Hrs., 20 marks)**

Ground Water :- Meteoric, connate and juvenile water, watertable and depth zones, relation between surface relief and water table, perched water table,

Influence of textures and structures of rocks on ground water storage and movement, pervious and impervious rocks, Geological conditions favourable for natural springs and seepages, depression and contact springs, hot springs and geysers. wells and drillholes, fluctuations in water table levels, effects of dams and canals, effect of pumping, cone of depression, circle of influence, conservation of ground water, Artesian wells, geological conditions that produce artesian pressure, water bearing capacity of common rocks.

Earthquakes: geological considerations for choosing sites of buildings in seismic areas.

Indian Geology: General principals of stratigraphy, age of the earth and divisions of geological time, physiographic divisions of India and their characteristics, geological history of peninsula, study of formations in peninsula and the significance of their structural characters in major civil engineering activities, economic minerals and building stones.

UNIT-IV **(10 Hrs., 20 marks)**

Preliminary geological Investigation: use of geological maps, aerial photographs, remotely sensed imageries, verification of surface data by subsurface exploration, drill holes, test pits, trenches, exploratory tunnels, shafts, adits, drifts, etc.

Compilation and interpretation of information obtained from these. correlation of surface data with the results of subsurface exploration. Limitations of drilling, comparative reliability of data obtained by drilling and excavation.

Engineering significance of geological structures such as stratification, dip, folds, faults, joints, crush zones, fault zones, dykes etc.

Land Slides: Causes, use of remotely sensed Imageries for identification of land sides, role of water, stability of slopes in consolidated material, influence of dip and slope, safe and unsafe slopes, prevention of landslides, keeping slopes free from water, retaining walls, vegetation, slope treatment. Precautions to be taken while aligning roads etc. across hills and making cuts in hillsides.

UNIT-V **(10 Hrs., 20 marks)**

Tunneling:- Influence of geological conditions on design and construction methods. Preliminary geological investigation for tunnels. Important geological considerations while choosing alignment. Difficulties during tunneling as related with lithology, nature and structures of material to be excavated. Role of groundwater, geological conditions likely to be trouble some. Suitability of common rock types for tunneling, unlined tunnels.

Geology of Dam Sites: - Depending of strength, stability and water tightness of foundation rocks on their physical characters and geological structures, Influence of geological conditions on the choice of type and design of dam , precautions to be taken to counteract unsuitable conditions, treatment of leaky rocks, faults dykes, crush zones, joints, unfavorable dips, etc. Earthquake in regions of dam.

Geology of Reservoir sites:- Dependence of water tightness on physical properties and structure of rocks ,geological conditions suitable and suitable for reservoir sites, precautions of amount of siltation in reservoir. Conditions likely to cause leakage through reservoir rim, importance of growing water studies and effects of raising of the water table.

TERM WORK:- It shall be based upon following :-

1) Study of the following minerals in hand specimen:
   Quartz and its varieties, common varieties of cryptocrystalline ,muscovite,biotite zeolites, calcite,iceland sper, gyspem satinsper ,fluorite, barytes,tourmaline, beryl asbestos ,talc ,kyanite, garnet , galena, magnetite, haematite, limonite, iron pyrites, cchromite, bauxite, azurite, malachite.
2) Study of the following rock types in hand specimens: Granites, syenites ,diorites, gabbros rhyolites trachytes, andesites Basalts, varieties of Deccan trap rocks ,volcanic breccias, pegmatites, dolerites, Graphic granites.Laterrites , Bauxites, Conglomrates, Breccias, Sand stones, Quartzites, Grits Arkose, Shales, Mudstone , chemical and organic lime stone .
   Marbles , quartzites , varieties of Goeisses ,slates,phyllites and varieties of schists.
3) Construction of geological sections from contoured geological maps, interpreting geological features without drawing section, solution of engineering geological problems such as alignment of dams, tunnels,roads,canals, etc. based on geological maps.

REFERENCE BOOKS:-

1. R.B. Gupte - A text book of Engineering geology.
2. D.V. Reddy - Engineering geology for civil Engineers.
3. David Tood - Groundwater Hydrology
4. Keller - Environmental Geology.
5. G.B. Deshpande - Geology of Maharashtra (GSI Publication).

SYLLABUS OF

THIRD YEAR (CIVIL)

NORTH MAHARASHTRA UNIVERSITY, JALGAON.

(w.e.f. 2007-08)

NORTH MAHARASHTRA UNIVERSITY, JALGAON STRUCTURE OF TEACHING AND EVALUATION

T.E. (Civil) w. e. f. 2007 - 08

FIRST TERM

Sr. No	Subject	Teaching Scheme Hours/Week			Examination Scheme				
		Lectures	Tutorial	Practical	Paper Duration Hours	Paper	TW	PR	OR
1	Structural Design & Drawing – I	4	-	4	4	100	50	-	25
2	Fluid Mechanics- –II	4	1	2	3	100	25	-	25
3	Geotechnical Engineering – I	4	-	2	3	100	25	-	25
4	Transportation Engineering – I	4	1	-	3	100	25	-	-
5	Numerical Methods in Civil Engineering	4	-	2	3	100	50	-	-
	Total	20	2	10		500	175	-	75
	Grand Total	32			750				

SECOND TERM

Sr. No	Subject	Teaching Scheme Hours/Week			Examination Scheme				
		Lectures	Tutorial	Practical	Paper Duration Hours	Paper	TW	PR	OR
01	Structural Design & Drawing – II	4	-	4	4	100	50	-	25
02	Theory of Structures – II	4	1	-	3	100	25	-	-
03	Geotechnical Engineering – II	4	-	2	3	100	25	-	-
04	Transportation Engineering – II	4	1	-	3	100	25	-	-
05	Environmental Engineering – I	4	-	2	3	100	25	-	25
06	Testing of Materials	-	-	2	-	-		-	25
07	Practical Training/Mini Project/Special Study	-	-	-	-	-	25	-	-
	Total	20	2	10		500	175	-	75
	Grand Total	32			750				

N O R T H   M A H A R A S H T R A   U N I V E R S I T Y ,   J A L G A O N .

SYLLABUS OF THIRD YEAR (CIVIL)

TERM-IST (w.e.f. 2007-08)

STRUCTURAL DESIGN AND DRAWING-I

Teaching Scheme:	**Examination Scheme:**
Lectures: 4 Hours/Week	Theory Paper: 100 Marks
Practical: 4 Hour/Week	(4 Hours Duration)
	Term Work: 50 Marks
	Oral: 25 Marks

UNIT I **(12 Hours, 25 marks)**

A) Introduction to various design philosophies of R.C structures: working stress method, ultimate load method, limit state method , limit state of collapse, limit state of serviceability, limit state of durability, characteristic strength, characteristic load, partial safety factors for material strengths and loads. Study of structural properties of concrete.

B) Limit state method for flexure: (Singly Reinforced Rectangular Section) assumptions, stress & strain diagram, MR of Balanced, under reinforced & over reinforced RC sections.

C) MR of Doubly reinforced & flanged section

UNIT II **(12 Hours, 25 marks)**

Design of beams for flexure, shear and bond

A] for simply supported & cantilever beams.

B] for continuous beams using IS code coefficient method.

UNIT III **(12 Hours, 25 marks)**

A] Design of one way simply supported, cantilever & continuous slabs

B] Design of Two way simply supported & continuous slabs

C] Design of dog legged stair case.

UNIT IV **(12 Hours, 25 marks)**

A] Column: Introduction, strain and stress variation diagrams, axially loaded short column with minimum eccentricity requirements, Design of short column for axial load.

B] Design of short column for axial load, uniaxial & biaxial bending.

C] Design of isolated pad footing for axial load & uniaxial bending.

TERM WORK:- shall consist of following

Design of G + 2 building covering slab, beam, column, footing & stair case.

A design report shall be prepared showing details on half imperial drawing sheets. A few typical details of beam column etc. shall be shown on A4 / A3 size sheets using drafting software also.

A report on at least one site visit shall be submitted in term work.

BOOKS :

1) Limit State Analysis and Design : P. Dayaratnram – Wheeler Publishing company, Delhi.

2) Comprehensive Design of R.C. Structures : Punmia, Jain and Jain – Standard Book House –New Delhi.

3) Limit State Theory and Design : Dr.V.L.Shah and Dr.S.R. Karve – Pune Vidyarthi Publication.

4) RCC Analysis and Design Vol.II and I : Sinha – S.Chand and Co., New Delhi.

FLUID MECHANICS - II

Teaching Scheme:
Lectures: 4 Hours/Week
Practical: 2 Hour/Week
(Two lecture for unit tests)

Examination Scheme:
Theory Paper: 100 Marks
(3 Hours Duration)
Term Work: 25 Marks
Oral --------: 25 Marks

UNIT-I (10 Hours 20 marks)

Boundary Layer Theory : Concept of boundary layer, various thicknesses of boundary layer, application of momentum equation (no derivation), boundary layer over a flat plate, laminar and turbulent boundary layers, local and average drag coefficients, hydrodynamically smooth and rough boundaries, separation of boundary layer and control of separation.

Fluid Flow around submerged Bodies : Practical problems involving fluid flow around submerged objects, definitions and expressions of drag & lift, drag & lift coefficients, types of drag, drag on sphere, cylinder, airfoil. Karman's vortex street, Lift, Magnus effect , lift on cylinder and aerofoil, polar diagram.

UNIT-II (9 Hours 20 marks)

Turbulence Flow Theory : Turbulence phenomenon, instantaneous velocity & temporal mean velocity, scale & intensity of turbulence, Boussinwsqs theory , Reynold's expression , Prandtls mixing length theory, velocity distribution for smooth & rough boundaries, mean velocities in pipes, Karman Prandtls equation.

Darcy Weisbach equation, friction factors for smooth, rough & transition boundaries, Moodys diagram.

Turbulent flow through pipes, minor losses, pipes in series & parallel, three reservoir problem (no trial & error solution), siphon.

Unsteady flow through pipes : Celerity of pressure wave in an elastic pipe, water hammer phenomenon, pressure changes due to changes in valve opening – simple cases neglecting friction. Surge tanks – function, locations, types (no mathematical treatment for surge tank.)

UNIT-III (9 Hours 20 marks)

Definition & types of non-uniform flow, Gradually varies Flow (GVF) and rapidly varied flow (RVF), differential equation of GVF- alternate forms, different types of GVF profiles, their characteristics & examples of their occurrence, control sections.

Computation of GVF surface profiles by Direct step method, venture flume, standing wave flum.

Hydraulic Jump :

Phenomenon of hydraulic jump, example of occurrence, application of momentum equation to hydraulic jump in horizontal, frictionless, rectangular channel., specific force, conjugate depths & relation between conjugate depths, energy loss in hydraulic jump, length of jump, classification & practical uses of hydraulic jump.

UNIT-IV (10 Hours 20 marks)

Impact of Jet : Impact of jet on stationary & moving , flat & curved surfaces using linear momentum principle, workdone, principle of angular momentum , Eulers momentum equation for turbine & pumps (No derivation)

Hydraulic Turbine :

Elements of hydro elastic power plant, unit & specific quantities, hydraulic turbines, classification of hydraulic turbines, heads & efficiencies of hydraulic turbines.

Theory & design of hydraulic turbines (Pelton, Francis & Kaplan turbines), force and torque development, cavitation, governing of turbines, speed of turbines.

UNIT-V **(8 Hours 20 marks)**

Centrifugal Pumps :

General classification of pumps, classification of centrifugal pumps, specific speed, working of centrifugal pump, priming, theory of centrifugal pump, workdone by impeller, energy losses, heads & efficiencies, minimum starting speed, priming, cavitation, multistage turbine pump.

Model analysis of turbines & pumps. Prediction of performance in terms of unit & specific quantities, characteristic curves of turbine and pump.

PRACTICALS :

Any seven of following experiments should be performed.

1) Study of boundary layer on a flat plate.
2) Flow through pipes (laminar & turbulent) and determination of friction factor.
3) Drag and lift on airfoil.
4) Drag on cylinder.
5) Measurement of different parameters of hydraulic jump (model) in laboratory, OR Study of hydraulic flume. / jump on actual hydraulic structure on canals or dam near the college by arranging visit.
6) Venture flume / standing wave flume.
7) Velocity distribution in open channel .
8) Characteristics of Pelton wheel.
9) Characteristics of Francis turbine or Kaplan turbine.
10) Characteristics of centrifugal pump.

TERM WORK:

Termwork will consist of a journal giving details of at least seven out of 10 experiments above. Minimum seven experiments should be performed.

ORAL:

Oral shall be based on term work.

REFERECNE BOOK

1) Fluid Mechanics : Dr. A.K.Jain
2) Hydraulic and Fluid Mechanics : Dr. P.N.Modi , Dr. S.M. Seth.
3) Hydraulic and Fluid Mechanics : R.K.Bansal.
4) Flow in Open channels : Dr. K. Subramanya.
5) Theory and applications of Fluid Mechanics : Dr. K. Subramanya.
6) Fluid Mechanics : Dr.Grade and Mirakgaokar.
7) Fluid Mechanics : Streeter and Wylie.
8) Hydraulic Machines – Jagdish Lal
9) Hydraulic Machines – Rajpoot.

GEOTECHNICAL ENGINEERING – I

Teaching Scheme:	**Examination Scheme:**
Lectures: 4 Hours/Week	Theory Paper: 100 Marks
Practical: 2 Hour/Week	(3 Hours Duration)
	Term Work: 25 Marks
	Oral : 25 marks

UNIT I **(9 Hrs.,20 marks)**

a) soil as engineering material:- origin and formation of soil, geological processes, soils of India, geotechnical problems, three phase system, definitions and functional relationships.
b) Geotechnical properties:- physicochemical properties, engineering properties, volume weight relationships. Atterberg's limits, sieve analysis, identification of soil, I.S. classification system

UNIT II **(9 Hrs.,20 marks)**

a) Stresses in soil:-geostatics stresses, stresses due to surface loading, Boussinesq's westerguards theories, point load, area load and strip load, newmarks chart, stress strain relation ship soil modulus, elastic settlement.
b) Soil compaction, M.D.D. and O.M.C. , standard proctors test heavy compaction test, concept of stabilization , different methods of stabilization.

UNIT III **(10 Hrs.,20 marks)**

a) flow of water through soils: soil water, capillarity, Darcy's law laboratory measurement of permeability, flow through layered soils, simple field measurement, laplace equation, flow net, its construction and uses, seepage force, quick sand, critical gradient, reverse filters.
b) Consolidation Theory:- Terzaghi theory, consolidation test, time fitting curves, rate of settlements, Normal consolidated and over consolidated deposits, Pre consolidation pressure.

UNIT IV **(9 Hrs.,20 marks)**

a) shear resistance in soil:- pore pressure and effective stresses failure theories , Mohr - Coulomb's law of shear strength direct shear test, traxial test, unconfined compression test, vane shear test, drained loading , factors affecting the shear strength.

UNIT V **(9 Hrs.,20 marks)**

a) Earth pressures:- Rankine's state of plastic equilibrium at rest, active and passive states, effect of surcharge, wall friction, back fill behind smooth wall , Rankine's theory , Coulomb's theory determination of lateral earth pressure by analytical and graphical methods.(culmann's and poncelete's construction.)
b) Stability of slopes:- finite and infinite slopes , natural and man made slopes, modes of failure, slip circle method, swedish circle method, method of slices,critical height of slopes, stability number, landslides, Remedial measures.

TERM WORK:-

Term work shall comprise of any Ten experiments out of following set :

1) Field density by core cutter method , sand replacement method.
2) Sieve analysis and particle size determination or hydrometer analysis.
3) Specific gravity determination by voluminometer/ pychnometer
4) Determination of liquid limit and plastic limit
5) Determination of shrinkage limit
6) Determination of co-efficient of permeability by constant head or by variable head permeameter
7) Direct shear test

8) Unconfined compression test
9) Vane shear test
10) Proctor's test (MDD / OMC)
11) Tri- axial test
12) C.B.R. test or Consolidation test
13) Differential free swell test or swelling test.

REFERENCE BOOK:

1) Soil Mechanics and Foundation Engineering - V.N.S. Murthy.
2) GeoTechnical Engineering- Gulhati and Datta.
3) Basic and Applied Soil Mechanics- Gopal Ranjan, A.S.R.Rao
4) Modern Geotechnical Engineering & Foundation - Dr. Alam Singh
5) GeoTechnical Engineering – T.N. Ramamurthy and T.G.Sitharam.
6) Geotechnical Engineering - Garg
7) Geotechnical Engineering – C. Venkatramaiah.

TRANSPORTATION ENGINEERING - I

Teaching Scheme:
Lectures: 4 Hours/Week
Tutorials: 1 Hour/Week

Examination Scheme:
Theory Paper: 100 Marks
(3 Hours Duration)
Term Work: 25 Marks

UNIT-I **(9 Hours 20 marks)**

Introduction to railways as a Civil Engineering transportation system, permanent way components, Gauges on Indian railways, need of uniformity of gauge in view of problems of change of gauge, track structure and standards,rails requirments, stresses, wearing, stresses in ballast, coning of wheels, tilting of rails, fuctions, axle loads, defects, rail failure, causes of rail failure, sleepers, types, sleeper density, suitability of engineering materials for use as sleepers, manufacturing, testing and handling of concrete sleepers, rails joints, types, rail fastenings, welded rails, ballast, materials for ballast, requirements, specifications and design of ballast section, typical profiles of track and permanent way, cross sections in banking and filling.

UNIT-II **(9 Hours 20 marks)**

Track geometries ,gradients, types, alignments, curves ,superelevation , equilibrium cant ,cant deficiency, maximum permissible speed, negative superelevation

Horizontal transition and vally curves, Train resistance due to friction , wave action ,track irregularities, wind ,gradient curvature, compensated gradient for curve,resistances due to starting and accelerating,tractive efforts, types of traction, necessity and essentials of good trade management, creep effect and remedy, modern methods of track management, Engineering surveys, priliminary and detailed, information for preparation of project report ,land acquisition plate laying methods requirement of materials.

UNIT-III **(9 Hours 20 marks)**

Points and crossings , functions, constituents of turnouts, types of switches, terms used in crossings , standard turnouts, types of layouts, Diamond crossing , scissor crossing ,signals and interlocking , types of signals and principles of interlocking , CTC and ATC system , types , locations and layouts of stations , equipments for stations and yard platforms , loading gauges, locosheds, need of modernisation of railways, tracks for superhigh speed trains.

UNIT-IV **(9 Hours 20 marks)**

Tunnels, need, classification, choice of open cuts and tunnels, bridge action time and pressure relief, shapes and size, tunnel cross sections, shafts, types and constructions ,Pilot tunnel, tunnelling in rocks, heading and benching method, drilling, blasting, mucking ,ground support ,rock bolting and strata anchoring, lining, shotcreting, Tunnelling in soft stratra, problems encountered, methods of tunnelling, shield method of tunnelling, loads coming on tunnel crown, modern methods of tunnelling –TBM, bentonite slurry, safety measures about dust prevention, ventilation, lighting and drainage in tunnel.

UNIT-I **(9 Hours 20 marks)**

Importance of Docks and Harbours for inland water ways and sea routes, classification of harbours,ports and docks, types of harbours, site selection effectsof winds, waves and tides, littoral drifts, defects in harbours, breakwater , types, design. Construction,quay and quay walls, wharves, fenders, dolphins, piers, slips, moles, berths , pier heads, Jetties, Quay walls, Dock walls, Design criteria, wet docks , dry docks , Reel and bilge blocks, lock purpose and types.

Marine railways, Navigational aids, signals, buoys, light houses, ware house and Transit sheds.

TERM WORK:

1) It will consist of home assignments based on above syllabus and
2) Visit to a Railway station and study its layout..
3) A problem on calculation of loads on tunnel crown.

BOOKS RECOMMENDED

1) Railway Engineering –Rangwala
2) Railway Engineering - Oza
3) Railway Engineering – S.C. Saxena
4) Railway Engineering – Antia
5) Tunnel Engineering –Rangwala
6) Tunnel Engineering – S.C . Saxena
7) Tunnel Engineering – Oza
8) Docks & Harbour- Rangwala
9) Docks & Harbour -Oza

NUMERICAL METHODS APPLICATION IN CIVIL ENGINEERING

Teaching Scheme:	**Examination Scheme:**
Lectures: 4 Hours/Week	Theory Paper: 100 Marks
Practical: 2 Hour/Week	(3 Hours Duration)
	Term Work: 25 Marks
	Oral --------: 25 Marks

UNIT-I **(9 Hours 20 marks)**

Introduction to Numerical Computation, Errors and approximation –storage, approximation, truncation, round off, absolute and percentage errors

Solution of simultaneous algebraic equation by Gauss Elimination method, Gauss Seidel method, Gauss Jordan method, partial pivoting, methods of iteration and its condition for convergence.

Solution of linear algebraic and transcendental equations by method of simple iteration, bisection, false position, Newton Raphson Method, Generalized Newton Raphson Method.

UNIT-II **(9 Hours 20 marks)**

Liner Programming–Structures, Assumptions, Advantages, Limitations, General Mathematical Model, Guidelines for formulations

Graphical Solution Method – Extreme point enumeration approach, Iso-profit(cost) function line approach, Maximization, Minimization and Mixed Constraints LP problem, Multiple Optimal solution.

Simplex Method – Standard Form of an LP problem, Reduction of Feasible solution to basic feasible solution, Simplex Algorithm for Maximization & Minimization Cases, Two phase method, Big-M method.

UNIT-III **(9 Hours 20 marks)**

Curve Fittings & Interpolation –

Linear Regression, Polynomial Regression, Multiple Linear Regression,

General Linear Least Squares,

Newton's divided difference interpolating polynomials,

Lagrange Interpolating polynomials,

Non-linear regression, Coefficient of interpolating polynomials.

Engineering Application of curve fitting.

UNIT-IV **(9 Hours 20 marks)**

Numerical Differentiation & Integration –

High accuracy differentiation formula – First Derivative & Second Derivatives, Richardson Extrapolation,

Trapezoidal rule, Simpson's one third and 3/8th rule, Open Integration Formula, Multiple Integral,

Newton Cotes Algorithm,

Gaussian Quardature – Legendre Polynomials and Hermite Polynomials

UNIT-V **(9 Hours 20 marks)**

Solution of ordinary differential equation – Taylor's series method, Euler's method, Modified Euler's method, Runge Kutta method, Predictor Corrector Method.

Partial Differential Equation – Introduction to initial value and boundary value problem, Finite difference methods for the solution of one dimensional wave equation two dimensional (parabolic and elliptic) and higher order PDE.

TERM-WORK -

The term-work shall consist of computer programs along with the input and output file, flow chart/algorithm and numerical assignments from the list below –

***COMPUTER PROGRAMS** – (Minimum five)*

(1) Gaussian Elimination Method / Gauss Jordon Method
(2) Method of Bisection / method of false position
(3) Newton Raphson Method / Method of Simple Iteration
(4) Method of Least Square / Newton Interpolation / Lagrange Interpolation
(5) Euler's Method / Modified Euler's Method / Runge Kutte Method

***NUMERICAL ASSIGNMENT** – (Minimum three)*

(1) LPP – Graphical Method
(2) LPP – Simplex Method
(3) Curve Fitting
(4) Boundary Value Problem
(5) Simpson's One third/ Simpson's 3/8 rule
(6) Lagrange Formula / Gaussian quardature

BOOKS SUGGESTED –

1 –Steven C Chapra & Raymond P. Canale, "Numerical Methods for Engineers", Tata Mc-Graw HillCompany Limited, New Delhi, 2002
2 –Schilling & Harries, "Applied Numerical Methods for Engineers", THOMSON, Brooks/Cole, Newyork, 2000
3 –S.Rajasekaran, "Numerical Methods in Science & Engineering", A.H.Wheeler & Company Private Limited, 2000
4 –Sharma J.K., "Operation Research", MACMILLAN India Limited, 2003
5 –Jain, Iyenger & Jain, "Numerical Methods", New Age Publishing Company, New Delhi, 2004
6 –Sastry S.S., Introductory Methods of Numerical Analysis", Prentice Hall (India) Limited, New Delhi, 2000
7 –Kanti Swaroop & P.K.Gupta, "Operation Research", Sultan Chand & Sons, New Delhi, 1998
8 –S.S.Rao, "Optimization Theory and Application", Wiley Eastern Limited, 1999

N O R T H M A H A R A S H T R A U N I V E R S I T Y , J A L G A O N .

SYLLABUS OF THIRD YEAR (CIVIL)

TERM-II[ND] (w.e.f. 2007-08)

STRUCTURAL DESIGN AND DRAWING-II

Teaching Scheme:	**Examination Scheme:**
Lectures: 4 Hours/Week	Theory Paper: 100 Marks
Practical: 4 Hour/Week	(4 Hours Duration)
	Term Work: 50 Marks
	Oral: 25 Marks

UNIT I **(12 Hours, 25 marks)**

A) Introduction to steel structure, steel grades, Rolled sections. Types of connections Strength of weld & Rivet Value. connections subjected to axial force.

B) Design of axially loaded tension members

C) Design of axially loaded compression members

UNIT II **(12 Hours, 25 marks)**

A) Design of built up columns. Design of lacing. Introduction to battened column.

B) Design of Roof Truss for DL, LL & WL (Excluding purlin design)

UNIT III **(12 Hours, 25 marks)**

A) Design of Laterally restrained and unrestrained simple beams. Design of purlin.

B) Design of Welded plate Girder including Curtailment of flang plate, stiffeners, splices & welded connections.

UNIT IV **(12 Hours, 25 marks)**

A) Design of Column bases: Slab base & Gussetted base.

B) Design of connections subjected to moments. Beam to beam & beam to column connection (framed connections)

C) Design of foot over bridge.

TERM WORK:- shall consist of following

1) Design of roof Truss
2) Design of an industrial building
3) Design of welded plate Girder.
3) A report on at least one site visit.

Drawing shall be on half imperial sheets. At least one sheet of above 3 designs shall be in A3 / A4 size sheets using drafting software.

BOOKS :

1) Design of Steel Structures –L.S. Negi
2) Design of Steel Structures –S. K. Duggal.
3) Design of Steel Structures – Dr.Ram Chandra
4) Design of Steel Structures – Arya and Ajmani.
5) Design of Steel Structures – Dr. B.C.Punmiya.

THEORY OF STRUCTURE II

Teaching Scheme:
Lectures: 4 Hours/Week
Tutorial : 1 Hour/Week

Examination Scheme:
Theory Paper: 100 Marks
(3 Hours Duration)
Term Work: 25 Marks

UNIT-I **(12 Hours 20 marks)**

A) Basic concepts of Structural Analysis:- Types of skeletal structures, static and kinematics indeterminacy, equilibrium and compatibility conditions, stress-strain relations, force-displacement relations. concept of linear /non-linear structures. Energy theorem, Miller Breslau principle, concept of complementary energy, Fundamental concept of Force and the Displacement method of analysis.

B) Analysis of beams and frame by energy methods, (up to two unknown)

C) Slope deflection method, applied to continuous and rigid jointed frames, transverse and rotational yielding of supports.(up to three unknown).

UNIT-II **(10 Hours 20 marks)**

A) Moment distribution method applied to continuous beams and rigid jointed rectangular frames, transnational and rotational yielding of supports.

B) Approximate analysis of multistory frames for vertical and lateral loads, substitute frame, portal frame and cantilever method.

UNIT-III **(10 Hours 20 marks)**

Fundamental concept of flexibility :- Method for structural analysis , flexibility coefficient, matrix formulation for flexibility methods, degree of freedom. Influence coefficients, physical significance, choice of basic determinate structure and redundant forces, compatibility equations, effect of settlement and rotation of supports, temperature and lack of fit, hand solution of simple problems on beams, pin jointed plane truss and rigid jointed frames (involving not more than three unknown)

UNIT-IV **(8 Hours 20 marks)**

Fundamental concept of Stiffness:- Method of structural analysis, stiffness coefficient, matrix formulation for stiffness methods, Degree of freedom.

Influence coefficients, physical significance, effect of settlement and rotation of trusses and rigid jointed plane frames (involving not more than three unknown)

UNIT-IV **(8 Hours 20 marks)**

Plastic Analysis of Steel Structures :- introduction, Shape factor, plastic hinge, collapse mechanism, upper bound and lower bound theories, application to continuous, fixed and single bay single storey rectangular frames.

TERM WORK :

It shall consist of assignments based on above syllabus.

REFERENCE BOOKS

1. Pandit & Gupta -Structural Analysis,TataMcGrawHill,Pub. Co.Ltd ., New Delhi
2. Wang C.K.-Intermediate structural analysis, McGraw Hill, New York.
3 Kinney- Streling J. Indeterminate structural Analysis, Addition Wesley.
1. Reddy C.S.-Basic Structural Analysis Tata McGraw Hill Pub. Co. New Delhi.
2. Norris C.H. Wilbur J.B. and Utkys.-Elementary Structural Analysis, 4/e, Tata McGraw Hill Pub. Co.Ltd.
3. Weaver W & Gere J.M-Matrix Method of framed Structures CBS Publishers & Distributors, Delhi.

4. Ghali A & Neville M. Structural Analysis- A Unified classical and matrix Approach ,Chapman and Hall, New York. .

TEXT BOOKS

1. Theory of Structure – Punmia B.C.
2. Theory of Structure – Ramamrutham
3. Theory of Structure Vol II– Gupta and Gupta

GEOTECHNICAL ENGINEERING – II

Teaching Scheme:
Lectures: 4 Hours/Week
Tutorial : 1 Hour/Week

Examination Scheme:
Theory Paper: 100 Marks
(3 Hours Duration)
Term Work: 25 Marks

UNIT-I **(10 Hours 20 marks)**

Soil Exploration, Sampling and Testing:- Subsurface exploration trail pits, shafts, boring, geophysical tests wash, boring, representative and undisturbed samples, bore hole sampling, laboratory evaluation of foundation parameters, field testing, penetration tests , plate load test, bore hole tests.

Bearing Capacity:- Load settlement curve, local and ganeral shear, terzaghi b.c. analysis, B.C. factors, mayorhoff and hansel equations, rectangular, square and round footings, effects of water table and depth, bearing capacity of layered soils, effect of eccentricity, B.C. of rocks.

UNIT-II **(9 Hours 20 marks)**

Elastic settlement :- Contact pressure, elastic stresses and strains, pressure bulb, elastic settlement, empirical relation for settlement of basses, total and differential settlement, tolerable settlement, I.S. criteria, effect of lowering water table.

UNIT-III **(9 Hours 20 marks)**

Shallow Foundations :- Spread footings, minimum depth plain and R>C>C> footings, allowable soil pressure, use of SPT blow count, I>S> charts, wall footings, column footings, combined footings, raft foundations, floating foundations, grillage foundations.

UNIT-IV **(9 Hours 20 marks)**

Pile Foundation:- purpose of piles, pile classification carrying capacity – static method, pile load test, dynamic methods, use of cone test ; group action felds rule, rigid block method ; negative skin friction, shearing of loads, settlement of group.

Foundation on black cooton soils:- characteristics of B.C. soil, problems, swelling potential, under-reamed piles, design principles and construction techniques.

UNIT-V **(10 Hours 20 marks)**

Piers and Caissions :- Hand excavated and drilled piers, method of installation, use of drilling mud, caissions and foundation walls open, box, pneumatic caissons, sinking method, sand island method, caisson disease, capacity and settlement of piers and caissons, well foundation.

Sheet piles and cofferdams:- temporary supports and braced sheetings for excavations, pressure distribution cofferdams bracked and cellular, cantilever and anchored sheet piles.

Machine Foundation : Mechanical vibrations, single degree freedom systems, free and forced vibrations, damped systems, natural frequency, resonance magnification, vibration parameters , vibration test, dynamic modules ,coefficient of elestic uniformcompression, block foundation design Balken method, isolation and control of vibration screen barriers.
Problems in foundation engineering .

Tutorial: It shall consists of following based upon above syllabus.:-

A) 1) Preparation of soil exploration, programming and testing report for any two of the following including bore logs.
   i) Multy storey building.
   ii) Dam.
   iii)Bridge.
   iv) Harbour.

2) Study of plate load test and presentation of test results.
3) Study of standard penetration test and presentation of result.
4) Study of pile load test and presentation of results.
5) Sketches of various types of sheet piles and coffer dams.
6) Sketches of various types of shallow foundations and deep foundations.

B) Home assignments based upon above syllabus.

BOOKS RECOMMENDED :-

1. Foundation Engineering - Punmia B.C.
2. Foundation Engineering - Kasmalkar
3. Basic and Applied Soil Mechanics- Gopal Ranjan, A.S.R.Rao
4. GeoTechnical Engineering- Gulhati and Datta.
5. Foundation Design – Wayne. C. Teng.

TRANSPORTATION ENGINEERING–II

Teaching Scheme:	**Examination Scheme:**
Lectures: 4 Hours/Week	Theory Paper: 100 Marks
Tutorials: 1 Hour/Week	(3 Hours Duration)
	Term Work: 25 Marks

UNIT-I **(10 Hrs.,20 marks)**

a) Role of transportation in the development of nation, component of transportation. Principal of highway planning, road development and planning in India, highway financing, Introduction to privatization in transportation projects.
b) Highway alignment:- requirements, factors controlling highway alignment, engineering surveys for highway location, basic requirements for an ideal alignment, special requirement for hill roads.
c) various types of roads, method of construction, quantity of material required and quality control. (Embankment WBM, BM, DBM Layer constructions only)
d) Geometric design:- Cross section, element width, camber, design speed, sight distance, overtaking sight distance, super elevation, gradient, requirement and design of horizontal and vertical alignment.

UNIT-II **(10 Hrs.,20 marks)**

a) Traffic Engineering:- Traffic characteristics, vehicle characteristics, traffic studies and the use, traffic operation , traffic control devices, types of road intersection.
b) Behavior of highway materials:- Properties of sub grade and pavement components, materials, material interaction. Test on sub grade soil, aggregate and bitumen material, test on bitumen and aggregate , requirements of bitumen mixes, marshal tests, stabilized soil mixes.
c) Introduction of pavement design:- Factors in design of flexible and rigid pavement, group index and C.B.R. method, westergaurd analysis of wheel load stresses in rigid pavement I.R.C. recommendations.
d) Typical problems in highway:- Drainage surface and subsoil, pavement failure, evaluation, maintenance.

UNIT-III **(9 Hrs.,20 marks)**

Airport planning:- The important characteristics of airport which influence judicious and scientific planning of airport selection of site for airport important term.

a) Airport layout: - Location of terminal building, aprons and hangers, design criteria, characteristics of good layout for an airfield, zoning requirements regarding the permissible height of constructions and the land use within the airport boundary.
b) Aviation organization and their function, airport drainage surface , subsurface drainage. Airport authority of India's bylaws.
c) Runway and Taxiway:- Influence and wing characteristics on orientation of runways, use of wind rose diagrams basic patterns of runways, basic recommendation regarding length, width and gradients of runways and taxiways.
   Lighting, marking and signs:- approach, runway, taxiway lighting, runway taxiway marking, taxiway sign systems.
d) Heliports:- Main characteristics of Helicopters, nature of helicopters transport, site selection for helicopters. Typical layouts, protection of approach and departure paths, elevated heliports.

UNIT-IV **(9 Hrs.,20 marks)**

a) Classification of bridges, selection of site , determination of design discharge, linear waterway , economical span, location of piers and abutment, afflux, scour depth.

b) Standard specification for bridges:- I.R.C. bridge code, width of carriage way and clearance, loading, Indian railway bridge loading, forces acting on bridge structures, design consideration, aesthetics of bridge design.

UNIT-V **(9 Hrs.,20 marks)**

a) Various types of bridges, culverts slab, pipe and box type, R.C.C. bridge "T" beam, half hollow girder, balanced cantilever, continuous girder, rigid framed arch, bow string girder, prestressed concrete bridges, steel bridges, plate girder, box girder, truss, arch cable stayed, cantilever and suspension bridges, temporary and movable bridges, floating pontoons bridges.

b) Selection of a suitable type of bridge, types of bridge foundation, their choice and method of construction, bearing and their types, design consideration.
Introduction to different techniques of erection of bridge , super structure and bridge maintenance.

TERMWORK:-

T.W. shall be based on Assignment given in lecterns hours.

REFERENCE BOOKS:-

1. Highway Engineering by Justo Khanna.
2. Highway Engineering by Rangwala.
3. Highway Engineering and Airports by K.L. Bhanot & S.B. Sehgal.
4. Airport Engineering by Rangawala.
5. Airport Engineering by G.Venkatappa Rao.
6. Bridge Engineering by S.P.Bindra.
7. Bridge Engineering by S.Ponnuswamy.

ENVIRONMENTAL ENGINEERING - I

Teaching Scheme:	**Examination Scheme:**
Lectures: 4 Hours/Week	Theory Paper: 100 Marks
Practical: 2 Hour/Week	(3 Hours Duration)
	Term Work: 25 Marks
	Oral --------: 25 Marks

UNIT-I **(9 Hours 20 marks)**

Introduction to Water Supply – Planning and necessity, brief description of different elements of water supply scheme

Water Demand – types, total requirement, per capita demand, factors affecting per capita demand, variations, effect of variation in different component of water supply scheme, design period,

Population – growth of population and forecasting method.

Sources of Water for WSS – Surface sources such as ponds and lakes, streams and rivers, storage reservoirs. Ground water sources such as infiltration galleries, infiltration wells and springs. Quality and quantities of water from different sources, Factors governing the selection of particular source for WSS.

UNIT-II **(9 Hours 20 marks)**

Intake structures – purpose, types such as canal intake, reservoir intake, river intake, intake tower etc, factors governing the location

Hydraulic Design of Intake well, Intake pipe, Jack well, pump house, open dug well (production well)

Pipes for conveyance of Water – (only different class of pipes, available sizes and suitability) AC pipes, MS pipes, CI/DI pipes, PVC pipes, GI pipes,

Stresses in pipes, Water Hammer Effect, Forces at Bends- Thrust Blocks

Hydraulic Design of Rising Main & Gravity Main,

Pipe Appurtenances (Purpose & Functioning) – Air Valves, Sluice Valves, Butterfly Valves, Pressure Relief Valves, Drain/Scour Valves

Pumps for WSS – Types of pumps in common use such as centrifugal, vertical turbine, submersible pumps, their suitability, Estimation of power of motor of pump, Economical diameter of pumping main

Reservoirs (Purpose, Location and Capacity)– Ground Service Reservoirs, Elevated Service Reservoirs, Master Balancing Reservoirs, Pressure Break Tank

UNIT-III **(9 Hours 20 marks)**

Quality of Water - Objectives of determination of quality, Pure water,

Physical Characteristics – Units of measurement, Reasons for their presence & Methods of determination of Colour, Taste and Odour, Turbidity (Turbidity Rod, Jakson Turbidity meter, Nephelometer), Specific Conductivity, Temperature

Chemical Characteristics – Units of measurement Reasons for their presence and determination of total solids, pH value, Hardness, Chloride Content, Nitrogen in its different forms, Alkalnity, Dissoloved Oxygen

Biological/Bacteriological/Microscopical Characteristics – Classification of Micro-organisms, Tests for Biological Characteristics of water (Total Count Test, E-Coli Test). E-Coli Test – (Presumptive Test, Confirmed Test and Completed Test) Determination of Coliform Index (E-coli index) and MPN index

Standard of water with respect to different characteristics as per norms of WHO and BIS

UNIT-IV **(9 Hours 20 marks)**

General Water Treatment of Surface Water – Objective of treatment of water, different elements of WTP for treatment of normal surface water.

Screening – Coarse and fine screens

Aeration Fountain – Types, Necessity and design

Plain Sedimentation – Theory of sedimentation (Laminar and Turbulent Settling of particles), Design Concept, Scouring of deposited particles, Different types of sedimentation tank, Inlet and outlet arrangements

Sedimentation aided with coagulation – Theory of coagulation & flocculant settling, Various types of coagulants and their suitability, Feeding Devices, Mixing Devices, Design of Flash Mixer, Flocculation tank & clarifier (Clariflocculator), Management of sludge in coagulation-sedimentation process

UNIT-V **(9 Hours 20 marks)**

Filtration – Theory of filtration – mechanical straining, flocculation and sedimentation in filter media, biological metabolism, electrolytic changes,

Filter Material – Types, characteristics and requirement of good filter material

Types of filters and their classification

Slow sand filters – Details of features, Operation and design criteria of Different elements of SSF (Tank, filter media, base material, inlet & outlet arrangements, Appurtenances. Efficiency & Performance of SSF

Rapid Sand Filters – Necessity, Details of features, Operation and design criteria of Different elements of RSF (Tank, filter media, base material, under drainage system, inlet & outlet arrangements, Appurtenances, Back wash arrangements). Operational Troubles in RSF, Efficiency & performance of RSF

Pressure Filters – Necessity, Details of Features and working, Efficiency and suitability, Advantages and Disadvantages

Disinfections – Purpose, Brief descriptions about Various Methods of disinfections (boiling, treatment with excess lime, ozone treatment, Iodine treatment, Treatment with potassium permanganate and silver treatment)

Chlorination – Disinfecting action, dosage, different forms of chlorination (Liquid chlorine, bleaching powder, chlorine di-oxide, chloramines, chlorine di-oxide), Types of Chlorination – Plain, Pre, Post, Double, Break point, Super Chlorination and Dechlorination. Importance of Chlorine residual and Testing.

TERM-WORK -

The term-work shall consist of minimum eight experiments and five assignments from the list below –

Experiments – (Any eight)

(1) Determination of pH
(2) Determination of Turbidity and optimum dose of alum
(3) Determination of Total Dissolved Solid
(4) Determination of different forms of alkalinity
(5) Determination of Total and mineral acidity
(6) Determination of Carbonate and Non-carbonate hardness in water
(7) Determination of Chlorine demand of water
(8) Determination of Dissolved Oxygen Content
(9) Determination of Fluoride Content
(10) MPN Test

Assignment – (Any five)

(1) Population Forecast of a town by three methods
(2) Design of Aeration Fountain

(3) Design of Flash Mixer
(4) Design of Clariflocculator
(5) Design of Slow Sand Filter
(6) Design of Rapid Sand Filter
(7) Visit Report of a Water Supply Scheme including WTP

BOOKS RECOMMENDED –

- Garg S.K., “Water Supply Engineering”, Khanna Publisher, New Delhi
- Punamia, Jain & Jain, “Water Supply Engineering”, Laxmi Publications, New Delhi
- Manual on Water Supply & Treatment, Central Public Health & Environmental Engineering, Organization, Ministry of Urban Affairs, Government of India
- Modi P.N., “Water Supply Engineering”, Standard Publications, New Delhi
- Rangwala, “Water Supply and Sanitary Engineering”, Charotar Publishing Company, Anand
- Raju, “Water Supply and Waste Water Engineering”, Tata McGraw Hill Publishing Company, New Delhi
- Sincero & Sincero, “Environmental Engineering – A Design Approach”, Prentice Hall International, New Delhi
- Therous, Eldridge & Mallmann, “Laboratory Manual for Chemical & Bacteriological Analysis of Water & Sewage”, Agro Botanic Publisher, India
- Benergee & Jain, “Handbook of Technical Analysis”, Jain Brothers New Delhi.
- Laboratory Manual for Environmental Quality Testing, Environmental Protection Research Foundation, Sangli

TESTING OF MATERIAL

Teaching Scheme:

Practical: 2 Hour/Week

Examination Scheme:

Term Work: 25 Marks

Oral --------: 25 Marks

List of Practicals to be conducted for Term work

1. Tension Test on metal.
    - Mild steel.
    - Tor steel
2. Hardness test on metal.
3. Impact Test on metal (Izod charpy Test)
4. Test on bricks.
    - Water absorption.
    - Compressive Strength.
5. Test on Tiles.
    - Abrasion and transverse test for floor tile.
6. Test on Timber.
    - Moisture content.
    - Bending.
7. Road Aggregates
    - Abrasion Test
    - Impact Test
8. Test on Bitumen.
    a. Penetration.
    b. Ductility.
    c. Softening point.
    d. Specific gravity.
    e. Flash and fire point.
    f. Viscosity test.
9. Bituminous mix design using Marshall stability test.

BOOKS RECOMMENDED.:-

Civil Engineering Materials by Janardhan Jha.
Civil Engineering Materials by Sushilkumar .
Civil Engineering Materials by Vazirani and Chandola.
Civil Engineering Materials by Rangwala.
Civil Engineering Materials by S.V. Deodhar.
Civil Engineering Materials by D.S. Arora.
Relevant BIS codes

SYLLABUS OF

FOURTH YEAR (CIVIL)

NORTH MAHARASHTRA UNIVERSITY, JALGAON.

(w.e.f. 2008-09)

N O R T H   M A H A R A S H T R A   U N I V E R S I T Y ,   J A L G A O N

STRUCTURE OF TEACHING AND EVALUATION

B.E. (Civil)   w. e. f.   2008 - 09

FIRST TERM

Sr. No	Subject	Teaching Scheme Hours/Week			Examination Scheme				
		Lectures	Tutorial	Practical	Paper Duration Hours	Paper	TW	PR	OR
1	Construction Management- I	4	-	2	3	100	25	-	25
2	Water Resources Engineering –I	4	-	-	3	100	25	-	-
3	Quantity Surveying & Valuation	4	-	2	3	100	25	-	25
4	Environmental Engineering - II	4	-	2	3	100	-	-	25
5	Elective- I i) Open Channel & Conduit Flow ii) Water Shed Management iii) Finite Element Method	4	-	2	3	100	25	-	--
6	Seminar	-	-	-	-	-	25	-	-
7	Project –Stage I	-	-	2	-	-	25	-	25
	Total	20	-	10	-	500	150	-	100
	Grand Total	30			750				

SECOND TERM

Sr. No	Subject	Teaching Scheme Hours/Week			Examination Scheme				
		Lectures	Tutorial	Practical	Paper Duration Hours	Paper	TW	PR	OR
01	Structural Design & Drawing – III	4	-	4	4	100	25	-	25
02	Construction Management- II	4	-	2	3	100	25	-	25
03	Water Resources Engineering. –II	4	-	2	3	100	25	-	25
04	Elective–II i) Water Power Engineering ii) Geographical Information System iii) Industrial Pollution & Control	4	-	2	3	100	25	-	-
05	Site Visit /Case Study	-	-	-	-	-	25	-	-
06	Project–Stage II	-	-	4	-	-	100	-	50
07	**Total**	16	-	14	-	400	225	-	125
	Grand Total	30			750				

N O R T H M A H A R A S H T R A U N I V E R S I T Y , J A L G A O N
SYLLABUS OF FOURTH YEAR (CIVIL)
TERM-I^ST (w.e.f. 2008-09)

CONSTRUCTION MANAGEMENT-I

Teaching Scheme:	**Examination Scheme:**
Lectures: 4 Hours/Week	Theory Paper: 100 Marks (3 Hrs)
Tutorial: 2 Hour/Week	Term Work: 25 Marks
	Oral: 25 Marks

UNIT--I **(10 Hours, 20 marks)**

Construction industry, construction team, Construction activities, classification of construction ,stages in construction, Need of management in construction, Ownership and entrepreneurship , Small scale industries in construction .
Jab layout, mass housing and value engineering.
Scientific management, Management technique and uses, Definition and objectives of management, levels of management, Leadership and its quality.
Organization, meaning and function , forms of organization - line, line and staff , functional ,Type A, Type B and Type C

UNIT—II **(10 Hours, 20 marks)**

Network Technique :- History, Advantages, Bar charts, S –Curve etc. various terms used in network technique, activity,. event, critical path, duration etc. Development of networks, network scheduling, to find various times and float. EST, EFT, TF etc. Monitoring of Network, Three phases of network technique.
PERT - its concept and PERT Time.

UNIT–III **(10 Hours, 20 marks)**

Cost analysis, Cost Curve, Optimization and crashing of networks. Updating of network During monitoring, resource leveling, allocation, leveling and smoothening.
Line of balance - Concept and uses.

UNIT – IV

Engineering economics, its definition and importance, demand and supply, factors affecting demand and supply. Production, its meaning, different factors of production, economics of production, cost concept, relationship of cost to level of production.
Bank, its type, uses and functions, banking systems, profit and loss account, appreciation and depreciation of money.

UNIT - V

a) Pile driving Equipments:-
Pile hammers, drop, single acting steam, double acting steam, differential acting steam, diesel, vibratory , hydraulic hammers , sonic hammers, selection of pile driving hammers.
b) Crushers – types , primary, secondary ,tertiary crushers, jaw, gyratory, cone crushers, hammer mills, roll crushers, rod and ball mills Screening aggregate, revolving, vibrating screens
c) Ready mix concrete plants :- central concrete batch plant , portable concrete batch plant, ready mixed concrete – central mixed , shrink mixed, truck mixed concrete, concrete pumps.

TERM WORK:- It shall consist of assignments based on each unit of above syllabus.

BOOKS RECOMMENDED:-

1. Mahesh Varma - Construction planning and management
2. S.V.Deodhar - Construction equipment and job planning
3. U.K.Shrivastava - Construction Management

4. Gehlot and Dhir - Construction Management
5. L.S.SrinathEngineering - CPM and PERT
6. Peurifoy - Construction Planning and Management
7. Tarachand - Engineering Economics
8. Sengupta - Construction Management and planning
9. Chitkara - Construction Project Management
10. Mukund Mahajan - Engineering Economics
11. R.L.Peurifoy - Construction planning ,Equipments and Methods.
12. Dr. Mahesh Verma - Construction equipments and its planning and application

WATER RESOURCES ENGINEERING - I

Teaching Scheme:	**Examination Scheme:**
Lectures: 4 Hours/Week	Theory Paper: 100 Marks (3 Hrs)
Practical: 2 Hour/Week	Term Work: 25 Marks

UNIT I **(10 Hours, 20 marks)**

Hydrologic cycle, Hydrology & Water resources development, Surface hydrology and sub-surface hydrology

Precipitation – Mechanism, essential requirement for occurrence, Different Forms, Types, Measurement of Precipitation – Different types of rain gauges- non-automatic and automatic, Radar measurement, Methods to find out the areal average depth of precipitation, Mean monthly precipitation, annual average precipitation, Optimum number of rain gauge stations, Estimation of missing data, Checking for consistency of data

Rainfall Intensity analysis, Frequency Curve, Depth Area Duration Curve

Disposal of precipitation - Factors affecting disposal, Evaporation Losses, Evapo-transpiration, Factors affecting evapo-transpiration, methods for measurement of evaporation and evapo-transpiration, Infiltration – methods for determination, factors affecting, infiltration indexes

UNIT II **(10 Hours, 20 marks)**

Discharge Measurement in Streams – Methods (Area Velocity, Moving Boat, Chemical), Selection of gauge site, Stage Discharge Relationship, Extension of Rating Curves, Slope Area Method

Run-off – Runoff Process, Runoff Cycle, Factors affecting Runoff, Estimation

Catchment -Classification & Salient Characteristics

Floods – Necessity, Causes, Factors affecting, Classification, Frequency, Estimation

Hydrographs – Definition, Components, Factors affecting the shape, Base flow separation, Flood Hydrograph, Unit Hydrograph, U.H.methods, S-hydograph (S-curve technique), Synthetic Unit Hydrograph

UNIT III **(10 Hours, 20 marks)**

Ground water hydrology: - Occurrences and distribution of ground water, specific yield of aquifers, movement of ground water, Darcy's law, permeability, yield of basins. Hydraulics of well sunder steady flow, condition in confined and unconfined aquifers, specific capacity a well, well irrigation: tube wells, open wells, their design and construction.

Water logging and drainage engineering - Causes of water logging, preventive and curative measures, drainage of irrigated lands, reclamation of water logged, alkaline and saline lands, design and spacing of the tile – drain.

UNIT IV **(10 Hours, 20 marks)**

Reservoir Planning – Advantages, Classification, Types of developments: Storage and diversion works. Single and multi-purposes reservoir, investigation for locating a reservoir, selection of site, height of the dam, reservoir, economics of reservoir planning, Benefit – cost ratio,

Reservoir Sedimentation – Process of Erosion, Factors affecting erosion, Mechanism of Sediment Transport, Sediment Yield, Distribution of sediment in reservoir, Factors affecting silting, Estimation of silt load, & Mode of sedimentation, Trap efficiency of reservoir, Control of reservoir sedimentation

Necessity and layouts of Lift Irrigation Schemes, Drip & sprinkler irrigation system

UNIT V **(10 Hours, 20 marks)**

Introduction to Irrigation - Definitions, functions, necessity, benefits, Ill effect, Irrigation System & its classification, Irrigation Methods & its classification, (Surface & Sub-sub surface Methods), Factors affecting choice of method,

Soil Water Plant Relationship – Classification of soil water, Soil moisture stress, Soil moisture tension, Saturation capacity, Field capacity, Determination of field capacity,
Major Soil Groups in India, Maintaining the soil fertility, Essential Elements for Plant Growth, Quality of Irrigation Water
Water requirement of crop :- Limiting soil moisture condition, Depth of irrigation water and frequency, Principal Indian Crops and their season, Crop and base period, Duty of water and delta, Factors affecting & methods of improving the duty of water, Commanded area their classification, Intensity of Irrigation, Paleo Irrigation, Kor watering, kor depth and kor period, outlet factor, capacity factor, time factor, crop ratio, overlap allowance, Consumptive use of water, factors affecting consumptive use, calculations of canal capacities.
Application of water, water management and distribution, National water policy, warabandi, rotational application.
Various Methods of Assessment of Canal Revenue
TERM WORK:- From each of the following groups minimum two assignments shall be performed. (At least one assignments from group 1 to 3 shall be done by using spread sheet on computer.)
Group 1: -
1) Marking catchment area on a topo-sheet and working out average annual rainfall and determining yield.
2) Checking for inconsistency of precipitation record by double mass curve technique.
3) Frequency analysis of precipitation data (plotting on semi-log graph paper)
Group 2: -
1) Development of flood hydrograph from unit hydrograph and complex storm.
2) Development of unit hydrograph from isolated and composite flood hydrograph.
3) Development of unit hydrographs of different durations use s- curve method.
Group 3: -
1) Determination of canal and reservoir capacity for water requirement of crops.
2) Determination of reservoir capacity from mass inflow and mass demand curve.
3) Benefit cost analysis of water resources project.
4) Determination of yield of well by recuperating test data.
Group 4: -
1) Design of drainage system in water logged area.
2) Design of micro – irrigation system; either sprinkler of drip irrigation system.
3) Design of lift- irrigation system.

BOOKS RECOMMENDED –

- Garg S.K., “Irrigation Engineering, Dams and Hydraulic Structure”, Dhanpat Rai & Sons, New Delhi
- Modi P.N., “Water Resources, Irrigation & Water Power Engineering”, Standard Publisher, New Delhi
- Punamia B.C., “Irrigation & Water Power Engineering”, Laxmi Publications, New Delhi
- Raghunath H.M., “Hydrology”, New Age Publications, New Delhi
- Raghunath H.M., “Ground Water”, New Age Publications, New Delhi
- Mutreja, “Applied Hydrology”, Tata McGraw Hill Company, New Delhi
- Arora K.R., “Irrigation Engineering”, Standard Publications, New Delhi
- P.Jayaram Reddi, “A Text Book of Hydrology”, Laxmi Publications, New Delhi
- Sharma R.K., “A Text Book of Hydrology & Water Resources”, Dhanpat Rai and Sons

QUANTITY SURVEYING & VALUATION

Teaching Scheme:	**Examination Scheme:**
Lectures: 4 Hours/Week	Theory Paper: 100 Marks (4 Hrs)
Practical: 2 Hour/Week	Term Work: 25 Marks
	Oral: 25 Marks

UNIT I **(08 Hours, 20 marks)**

Estimate, Detailed Estimate, types of detailed estimate, purpose, data required for preparing detailed estimate, factors to be consider during preparation of detailed estimate, methods of taking out quantities, abstracting, units of measurements, building cost index, prime cost, provisional sum, centage charges, work charged Establishment, administrative approval, technical sanction.

Approximate estimate: - Importance, purposes, approximate methods of building estimating and various civil engineering works.

UNIT II **(11 Hours, 20 marks)**

Detailed estimate of buildings (load bearing and framed structure specially RCC flat roof buildings.)

Detailed estimate of community well, septic tank, pipe culvert, earthwork in roads / cannels.

UNIT III **(11 Hours, 20 marks)**

Detailed estimate of reinforcement quantities of R.C.C. elements like slab, beam, column & Isolated column footing, staircase and preparation of bar bending schedule.

UNIT IV **(10 Hours, 20 marks)**

Task work, factors affecting task work, schedule of rate, Task work of various items of construction, Analysis of rates, factors affecting cost of an item of work, material, labour etc. Analysis of various items of construction.

Specifications, purposes, types, drafting of specifications, and specifications of a few main items of civil engineering works.

UNIT V **(10 Hours, 20 marks)**

Valuation, purposes, price cost and value, factors affecting value of a property, various types of value like market value, sentimental value, mortgage, year's purchase and outgoings, legal aspects of valuation and easement act. Methods of valuation, land and building method, rental method, belting method of valuation of land. Standard rent and Standard rent fixation.

depreciation, various methods of depreciation, sinking fund, book value, free hold and lease hold properties.

<u>TERM WORK</u>: - It shall consist of following

1) Units of Measurement of various items of Civil Engg. Works.
2) Approximate estimate of: -
   i) Residential Building. ii) Public Building (Any Two Types).
   iii) Elevated water service reservoir. iv) Road and Bridge.
3) Detailed estimate of a load bearing residential single story structure.
4) Detailed estimate of framed residential double story structure.
5) Detailed estimate of any two of the following:
   a) Community well. b) Pipe Culvert. c) Septic tank. d) Earth work in roads /cannels.
6) Detailed Specifications for any five items of construction.
7) Rate analysis for any five items for buildings.
8) Estimation of detailed quantities of reinforcement for any two of the following:
   i) Slab. ii) Beam. iii) Column and isolated column footing.

BOOKS RECOMMENDED

a) B.N. Dutta - Estimating and Costing.
b) M. Chatroboty - Estimating and Costing.
c) G.S. Birdie - Estimating and Costing for Civil Engg.
d) B.S.Patil - Estimating and Costing , Vol.I & II.
e) S.C Rangwala - Estimating , costing and valuations.

ENVIRONMENTAL ENGINEERING - II

Teaching Scheme:	**Examination Scheme:**
Lectures: 4 Hours/Week	Theory Paper: 100 Marks (3 Hrs)
Practical: 2 Hour/Week	Oral: 25 Marks

UNIT –I **(10 Hours, 20 marks)**

Definition of sewage, Necessity of sewage treatment, Requirement of a sewage management system. Composition of sewage,

Characteristics of sewage – Physical (Colour, Odour, Solids and Temperature), Chemical (Organic - Carbohydrates, Fats, Oil and Grease, Pesticides, Phenols, Proteins, Surfactants. Inorgainic – Alkalnity, Chlorides, Heavy Metal, Nitrogen, pH, Phosphorous, Sulphur, Toxic Compounds, Gases – Hydrogen Sulfide, Methane, Oxygen), Biological Characteristics

Cycle of Decomposition – Anaerobic and aerobic, Nitrogen and Carbon Cycle

Tests for determining the Oxygen Demand - Biochemical Oxygen demand, (First and Second Stage BOD), Chemical Oxygen Demand, Total Oxygen Demand. Limitation of BOD test, Population Equivalent

Self Purification of Natural Stream – Dilution, Oxidation, Reduction, Sedimentation, Action of Sunlight,

Zones of Pollution – Degradation, Active decomposition, recovery, clear water

Oxygen sag analysis – Deoxygenation and reoxygenation

UNIT –II **(10 Hours, 20 marks)**

SEWER DESIGN – Estimation of dry weather and rain water flow, hydraulic formulae, minimum and maximum velocity of flow, effect of variation in flow of sewage in velocity of flow , Forms of sewers, Design of storm water drains

CONSTRUCTION OF SEWERS – Factors affecting selection of material for sewer construction, materials & shape of sewers, Structural Loads on Sewers, Maintenance, Cleaning and ventilation of Sewers.

APPURTENANCES – Purposes and location of Inlets, catch pits, cleanouts, manholes, drop-manholes, lamp-holes, flushing devices, grease and oil traps, inverted siphons, storm water overflow devices.

UNIT –III **(10 Hours, 20 marks)**

Preliminary & Secondary Treatment of Sewage –

Screening – Purpose, Classification, Types, Cleaning, Design Consideration & Management of screenings material

Comminutors – Purpose and types

Grit Removal – Purpose, Quality and quantity of grit, Types and Design Criteria

Grease Removal – Necessity, Skimming Tanks, Vacuum Floatation, Disposal of skimmings

Flow Equalization – Location, volume Requirement and Benefits

Sedimentation – Characteristics of settleable solids, Types of settling – (Discrete, Flocculent, Zone and Compression Settling), Classification of Settling tanks, Design criteria of settling tanks, Chemical aided settling, coagulants used

UNIT –IV **(10 Hours, 20 marks)**

Biological Treatment of Sewage – Objective and classification

Activated Sludge Process – Process of Treatment, Operations and units, methods of aeration, Loading rate, oxygen requirement and transfer, Design consideration of aeration tank, secondary settling, operational difficulties

Sewage Filtration – Types of and basic functioning of different filters, Constructional features and design of standard trickling filter, Performance and efficiency of standard trickling filter, Troubles and remedies, Comparison of Tricking Filter Process versus ASP

Stabilization Ponds – Purpose and types of stabilization ponds and their functioning (aerobic, anaerobic and facultative ponds

UNIT –V **(10 Hours, 20 marks)**

Solid Waste Management –

Necessity of solid waste management, Types and Sources of solid waste

Properties – Sampling procedure, Determination of Physical (Individual Components, Particle size, Moisture content, Density) and chemical composition (Energy content, chemical content) of solid waste

Elements of Solid Waste Management - Materials flow in society, Reduction in raw material usage, reduction in solid waste quantities, reuse in solid waste material, material recovery, energy recovery.

Functional Element of SWM & their interrelationship –

Waste generation – factors affecting, estimation of quantities

Onsite handling, storage and processing – Municipal and industrial waste, Containers and their locations,

Collection – Collection service, Types of Collection system (Hauled Container System & Stationary Container System – Machine and manually loaded), Determination of Vehicle and Labour requirement, Collection route

Transfer and transport – Transfer stations, factors affecting design, classification (Direct, Storage and combined discharge), Requirements, Locations of Transfer stations, Transfer means and methods

Processing Techniques – Volume Reduction (mechanical, thermal) and recovery, Disposal – Land filling with solid waste – Methods and operations (area, trench method, depression land fills), Occurrence of gases and leachate in land fills

TERM-WORK -

The term-work shall consist of minimum seven experiments and four assignments and one technical report from the list below –

(A) Experiments – (Minimum Seven)

(1) Determination of Total solid, settleable solid, dissolved solid, fixed Soild, filterable & non filterable solids, Mixed Liquor suspended solids in a sample of waste water

(2) Determination of oil and grease in sample of sewage

(3) Determination of BOD of sewage sample

(4) Determination of COD of sewage sample

(5) Determination of Sulphate / Chloride Content

(6) Determination of Salt Content by electrical conductivity Measurement

(7) Determination of Total Nitrogen/Different forms Nitrogen

(8) Determination of Sulphate / Phosphate Content

(9) General techniques of microbiology : Determination of microbial quality of water-
- standard plate count,
- standard coliform test,
- determination of coliform density by MPN method
- fecal coliform test

(B) Assignments – (Minimum Four)

(1) Estimation of sewage quantity and design of sewer line

(2) Design of Grit Chamber & Settling Tank

(3) Design of Activated Sludge Plant / Standard Trickling Filter

(4) Drawing of Stabilization Pond showing all details

(5) Estimation of Overall Chemical Composition of Solid Waste

(6) Analyzing Hauled/Stationary - Container Collection System of Solid Waste

(7) Economic Comparison of Transport Alternative for SW

(C) Report –

(1) Technical Visit Report of a Waste Water Treatment Plant or Industrial Water Treatment Plant or Solid Waste Management System/Treatment Plant

Books Recommended –

- Punamia & Jain, "Waste Water Engineering", Laxmi Publications, New Delhi
- Modi P.N., "Sewage Treatment & Disposal and Waste Water Engineering", Standard Publications, New Delhi.
- Pevy, Rowe & Tchobanoglous, "Environmental Engineering", McGraw Hill International, New Delhi
- Garg S.K., "Sewage Disposal & Treatment & Air pollution Engineering",Khanna Publisher, New Delhi
- Hammer & Hammer, "Water & Waste Water Engineering", Prentice Hall International, New Delhi
- Sincero & Sincero, "Environmental Engineering – A Design Approach", Prentice Hall International, New Delhi
- Therous, Eldridge & Mallmann, "Laboratory Manual for Chemical & Bacteriological Analysis of Water & Sewage", Agro Botanic Publisher, India
- Benerjee & Jain, "Handbook of Technical Analysis", Jain Brothers New Delhi.
- Laboratory Manual for Environmental Quality Testing, Environmental Protection Research Foundation, Sangli

NORTH MAHARASHTRA UNIVERSITY JALGAON
UNDER GRADUATE COURSE IN CIVIL ENGINEERING (ELECTIVE– I)

OPEN CHANNEL AND CONDUIT FLOW

Lectures : - 04 Hours/ Week — Theory paper :- 100 Marks
Practical : - 02 Hours / Week — Duration :- 3 Hours
Term Works: - 25 Marks — Oral :- 25 Marks

UNIT – I **(12 Lectures, 20 Marks)**

1) Uniform flow in trapezoidal and circular channel, calculation of normal depth and critical depth in trapezoidal and circular, the first and second hydraulic exponents, hydraulically – efficient channel section for trapezoidal and circular channel sections.
2) Transitions – Rectangular channel with a hump and with change in width.

(10 Lectures, 20 Marks)
UNIT –II

1) Gradually varies flow theory and computation for trapezoidal and rectangular Prismatic channels, differential equation of G.V.F., alternate forms, different types of G.V.F. profiles and their characteristics and examples of their occurrence, control section.
Computation of G.V.F. profiles in trapezoidal channel by standard step method, Direct Integration Methods: Ven Te Chow method & Bresse's method & Bresse's method.

UNIT- III **(10 Lectures, 20 Marks)**

1) Rapidly varied flow due to weirs, sluice gates, end depths, hydraulic jump in rectangular channel, standing- wave flume, Parshall flume.
2) Unsteady flow in open channel : - Equation of continuity and equation of motion for GVUF, surges and waves in open rectangular channels – simple cases. Neglecting friction.

UNIT – IV **(08 Lectures, 20 Marks)**

1) Pipe flow : - Three reservoir problem, pipe network. Practical design methods of rising mains and gravity mains using nomograms/ charts, economical diam. Of rising main.

UNIT – V **(10 Lectures, 20 Marks)**

1) Unsteady flow in conduits: - Mention of types, equation of motion, establishment of flow, water hammer, celerity of pressure wave thought rigid and elastic pipes, sudden and gradual and partial opening and closing of valves, details of pressure cycles.
2) Surge tanks : - Necessity, location, function, types, analysis of simple cylindrical surge tank considering frictional effects.

TERM WORK: - Any six of following assignment should be performed

1) Calculation of normal depth & critical depth in trapezoidal / circular channel using graphs/ tables.
2) Example on transition in rectangular channel
3) Computation of G.V.F. profile in trapezoidal channel by standard step method or by Ven Te Chow method.
4) Developing and running computer programming for numerical method for obtaining G.V.F. profile.
5) Calculation of hydraulic jump in open rectangular channel.

6) Calculation of surges in open rectangular channel.
7) Design of gravity/rising main (Dead end system in case of gravity mains).
8) Calculation of water hammer pressures.
9) Design of simple cylindrical surge tank.

ORAL EXAM: - Based on above term work.

Book Recommended: -

1. Flow in open channels:- Dr.K.Subramanya.
   Tata McGraw – Hill publishing company Ltd. New Delhi.
2. Fluid Mechanics:- V.L Streeter and E.B. Wylie.
   Tata McGraw- Hill publishing company Ltd. New Delhi.
3. Fluid Mechanics: - Dr. A.K. Jain.
   Khanna Publishers, Dhelhi.
4. Theory and Application of Fluid Mechanics:- Dr. K. Subramanya.
   Tata McGraw – Hill publishing company Ltd. New Delhi.
5. Water power Engg.:- M.M. Dandekar and K.N. Sharma
   Vikas Publishing House, Pvt. Ltd. Delhi.
6. Open Channel Hydraulics:- Ven Te Chow.
   Tata McGraw – Hill Publishing Company, Ltd. New Delhi.

WATERSHED MANAGEMENT

Lectures : - 04 Hours/ Week Theory paper :- 100
Marks
Practical : - 02 Hours / Week Duration :- 3 Hours
Term Works: - 25 Marks

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UNIT -I

Concept of Watershed. Significance of watershed based development, Watershed characteristics – geomorphology and hydrology. Drainage basin, network and channel morphology.

UNIT- II

Watershed Hydrology - Hydrologic cycle, water balance, climate and precipitation, soils and infiltration, interception and evapotranspiration, groundwater, streamflow and runoff, water quality, aquatic ecosystems (eutrophication, habitat disturbance, etc.

UNIT- III

Watershed resource appraisal – Physical, hydrological, land use/cover. Land Capability Classification.
Watershed Management and Planning – objectives

UNIT- IV

Issues in water resources - Point source pollution, agricultural and urban non-point source pollution, erosion, water scarcity, flooding, drinking water protection, wastewater treatment and septic systems
Soil and water conservation measures
Watershed Program – Benefit-Cost Analysis

UNIT- V

Urban Watershed Management – Wet weather flow, Infrastructure Integrity Testing, Effect of discharge to receiving water, Green Roof, Rain water harvesting from urban structures, Urban watershed management – goals & strategies, Sustainability & UWSM, urban stormwater-pollution-abatement technologies and sediment management, Source Loading And Management Model

List of Practical/Term work Assignments -
(Minimum six practicals /Assignments shall be performed)

1. Mapping and demarcation of watershed
2. Morphometric analysis of watershed
3. Areal Precipitation – Thiessen Polygon, Isohyetal methods. Analysis and interpretation of rainfall data.
4. Water balance estimation
5. Estimation of Runoff and streamflow. Flow duration curve, return period. Analysis and interpretation of streamflow data
6. Groundwater contouring and interpretation regarding movement and flow direction
7. Land capability classification

8. Soil loss estimation
9. Visit to a Watershed and submission of report

Text / Reference Books -

1. Murthy, J. V. S. (1994). Watershed Management in India. Wiley Eastern Ltd., New Delhi.
2. Pranjape, S. and Others. (1998). Watershed-based Development, Bharat Gyan Vigyan Samithi, New Delhi.
3. Mutreja, K. N. (1990). Applied Hydrology, Tata McGraw-Hill Pub. Co. Ltd. New Delhi.
4. Singh R. J. (2000): Watershed Planning and Management, Yash Publishing House, Bikaner.

FINITE ELEMENT METHOD

Lectures : - 04 Hours/ Week	Theory paper : 100 Marks
TW/PR : - 02 Hours / Week	Duration : 3 Hours
Term Works: - 25 Marks	Oral : 25 Marks

UNIT I.

Concept of Finite element, Classification of element for discrete and continuum structure , characteristics of an element, Displacement function , General approach for formulation of the problem , Degree of freedom , Assembly rules and boundary conditions. Gradient and divergence theorem.

Matrix's algebra, concept of local and global , coordinates, Rules of transformation of stiffness matrix from local to global axes, Variation methods of Approximations.

Approximation errors in F.E.M. various measures of errors, accuracy of solution.

Advantages and disadvantages of F.E.M.

UNIT - II.

Discretization of the domain into elements, shape function, "Pascal triangle", Selection for the order of polynominal, convergence requirements, inter element compatibility conforming and non conforming element, concept of band width. Principle of minimum potential energy, Rayleighrit method, The method of weight residuals, Saint Vasant Principal. Application of above method to civil engineering fields.

UNIT - III.

One dimensional second order and fourth order equations, Lumped and work equivalent load, Theory of work equivalent load, Shape function for one dimensional analysis, Derivation of element equations.

Analysis of one dimensional structure (beam, coloumn etc.) by F.E.M. with different loading and boundary conditions.

UNIT – IV.

Finite element method for two dimensional problems, second order equation involving scaler-valued function, Two dimensional finite elements and interpolation function.

Direct method for determination of stiffness matrix for plane truss, continuous beams and plane frame elements, solution for displacement unknowns and analysis.

UNIT – V.

Triangular and Rectangular elements for plane stress/strain conditions, effect of element aspect ratio, finite representation of infinite mass.

Formulation of stiffness matrix for slabs using triangular or rectangular elements with different boundary condition.

Introduction of Isoparmetric 1 D and 2 D elements, shape function and natural coordinate system, quadrilateral isoparametric elements for plane stress/ strain conditions.

TEXT BOOKS:-

1) The finite element method (fourth edition) Vol – I & II.
By O.C. Zinekiewice & R.L. Taylor.

2) An introduction to the finite element method.
By J.N. Reddy.

3) Introduction to the finite element method.
By C.S. Desai and J.F. Abel.

4) Rudiments of finite element method.
By V.K. Manikar Selvam, Dhanpat Rai Pub.

5) Finite element primer.
By V.K. Manikar Selvam, Dhanpat Rai Pub.

NORTH MAHARASHTRA UNIVERSITY JALGAON
B.E. (CIVIL)

W.E.F : 2008- 09

TERM - I
SEMINAR

Teaching scheme: **Examination scheme:**
Practical: 2 hrs / week **Term Work : 25 Marks**

1. For seminar every student will individually study a topic assigned to him / her and submit a report and shall deliver a short lecture / Seminar on the topic at the end of term.
2. Selection of topic should be done by students in consultation with concerned guide
3. A typed report should be submitted in paper bound copy.
   a. Size of report depends on advancement of topic.

4. ASSESSMENT OF SEMINAR for TERM WORK
   Title of seminar: ____
   Name of guide : ____

Sr. No.	Exam Seat No.	Name of Student	Assessment by examiners					Grand Total
			Topic Selection	Literature Survey	Report Writing	Depth of understanding	Presentation	
			5	5	5	5	5	25

5 . Assessment of Literature survey will be based on
   a. Collection of material regarding history of the topic.
   b. Implementation.
   c. Recent applications.

6. Assessment of Depth of understanding will be based on
   a. Questioning by examiners.
   b. Questioning by students.
   c. What the student understands i.e. conclusion regarding seminar.

7. Assessment of presentation will be based on;
   a. Presentation time (10 minutes)
   b. Presentation covered (full or partial)
   c. Way of presentation
   d. Questioning and answering (5 minutes)

8. Examiners should be a panel of two one of them must be guide.

NORTH MAHARASHTRA UNIVERSITY JALGAON
B.E. (CIVIL)

W.E.F : 2008- 09

TERM - I
PROJECT I

Teaching scheme:
Practicals: 2 hrs / week

Examination scheme:
Oral : 25 Marks
Term Work : 25 Marks

1. Every student individually or in a group shall take a project in the beginning of the (B.E. first Term) seventh term in consultation with the guide and the project must be completed in the (B.E. Second Term) eighth term.
2. The project proposal must be submitted in the institute in the beginning of the (B.E. first Term) seventh term. While submitting project proposal care is to be taken that project will be completed within the available time of two term i.e 2 Hrs per week for (B.E. first Term) seventh term and 4 Hrs per week for (B.E. Second Term) eighth semester (total time become 12*2 + 12*4 = 72 Hrs per project partner). The final title of the project work should be submitted at the beginning of the (B.E. Second Term) eighth semester.
3. The guides should regularly monitor the progress of the project work.
4. Assessment of the project for award of TW marks shall be done by the guide and a departmental committee (consisting of minimum two teachers with experience more than three years) as per the guidelines given in the following table.

A) ASSESSMENT OF PROJECT I TERMWORK B.E. FIRST TERM

NAME OF THE PROJECT ____
NAME OF THE GUIDE: ____

Sr No	Exam Seat No	Name Of Student Marks	Assessment by guide (70%)					Assessment by Departmental committee (30%)			Grand Total	Out of 25 Marks
			Literature survey	Topic Selection	Documentation	Attendence	Total	Evaluation (10%)	Presntaion (20%)	Total		
			10	05	15	05	35	05	10	15	50	25

Sign of Guide Sign. of Committee Members Sign. of H. O. D.

5. The guide should be internal examiner for oral examination.

6. The external examiner should be from the related area of the concerned project. He should have minimum of five years of experience at degree level / industry.

7. The evaluation at final oral examination should be done jointly by the internal and external examiners.

SYLLABUS OF FOURTH YEAR (CIVIL)
TERM-IIND (w.e.f. 2008-09)
STRUCTURAL DESIGN AND DRAWING-III

Teaching Scheme:
Lectures: 4 Hours/Week
Practical: 4 Hour/Week

Examination Scheme:
Theory Paper: 100 Marks (4 Hrs)
Term Work: 25 Marks
Oral: 25 Marks

UNIT I **(12 Hours, 25 marks)**

R.C. STRUCTURES
i) Ductile detailing of RC members as per Is 13920.
ii) Design of rectangular combined footing.
iii) Design of flat slabs.

UNIT II **(12 Hours, 25 marks)**

i) Design of cantilever retaining wall.
ii) Design of circular water tanks resting on ground.

UNIT III **(12 Hours, 25 marks)**

PRESTRESSED CONCRETE STRUCTURES

a) Introduction :- Basic concept, materials, prestressing systems, stages of loading, stresses in tendons.
b) Losses in prestresses :- Nature of losses, loss due to classic shortening of concrete, successive prestressing of straight cables, relaxation of stress in steel friction in a curved cable anchorage.
c) Design of one way and two way prestressed concrete slabs.

UNIT IV **(12 Hours, 25 marks)**

a) Transfer of prestres in pretensioned members, transmission length, end zone reinforcements. Anchorage Zone stresses in post –tensioned members – Guyan's method.
b) Limit state design of prestressed concrete members philosophy of design, various criteria for limit. States, design loads, strength and serviceability.
c) Design of pretensioned and post tensioned flexural members – Rectangular and flanged sections, cable profile, Design of shear reinforcement, bond partial prestressing limit state method.

TERM WORK:- It shall be based on above syllabus and will consist of

i) At least three numbers of imperial size sheets based on prestressed & R.C. structures.
ii) Demonstration of computer softwares for design of structures.
iii) Report on site visit to at least one structure based on above syllabus

TEXT BOOKS:-

1) N. Krishnaraju - Prestressed Concrete
2) S.R. Karve & V. L. Shah- 'Limit State Analysis & Design of Reinforced Concrete', Structures PublicatinsR.C.C. Structures.
3) Punmia, Jain & Jain – 'Comprehensive R.C.C. Design', Laxmi Publications.
4) S. K. Duggal – 'Earthquake Resistant Design of Structures', Oxford University Press.
5) N. C. Sinha & S. K. Roy – 'Fundamentals of Reinforced Concrete',

CONSTRUCTION MANAGEMENT –II

Teaching Scheme:	**Examination Scheme:**
Lectures: 4 Hours/Week	Theory Paper: 100 Marks (3 Hrs)
Tutorial: 2 Hour/Week	Term Work: 25 Marks
	Oral: 25 Marks

UNIT –I **(10 Hours, 20 marks)**

A) Important Acts and Laws related to Constructions Industry- Factory act, The Employees Provident Fund Act, Minimum wage Act, Workman Compensation Act, Industrial Dispute Act, Indian Trade Union Act, arbitration act, employees state insurance act.

B) Safety in Construction : Causes of accidents, Classification costs of accident, measurements of accidents ,Injury frequency rate, injury severity rate, injury index, safety programme, accident report,

Safety measures in handling of building materials, construction of elements of building, demolition of buildings, hot bituminous works, scaffolding, formwork and other equipments, excavation.

UNIT–II **(10 Hours, 20 marks)**

Materials management , its aims and functions, inventory analysis , inventory models, ABC analysis, inventory management, buffer stock, lead time, EOQ.

Material requirement, planning , market research, system of purchase of materials, stock of material at site , MAS account, working capital management.

Supervision and quality control, concept of quality, stages of control , measures of control, organization for control, quality control management, sample and sampling technique, inspection, introduction to ISO 9000 and ISO 14000.

UNIT—III **(10 Hours, 20 marks)**

Contract, essentials, types, registration and law of contract, free consent, contract documents , performance of contract, breach of contract, advances to contractor, bills of contract and payments , subletting , inspection of works, tender, tender notice ,various terms used in tender notice such as SD, EMD, estimated cost, Time period of work ,cost of tender form, invitation of tender, time schedule of calling tender, tender documents two envelopes system, scrutiny and acceptance , revocation of tender , extra items , additions and alterations , defect liability , liquidated and unliquidated damages , escalation of rates, work order.

UNIT IV **(10 Hours, 20 marks)**

Excavating & Hauling Equipments :-

a) Power shovels; size, basic parts, selection ,factors affecting output.
b) Draglines:- types, size, basic parts, effect of job and management conditions on the out put of dragline.
c) Clamshells – clamshell buckets
d) Hoes- basic parts working ranges
e) Bulldozers-types, moving earth with bull dozers.

UNIT –V **(10 Hours, 20 marks)**

a) Compacting Equipments:-
Types of compacting equipments. Such as tamping rollers, smooth wheel rollers, pneumatic tyred rollers,
b) Hoisting equipments :Chain, hoist, fork trucks
Cranes : Classification, derrick crane, mobile crane, Tower crane, Hydraulic crane, overhead or gantry crane.

Safety in crane operation
Use of cranes in steel construction
Use of cranes in concrete construction

TERM WORK : Term work shall consist of assignments based on each unit of the above syllabus

BOOK RECOMMENDED

1) R.L.Peurifoy - Construction planning ,Equipments and Methods.
2) Dr. Mahesh Verma - Construction equipments and its planning and application
3) Dr.U.K. Shrivastava - Construction planning and Management
4) Dr. S.V. Deodhar - Construction equipment and planning
5) Sengupta - Construction Management and planning.
6) Chitkara - Construction Project Management
7) B.N.Dutta - Estimating and Costing
8) M.Chakroborty - Estimating and Costing
9) S.C.Rangwala - Estimating and Costing
10) B.S.Patil - Estimating and Costing -Vol-1& 2.

WATER RESOURCES ENGINEERING - II

Teaching Scheme:
Lectures: 4 Hours/Week
Practical: 2 Hour/Week

Examination Scheme:
Theory Paper: 100 Marks (3 Hrs)
Term Work: 25 Marks
Oral: 25 Marks

UNIT I **(11 Hrs., 20 marks)**

1. Dams: - Introduction, types of dams, selection of site for dam, choice of a dam, economical height of dam.
2. Gravity dams: - Introduction, forces acting on dam, elementary and practical profile, modes of failure and stability analysis and design of gravity dam, low and high dam. Construction and materials of construction, control of cracking, galleries, Joints and keys.

UNIT II **(09 Hrs., 20 marks)**

1. Introduction to arch dams (only elementary)
2. Spillways: - Introduction, spillway capacity, different types of spillways: their construction and suitability, design principles of Ogee spillway and siphon spillway.
3. Energy dissipation below spillway, types of hydraulic jump, jump height curves and tail water rating curves, various types of energy dissipators: Indian Standard stilling basins and buckets.
4. Gates: - Various types of spillway crest gates and their uses.

UNIT III **(10 Hrs., 20 marks)**

1. Earth dams :- Introduction, types ,elements of earth dam, basic design considerations, causes of failures, piping and its prevention, control of seepage, drainage in earth dams, phreatic line, stability of U/S and D/S slopes under various situations, introduction to rock-fill dam.
2. Diversion headworks :- Introduction, selection of site, types of weirs and barrages, layout of diversion headwork and its components and functions, causes of failures of weirs on permeable foundations and remedies, Hydraulic design of weir w.r.t. subsurface flow, safety against piping and uplift, Bligh`s, Lane' s and Khosla' theories.

UNIT IV **(10 Hrs., 20 marks)**

Canal irrigation :- Types of canals, canal alignment.

Design of c/s of unlined stable channels in alluvium: Kennedy's and Lacey's theory and their merits and demerits.

Preliminary sediment transport theory, critical tractive force, suspended and bed loads.

Design of c/s of unlined channels in alluvial soil according to IS 7112 – 1973 : Lacey's method and tractive force approach.

Design procedure for L – section for an irrigation canal, balancing depth, losses in canals, schedule of area statistics and channel dimensions, Garret's and Lacey's diagrams.

Lining of irrigation canals, advantages of lining, economics of linings, types of linings. Design of lined Channel, land drainage, discharge and spacing of closed drain.

UNIT V **(08 Hrs., 20 marks)**

1. Canal Masonry Works:- Cross drainage works: necessity, types, selection, comparative merits and demerits. Various types of falls: introduction and necessity (no mathematical treatment for any of above structures)

2. River training works:- necessity and types of river training works and bank protection and their construction details. (No mathematical treatment)
3. Hydropower: - general features of hydropower development, advantages of hydropower, types of hydropower plants and their layouts, assessments of power potential, load factor, capacity factor, diversity factor.

TERM WORK

Minimum six out of following assignments should be performed:-

1. Stability analysis of a gravity dam.
2. Stability analysis of slope of earth dam.
3. Design of Ogee spillway with energy dissipator
4. Analysis of weir on permeable foundation by using Khosla's charts.
5. Design of unlined canal in alluvium by using Garret;s /Lacey 's diagrams (at least three sections
   along the alignment.) and ploting L-section, also preparing schedule of area statistics and Channel dimensions.
6. Any one of the following :
   1. Analysis and layout and section of any one type of cross drainage work or fall or regulator .
   2. Any one type of river training work.
   3. A typical layout of high head hydropower plant and functions of components.
7. Report based on visit to any dam or hydropower plant.
8. Benefit - cost analysis of a water resources engineering project.

ORAL EXAM:- Based on the above T.W.

Imp. Note:- Following charts should be provided to students of B.E. (civil) during theory paper.

i) Dr. A.N. Khosla's curves for design of weir on permeable foundation.
ii) Gaarret's & Lacey's diagrams for design of canals

BOOKS RECOMMENDED:-

- Dr. P.N. Modi, Standard Book House , Delhi. - Irrigation, Water Resources and Water Power Engg.
- S.K.Garg - Irrigation Engg. and Hydraulic Structures .
- Dr. B.C.Punmia - Irrigation Engg. and Water Power Engg..
- Varshney ,Gupta, Gupta -Theory and design of Irrigation structures, Volume I and II .
- Bharat Singh - Irrigation Engg.
- K.B.Khushlani - Irrigation Engg. .
- Justin , Hinds - Irrigation Engg. and Practice

NORTH MAHARASHTRA UNIVERSITY JALGAON
UNDER GRADUATE COURSE IN CIVIL ENGINEERING (ELECTIVE– II)

WATER POWER ENGINEERING

Lectures : - 04 Hours/ Week	Theory paper :- 100 Marks
Practicals : - 02 Hours / Week	Duration :- 3 Hours
Term Works: - 25 Marks	

UNIT -I

General – Conventional Source of Energy, Status of Electrical Power in the World and India, Advantages and dis-advantages of hydro-electric power over other conventional sources, Place of hydropower in the power system, Investigation and studies for hydro power development.

Estimation of Water Power Potential – Mass Curve, Flow Duration Curve, Firm Power & Secondary Power, Power Duration Curve (Available Power)

Power Plant Economics – Types, Factors affecting outline design, Useful Life, Connected Load, Maximum Demand, Demand Factor, Load Factor, Load Curve, Base & Peak Load, Plant Capacity Factor, Plant Use Factor, Diversity Factor, , Economic Load Sharing between Base Load & Peak Load Power Stations., Cost of Electrical Energy, Energy Rates (Tariff)

UNIT- II

Classification of Hydro-electric Power Plants – Run-Of -River Plant, Valley Dam Plant, Diversion Canal Plant, High Head Diversion Plant – General Arrangements & Different Layouts

Storage and Pondage, Pondage Factor

Pumped Storage Plants – Essential Requirements, Necessity, Advantages, Classification of PSP development, Relative Merits of Different Arrangements, Problems in Operation, Layout & Economics

Tidal Power Plants - Principles of power generation - components of power plant – Single and two basin systems – Turbines for tidal power - Estimation of energy – Maximum and minimum power ranges

UNIT- III

Surface Power Stations – Structure, Dimensions, Lighting & Ventilation, Variations in design

Underground Power Station – Location, Types of Layout, Components, Advantages

Penstock & Accessories – Classification, Design Criteria, Economical Diameter, Anchor Blocks, Conduit Valves, Bends & Manifolds Water Hammer & Surges in Penstocks – Phenomenon, Resonance, Surge Tanks Intakes – Types, Losses, Air Entrainment, Inlet Aeration

UNIT- IV

NON CONVENTIONAL ENERGY -

Biomass energy - Bio fuel classification – Examples of thermo chemical, Pyrolysis, biochemical and agrochemical systems – Energy farming – Direct combustion for heat – process heat and electricity – Ethanol production and use – Anaerobic digestion for biogas – Different digesters – Digester sizing – Applications of Biogas

Solar Energy - Availability - Solar radiation data and measurement - Estimation of average solar radiation - Solar water heater types - Heat balance – Flat plate collector efficiency – Efficiency of heat removal - Thermo siphon flow calculation - Forced circulation calculation - Evacuated collectors - Basics of solar concentrators Solar Energy Applications - Solar air heaters – Solar Chimney - Crop driers - Passive solar system - Active solar systems - Water desalination - Output from solar still – Principle of solar ponds.

UNIT- V

Wind Energy – Nature of wind – Characteristics – Variation with height and time – Power in wind –Aerodynamics of Wind turbine – Momentum theory – Basics of aerodynamics – Aerofoils and their characteristics – HAWT – Blade element theory – Prandtl's lifting line theory (prescribed wake analysis) VAWT aerodynamics – Wind turbine loads – Aerodynamic loads in steady operation – Yawed operation and tower shadow.

Wind Energy Conversion System – Siting – Rotor selection – Annual energy output – Horizontal axis wind turbine (HAWT) – Vertical axis wind turbine (VAWT) – Rotor design considerations – Number of blades – Solidity - Blade profile – Upwind/Downwind – Yaw system – Tower – Braking system - Synchronous and asynchronous generators and loads – Integration of wind energy converters to electrical networks – Inverters – Control system – Requirement and strategies – Noise – Applications of wind energy

Term Work - Assignment –

The term work shall consist of eight assignments, which should include minimum one assignment from each unit.

The term work shall include a visit report on Hydroelectric Power Station and Wind Farm.

References:

1. Water Power Engineering / M. M. Dandekar & K. N. Sharma
2. A text Book of Water Power Engineering / R.K.Sharma & T.K.Sharma
3. Renewable Energy Resources / John Twidell and Tony Weir / E & F.N.Spon
4. Solar Energy - Principles of thermal collection and storage/ S.P. Sukhatme / TMH
5. Solar Heating and Cooling / Kreith & Kreider

Wind Energy Handbook / Tony Burton, David Sharpe, Nick Jenkins and Ervin Bossanyi / WileyWind Electrical Systems / S.N.Bhadra, D.Kastha and S.Banerjee / Oxford

GEOGRAPHICAL INFORMATION SYSTEM (GIS)

Lectures : - 04 Hours/ Week | Theory paper :- 100 Marks
Practical : - 02 Hours / Week | Duration :- 3 Hours
Term Works: - 25 Marks

UNIT -I

Introduction to GIS – Definition, Sources & types of data, Concept of Space and Time, Spatial Information Theory, History of GIS, Objectives, Elements, Hardware & Software requirements and applications of GIS

Data Models of Spatial Information – Layers and Coverages, Conceptual model, Object based network and field model,

Representation of SDM in computer – Raster & Vector models, Comparision

Data Models of Non-Spatial Information – Database Management Systems, Hierarchical Structures, Network Structures, Relational Structures

UNIT- II

Digitizing Editing and Structuring of Map Data – Digitizing manual, semi-automatic

Editing – Error detection and correction

Tolerances – TIC Match, Fuzzy, Node Snap, Arc Snap, Weed, Grain Tolerance

Topology creation, Attribute Map Generation

Digital Elevation Model – Needs of DEM, Various Structures of DEM- Line, TIN, Grid, Products derived from DEM

UNIT- III

Spatial Data Analysis –

General – Attribute quarry, and spatial quarry, Single and Multi-layer operations, Spatial modeling, Network and surface analysis

Vector based spatial data analysis – Topographical overlays, logical operators, conditional operators, proximity operators.

Raster based spatial data analysis – Local functions, focal functions, zonal functions, global functions, area numbering, cost surface analysis, optimal path analysis, proximity search

UNIT- IV

Use of GIS for Water Resources and Management – Water Resources Potential Estimation, Analysis & Estimation of Sediment in Reservoirs, Water Supply Systems Planning and Management, Waste Water Planning and Management, Role of Remote Sensing and GIS in Ground Water exploration, Use of GIS for Watershed Planning and management

UNIT- V

LAND RESOURCES: Land evaluation and suitability studies by Remote Sensing and GIS. Techniques of Landuse/Land cover map preparation. Landuse/ Landcover mapping and planning.

Municipal GIS - Landuse - Statistics as a basis for Environmental Planning, Solid and Hazardous waste disposal site selection.

Use of GIS for Agricultural Practices and Management

List of Practical / Term work Assignments –

The term work shall consist of any six practical/ assignments.

1. Data quality and sources of errors
   i) Nature of sources of geographical data

ii) Sources of errors in GIS database

iii) Data quality parameters

2. Map scale and projections

    i) Information on various scales

    ii) Need of projection

    iii) Spherical co-ordinate system

    iv) Properties of map projections

3. Preparation of vector database and maps: manual method for point line and area entities.
4. Preparation of a raster database and map: manual method for point line and area entities.
5. Measurement of distance between two points for vector and raster data.
6. Measurement of area - vector and raster data.

    i) Image enhancement

    ii) Filtering - Low Frequency

    iii) Linear edge enhancement

    iv) Band rationing

    v) Ground truth data collection

7. GIS operations

    i) Overlay Analysis

    ii) Buffer Analysis

    iii) Map Algebra

    iv) Multicriteria and Querry Analysis

    v) GPS

Text / Reference Books -

1. Burroughs, P. A (1986): Principles of Geographical Information Systems for land Resources Assessment, Oxford University Press
2. Environmental Systems Research Institute (1993): Understanding GIS: The Arc Info method
3. Training Course for GIS for resource management and development planning: Lecture notes, V1: GIS Fundamentals and Techniques, Government of India
4. Bernhardsen, Tor (1999): Geographic Information Systems: An Introduction, John Wiley and Sons
5. Clarke, Keith C. (1999): Getting Started with Geographic Information Systems, Prentice Hall
6. Demers, Michael N. (2000): Fundamentals of Geographic Information Systems, John Wiley
7. Haywood, Ian (2000): Geographical Information Systems, Longman
8. Chang, Kang-taung (2002): Introduction to Geographic Information Systems, Tata McGraw-Hill
9. Williams, Jonathan (1995): Geographic Information from Space: Processing and Applications of Geocoded Satellite Images, John Wiley and Sons

10. Geographic information Systems by Jeffery star, John Esstes Prentice Hall 2004.
11. Fundamental of Geographic Information Systems -Demers 2001 Edition.
12. Geographic Information Systems: An Introduction, By Tor Bernhardsen, Jhon Wiley and Sons, 2005
13. Remote Sensing and Image Interpretation by T.M.Lillesand and R.W.Kiefer, John Wiley, Third Edition, 2005
14. GIS Applications for Water, Wastewater, and Stormwater Systems, U.M. Shamsi, A CRC Press Book, 2004

INDUSTRIAL WATER POLLUTION CONTROL

Lectures : - 04 Hours/ Week	Theory paper :- 100 Marks
Practical : - 02 Hours / Week	Duration :- 3 Hours
Term Works: - 25 Marks	

UNIT -I

Sources and Characteristics of Industrial water – Source and characteristics of waste water, Industrial waste survey, In-plant waste control and water reuse, Estimation of organic contents, Measurement of effluent toxicity.

Different water quality requirements of various industries for different pressure boiler feed waters, cooling water and process water. Waste generation and characterization from different industries like paper and pulp, breweries and distilleries, tanneries, textile, dairy, fertilizer, sugar mill, steel, oil refinery, petrochemical and pharmaceutical industries.

Pre & Primary Treatment – Equalization, Neutralization, Sedimentation, Oil separation, Sour water strippers, Floatation, Coagulation, Precipitation and Heavy Metal Removal

UNIT- II

Aeration and Mass Transfer – Mechanism, Equipment, Air Stripping of VOC.

Aerobic Biological Oxidation – Mechanism of Organic Removal,, Bio-oxidation mechanism, Sludge Quality Consideration, Soluble Microbial Product formation, Bio inhibition of ASP, Nitrification and De-nitrification, Development of Process Design Criteria

Biological WW Treatment Process – Lagoons and Stabilization basins, Aerated Lagoons, Activated Sludge Process, Tricking Filtration, Anaerobic Decomposition, Rotating Biological Contractor, Evaluation of Anaerobic Treatment

UNIT- III

Adsorption – Theory of Adsorption, Properties of activated carbon, The PACT process

Ion Exchange – Theory of Ion Exchange, Plating Waste Treatment

Chemical Oxidation – Introduction to stereochemistry and applicability, Hydro thermal process

Sludge Handling & Disposal – Characteristics of Sludge for disposal, Aerobic digestion, Gravity thickening, Floatation thickening, Gravity belt thickener, Centrifuge – Disk, Basket,

Filtration – Vacuum, Pressure

Sand Bed Drying, Land disposal of sludge, Incineration

UNIT- IV

Air Pollution – Definition of Air Pollution, Definition of Air Pollutants, Measurement of Air Pollution, Classification of Air Pollutants, Primary and Secondary Air Pollutants, Properties of major air pollutants,

Effects of Air Pollutants on Man, Vegetation, Animals and Materials

Meteorology and Plume Dispersion – Atmosphere, Zones of Atmosphere, Scale of Meteorology and different meteorological parameters affecting pollutnant's dispersion in atmosphere, Temperature Lapse Rate, Plume behavior, Gaussian Plume Model, Plume Rise in Atmosphere, Different formulae for estimation of stack height.

UNIT- V

Global Effects of Air Pollution – Green House Effect, Effects of Particulate on earth-atmosphere heat balance, Heat Islands, Acid rains and Ozone holes

Air Pollution Control – Atmospheric Cleansing Process, Approaches to Contaminant Control, Control Devices for Particulate Contaminants – Gravitational Settling Chambers, Centrifuge Collectors, Wet Collectors, Bag house filters & Electrostatic Precipitators Control Devices for Gaseous Contaminants – Adsorption, Absorption, Condensation, Combustion, Automotive Emission Control

Practical & Term Work - Assignment –
(Total 12 = 7 Experiments + 3 Assignments)

GROUP – A "Experiments" - (Minimum Seven Practical should be performed – (4 from Water Pollution Monitoring and 3 from Air Pollution Monitoring)

WATER POLLUTION MONITORING - Estimation of -

i) Hardness by EDTA Method
ii) Ammonia/Nitrogen
iii) Nitrite/Nitrogen
iv) Estimation of phosphates
v) Sulfate by Spectrophotometric & Turbiditimetric Method
vi) Biological Oxygen Demand
vii) Chemical Oxygen Demand
viii) Fluorides by SPADNS Reagent
ix) Heavy metals by AAS
x) Pesticide Residue Estimation

AIR POLLUTION MONITORING : Estimation of -

i) NOx
ii) SOx
iii) Particulate matter
iv) Hydrocarbon

GROUP – B "Assignments" - (Minimum three assignments)

1. Determination of Concentration of Air Pollutants by using the Air Pollution Dispersion Models
2. Design of Height of Stacks
3. Design Problems on Air Pollution Control Equipments

References:

1. Pevy et al Environmental Engineering, McGraw Hill International, New Delhi, 2004,
2. W.Wesley Eckenfelder, Industrial Water Pollution Control, McGraw Hill International Edition, 2003
3. Sincero & Sincero, Environmental Engineering – A Design Approach, Prentice Hall India, 2002
4. Sewage Disposal and Air Pollution Engineering, Khanna Publisher, New Delhi, 2004
5. Goel PK, Water Pollution – Causes, Effects and Control, New Age Publications, New Delhi 2001
6. Waste Water Treatment , M.N.Rao and A.K. Dutta, 1987, Oxford & IBH Pub.Co.
7. Environmental Pollution Control, C.S.Rao, 1993, Wiley Eastern Ltd.
8. Industrial wastes their disposal and treatment W. Rudolfs 1997.
9. Industrial environment, assessment and strategies S.K. Agarwal 1996.

NORTH MAHARASHTRA UNIVERSITY JALGAON
B.E. (CIVIL)

W.E.F : 2008- 09

TERM - II
SITE VISIT / CASE STUDY

Teaching scheme:	**Examination scheme:**
NIL	**Term Work : 25 Marks**

EDUCATION TOUR / TECHNICAL VISITS / CASE STUDY AND ITS EVALUATION

1. During (B.E. First Term / Second Term) seventh and / or eighth terms or during vacation between (B.E. First Term / Second Term) seventh and eighth terms, every student; shall visit minimum two construction sites / industries arranged by college and accompanied by teachers. The colleges should obtain appropriate certificates of visit from the concerned organizations just after the visits.

2. Students should submit written report about the visits individually at the end of (B.E. Second Term) eighth term.

3. The report should contain information about the following points:

   (a) The organization - activities of organization and administrative setup technical personnel and their main duties.
   (b) The project / industry brief description with sketches and salient technical information.
   (c) The work / processes observed with specification of materials, products, equipments etc. and role of engineers in that organization.
   (d) Suggestions (if any) for improvement in the working of those organizations.

4. The evaluation of the report of technical visits will be made by panel of two teachers appointed by principal.

NORTH MAHARASHTRA UNIVERSITY JALGAON
B.E. (CIVIL)

W.E.F : 2008- 09

TERM - II
PROJECT II

Teaching scheme:
Practicals: 4 hrs / week

Examination scheme:
Oral : 50 Marks
Term Work :100 Marks

1. The Project group in (B.E. first Term) seventh term will continue the project work in (B.E. Second Term) eighth term and complete project in all respect .
2. The guides should regularly monitor the progress of the project work.
3. The project work along with project report should be submitted as part of term work in (B.E. Second Term) eighth term on or before the last day of the (B.E. Second Term) eighth term
4. Assessment of the project for award of TW marks shall be done by the guide and a departmental committee (consisting of minimum two teachers with experience more than three years) as per the guidelines given in the following table.

B) ASSESSMENT OF PROJECT II TERMWORK (B.E. SECOND TERM)

NAME OF THE PROJECT: ____

NAME OF THE GUIDE: ____

Sr. No	Exam. Seat No	Name Of Students	Assessment by guide (70%)						Assessment by department (30%)			Grand Total
			Fabrication /software / actual work	Execution of project	Project report	Scope/ Cost / Utility	Attendenece	Total	Evaluation (10%)	Presentaion (20%)	Total	
		Marks	20	10	20	10	10	70	10	20	30	100

Sign of Guide   Sign. of Committee Members   Sign. of H. O. D.

7. The guide should be internal examiner for oral examination.

8. The external examiner should be from the related area of the concerned project.

9. The evaluation at final oral examination should be done jointly by the internal and external examiners.

NORTH MAHARASHTRA UNIVERSITY, JALGAON
STRUCTURE OF TEACHING AND EVALUATION
S.E.(COMPUTER ENGINEERING)

First term

W.E.F. 2006-07

Sr. No.	Subject	Teaching Scheme Hours/week			Examination Scheme				
		Lectures	Tutorial	Practical	Paper Duration Hours	Paper	TW	PR	OR
1	Analog Electronics	4	--	2	3	100	25	25	- -
2	*Discrete Structure and Graph Theory	4	--	--	3	100	--	--	--
3	*Digital Systems and Microprocessor	4	--	2	3	100	50	25	--
4	*Industrial Management and Economics	4	--	--	3	100	--	--	--
5	*Engineering Mathematics-III	4	1	--	3	100	25	--	--
6	*Programming Laboratory-I	3	--	4	--	--	50	50	--
	Total	**23**	**1**	**8**	**--**	**500**	**150**	**100**	**--**
	Grand Total	**32**			**750**				

SECOND TERM

Sr. No.	Subject	Teaching Scheme Hours/week			Examination Scheme				
		Lectures	Tutorial	Practical	Paper Duration Hours	Paper	TW	PR	OR
1	*Microprocessor-I	4	--	2	3	100	25	25	--
2	*Data Structure and Files	4	--	4	3	100	50	50	--
3	*Computer Organization	4	--	--	3	100	--	--	--
4	Digital System Design	4	--	--	3	100	--	--	--
5	*Data Communication	4	--	--	3	100	--	--	--
6	*Programming Laboratory-II	2	--	4	--	--	50	50	--
	Total	**22**	**--**	**10**	**--**	**500**	**125**	**125**	**--**
	Grand Total	**32**			**750**				

* Common subject with SE(IT)

NORTH MAHARASHTRA UNIVERSITY, JALGAON

SE (COMPUTER ENGINEERING)
(w.e.f. 2006-07)

TERM – I

ANALOG ELECTRONICS

Teaching Scheme:	**Examination Scheme:**
Lectures: 4 Hrs / Week	Theory Paper: 100 Marks (3 Hrs)
Practical: 2 Hrs / Week	Term work: 25 Marks
	Practical: 25 Marks

Unit – I

Basic Definition, ideal and practical voltage and current sources, dependent and independent voltage and current sources, Linear, unilateral, bilateral networks.
Loop and node analysis (DC & AC).
Network Theorems – (AC & DC) (including controlled sources) superposition, Thevenin's and Norton's and Maximum power theorem, principle of duality.
(10 Hrs, 20 Marks)

Unit – II

Transistor at low frequencies: Analysis of an amplifier using h-parameters A_I, R_i , A_V, A_{VS}, A_{IS}, R_O. CE, CB, CC configurations, Miller's theorem, Miller's Dual theorem.
Transistor at high frequencies: CE hybrid Π-model, significance, CE short circuit current gain and current gain with resistive load. (10 Hrs, 20 Marks)

Unit – III

Cascade Configurations – CE-CE, CE-CB, CE-CC, CC-CC (Darlington pair), Bootstrapping, Emitter coupled differential amplifier (DC analysis and AC analysis for Ad, Ac and CMRR using h-parameters), square wave testing.
Large signal amplifier: Class A – Direct coupled, Transformer coupled, Class A push-pull, Harmonic distortion. (10 Hrs, 20 Marks)

Unit – IV

FET biasing: JFET and MOSFET biasing (Q point). Low frequency analysis CS configurations.

Feedback amplifier: Classification, block diagram of general feedback concept (Negative), Relation between A_F and A, Block diagram of A feedback amplifier topologies, General characteristics and advantages of negative feedback amplifier.

Oscillator: Barkhausain criterion, Phase shift oscillator, Wein bridge oscillator, Collpits oscillator, Hartley oscillator, Clapp oscillator (no derivations). (10 Hrs, 20 Marks)

Unit – V

Voltage Regulators:

Performance parameters of regulators; Zener shunt, transistor shunt, emitter follower type series regulator and controlled transistor regulators. (Analysis of Sv and Ro)

Protection circuits: Short-circuit protection, current limiting and feedback current limiting

IC Regulators: Block diagram of 3 PIN IC regulators, LM317, 340 for fixed voltage, adjustable output and current regulator IC723 for low voltage and high voltage as well as current boosting.

SMPS and UPS (Block diagram and working only)

(10 Hrs, 20 Marks)

List of experiments -

1. Study of Superposition and Thevenin's theorem
2. Square wave testing of an amplifier.
3. To plot the frequency response of single stage CE amplifier.
4. To measure mid-band voltage gain of CE from transistor stage followed by CC stage.
5. Find CMRR of Emitter coupled differential amplifier.
6. Push Pull class B power amplifier cross over distortion & its elimination.
7. To calculate the mid-band voltage gain of single stage FET amplifier.
8. Study of LC oscillator
9. Study of Crystal oscillator
10. Load regulation of controlled transformer series regulator
11. Adjustable output and current regulation using IC LM377 and 340
12. Study of SMPS

Term work should include minimum 8 (eight) experiments from above list.

Reference Books -

1. Singh "Electronic Devices and Integrated Circuits", Pearson
2. R S Shedha " Electronic Devices and circuits ", S Chand Publications
3. Salivahanan " Electronic Devices and circuits ", TMH
4. Ramakant A. Gaikwad "Op-Amp and Linear Integrated circuits". 3rd" Ed., Pearson
5. M.E.Van Valkenberg, "Network Analysis", Pearson
6. Boylestad, Kishor "Electronic devices and Circuit Theory", Pearson

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NORTH MAHARASHTRA UNIVERSITY, JALGAON

SE (COMPUTER ENGINEERING / INFORMATION TECHNOLOGY)
(w.e.f. 2006-07)

TERM – I

DISCRETE STRUCTURE AND GRAPH THEORY

Teaching Scheme:	**Examination Scheme:**
Lectures: 4 Hrs / Week	Theory Paper: 100 Marks (3 Hrs)

Unit - I

Sets, Logic and Proofs

Propositions, proposition and logical operations, Conditional Statements, Propositional Calculus, Quantifiers: universal and existential quantifiers, methods of proofs, Set Theory: Set, Combinations of Sets, Finite and Infinite sets, uncountably infinite sets, Mathematical Induction, Principle of inclusion and Exclusion.
Discrete Probability, Information and Mutual information (10 Hrs, 20 Marks)

Unit - II

Relations, functions, Recurrence Relations
Definitions, properties of Binary relations, Equivalence Relations and partitions, Partial ordering relations and lattice, chains and antichains, Transitive Closure and Warshall's Algorithm.
Functions Definitions, Pigeonhole principle.
Recurrence Relation, Linear Recurrence Relations with constant Coefficients, Homogeneous Solutions, Particular Solutions, total solutions, Solution by the method of generating functions.
(10 Hrs, 20 Marks)

Unit - III

Graphs
Basic terminology, multigraphs and weighted graph , paths and circuits , shortest path algorithms, Euler and Hamiltonian Paths and circuits , factors of a graph, Planer graph and Kuratowski theorem, graph coloring.
Trees
Trees, rooted trees, path length in rooted trees, prefix code, binary search trees, spanning trees and cut set, minimum spanning trees, kruskal's and prim's algorithms for minimum spanning tree.
(10 Hrs, 20 Marks)

Unit - IV

Analysis of Algorithm and Algebraic systems - Time Complexity of algorithms, shortest path algorithms, complexity of problems, tractable and intractable problem.
Algebraic system - Groups, subgroups, Isomorphisms and Automorphisms, Homomorphisms and Normal subgroup, Rings, Integral domains and fields. (10 Hrs, 20 Marks)

Unit - V

Boolean algebra - Lattice and Algebraic systems, Principle of duality, basic properties of lattice defined by lattices, distributive and complemented lattices, Boolean lattices and Boolean algebras, Boolean functions and Boolean Expressions.
Binary Number systems- binary, octal, hex conversion. Application of Boolean algebra.
(10 Hrs, 20 Marks)

Reference Books

1. C.L. Liu , " Elements of Discrete Mathematics", 2nd edition, TMH
2. Kenneth H. Rosen, Discrete Mathematices and its Application, 5th edition, TMH
3. Lipschutz, lipson, " Discrete Mathematics", 2nd edition, TMH
4. V. K. Balakrishnan, " Graph Theory", TMH
5. B. Kolman , R. Busby and S. Ross, "Discrete Mathematical Structures" 4th edition, Pearson
6. J. Treamblay , R. Manohar ," Discrete Mathematical structures with application to computer science" , TMH

NORTH MAHARASHTRA UNIVERSITY, JALGAON

SE (COMPUTER ENGINEERING / INFORMATION TECHNOLOGY)
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TERM – I

DIGITAL SYSTEMS AND MICROPROCESSOR

Teaching Scheme:
Lectures: 4 Hrs / Week
Practical: 2 Hrs / Week

Examination Scheme:
Theory Paper: 100 Marks (3 Hrs)
Term work: 50 Marks
Practical: 25 Marks

Unit – I

Review of fundamental concepts: Basic gates, universal gates & Exclusive gates. Digital Signal, Positive & Negative logic,
Boolean Algebra: Boolean postulate and Theorems, Examples of realization of Boolean functions using Boolean algebra.
Introduction to digital logic families: DTL, TTL & CMOS (10 Hrs, 20 Marks)

Unit – II

Combination logic design: Standard representation of logical function, K map representation of logical function, simplification of logical function using K map, for 2, 3 & 4 variables. K map with Don't care condition. Introduction to five and six variable K map with don't care condition. Design of half adder, full adder, half sub tractor, full sub tractor (10 Hrs, 20 Marks)

Unit – III

Combination logic design examples: Various Example of combinations logic circuit (truth table – K map – circuit diagram) with the help of K map and their implementation with the help of Basic/Universal gates.
Design of multiplexer & Demultiplexer: Design of comparator circuits using logic gates. Design of parity generator & checker circuit using logic gates
Introduction to sequential logic circuit: function of one bit memory cell, Truth table and excitation tables of S – R, JK, D & T Flip – Flop. (10 Hrs, 20 Marks)

Unit – IV

8085 Microprocessor
Introduction to 8085 Microprocessor - Architecture, functional pin diagram, register model , programming model , Bus architecture
Instruction Set of 8085 - Instruction cycle, fetch operation, execute operation machine timing diagram for op code fetch cycle, memory read, I/O read, memory write, I/O write, various addressing modes, various instruction set such as data transfer group, arithmetic group, logical group, branch group, stack, input, output and machine control group, instruction format, various addressing modes (10 Hrs, 20 Marks)

Unit – V

8085 assembly programming - Assembly Language, comparison of high level language and assembly language , role of assembler, Assembly language programming of 8085: addition and subtraction of 8 and 16 bit numbers, one's and two's complements of 8 and 16 bit numbers, multiplication and division of 8 and 16 bit numbers, largest and smallest number using array, sorting of numbers using array, finding square from look up table, square root of number, program related to shift and masking operation of 8 and 16 bit numbers.

(10 Hrs, 20 Marks)

List of Experiments

Group A

1. Verification of the truth table of logic gates and verification of De Morgan's theorem.
2. Construction of basic gates using universal gate (NAND / NOR)
3. Construction of half adder & full adder circuit. Implementation of full adder with the help of two half adder circuit & one OR gate.
4. Construction of Half subtractor & full subtractor Circuit.
5. Conversion of Gray to Binary and Binary to gray code.
6. Verification of truth table of multiplexes & flip flops.

Group B (8085 Assembly Language Programming)

1. Addition and subtraction of 8 and 16 bit numbers
2. Determining maximum and minimum elements in array
3. Verification of look up table for BCD to 7 Segment conversions
4. HEX To BCD and BCD to HEX conversion
5. Arranging the numbers in ascending and descending order
6. Shift and mask off operation of 8 bit number

The term work should include minimum four experiments from Group A and minimum four experiments from Group B.

Reference Books

1. Modern Digital Electronics by R.P. Jain, 3rd Edition, TMH.
2. Digital Logic and Computer Design by M. Morris Mano, Pearson.
3. Fundamentals of Digital Circuits by A Anandkumar, Pearson.
4. Microprocessor and Interfacing , 2nd edition ,Douglas V Hall
5. Advanced Microprocessors and Interfacing , B Ram, TMH
6. Microprocessor architecture, programming and applications , 2nd ed , Ramesh Gaonkar
7. Introduction to Switching Theory and Logic Design, Hill and Peterson , John Wiley and Sons.
8. Digital system, James E Palmer, David E Parlman, McGraw Hill.

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TERM – I

INDUSTRIAL MANAGEMENT AND ECONOMICS

Teaching Scheme:	**Examination Scheme:**
Lectures: 4 Hrs / Week	Theory Paper: 100 Marks (3 Hrs)

Unit - I

History of Management, Scientific Management, & its Principles, Administration Management, Neo – Classical Theory, Gilberth's contribution, Modern management Theories, Relation between Administration and organization, Levels of managements, Function of Management.

(10 Hrs, 20 Marks)

Unit – II

Organizational structures: Line, functional, Line staff forms of Business ownerships: Proprietorship, partnership Joint stock Co - Pvt. Ltd. Co., public Ltd Co., Co-operative organizations, public sector, joint ventures, Their meanings, formation, Advantage, Limitations & Applications.

(10 Hrs, 20 Marks)

Unit – III

Engineering Economics. Wants, Utility, Demand, Supply, Elasticity of demand & supply. Capital: Fixed, Working capital, sources of finance Credit, shares, Debentures, ploughing Back, Loans from banks, Trade Public Deposits, financial Institution, foreign capital. Cost Estimating, Cost Accounting, Fixed costs, veriable costs selling price. (No Numericals)

(10 Hrs, 20 Marks)

Unit – IV

Manpower planning, factors affecting manpower planning sources of Recruitment, Need, objectives & benefits of Training, Method of Training workers, supervisors and Executives. Job Evaluation & Merit rating (Concept Only) Selling & Marketing Concept, Sales promotion, Advertising.

(10 Hrs, 20 Marks)

Unit – V

Quality (International Standard Organization of standards) ISO certificate Intellectual property rights (IPR), patents, Trademarks, copyrights, Management information system (MIS), Definition, Need & objectives of MIS, MIS & Computer, Designing of MIS, Application of MIS.

(10 Hrs, 20 Marks)

Reference Books –

1. Industrial Engineering & Production Management by M. Mahajan.
2. Engineering Management by Mazda, Pearson
3. Industrial Organization and Management by O.P. Khanna, Dhanpat Rai Publication
4. Management Information system by Jawdekar, THM
5. Information systems: Foundation of eBusiness by Alter, Pearson
6. Management by Stoner, Pearson

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TERM – I

ENGINEERING MATHEMATICS - III

Teaching Scheme:	Examination Scheme:
Lectures: 4 Hrs / Week	Theory Paper: 100 Marks (3 Hrs)
Tutorial: 1 Hr / Week	Term work: 25 Marks

Unit – I

Linear Differential Equation – Linear differential equation of order n, solution of LDE with constant coefficient, method of variation of parameters, equation reducible to linear form with constant coefficients, Cauchy's linear equation, Legendre's linear equation, Solution of simultaneous and symmetric simultaneous differential equation, applications to electric circuits.

(10 Hrs, 20 Marks)

Unit – II

Fourier and Z-transforms –
Fourier Transform (FT) – Fourier integral theorem, sine and cosine integrals, Fourier transform, Fourier cosine transform, Fourier sine transform and their inverses, Problems on wave equation.
Z-Transform – definitions, standard properties (without proofs), ZT of standard sequences and inverse, Solution of simple differential equations, Applications of Z-transform to discrete system analysis.

(10 Hrs, 20 Marks)

Unit – III

Laplace Transform (LT) – definition of LT, inverse LT, properties and theorems, LT of standard functions, LT of some special functions, (1^{st} order Bessel's periodic, unit step, unit impulses and ramp), Problems on finding LT and inverse LT, initial and final value theorems, applications of LT for network analysis.

(10 Hrs, 20 Marks)

Unit – IV

Statistics – mean, mode, median, standard deviation, variance, co-efficient of variation, Moments, skewness and kurtosis, Bivariate distribution, correlation and regression, rediability of regression estimates

Probability – Theorems on probability, Binomial distribution, Poisson distribution, Normal distribution

(10 Hrs, 20 Marks)

Unit – V

Probability – Beta distribution, Gamma distribution, Chi-square distribution

Theory of sampling – Sampling, types of sampling, sampling distribution, testing Hypothesis, Null hypothesis, level of significance, Test of significance, test of significance of large sample, decision quality control.

(10 Hrs, 20 Marks)

Text Books –

1. Advanced Engineering Mathematics – Erwin Kreyszig (Wiley Eastern Ltd)
2. Advanced Engineering Mathematics – H K Dass (S Chand)

Reference Books –

1. Advanced Engineering Mathematics – Wylie C R and Barrett, McGraw Hill
2. Higher Engineering Mathematics – B S Grewal, Kanna Publication
3. Engineering Mathematics – B V Raman, Tata McGraw Hill
4. Applied Mathematics Vol 1 and 2 – P N Wartikar and J N Wartikar (Pune Vidharthi Griha Prakashan Pune)
5. Advanced Engineering Mathematics with MatLab, 2^{nd} Edition – Thomas L Harman, James Dabney and Norman Richert , Thomas Learning

6. Engineering Mathematics – III – Dr. Gokhale, Dr. Chaudhary and Dr. Singh

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TERM – I

PROGRAMMING LABORATORY - I

Teaching Scheme:	**Examination Scheme:**
Lectures: 3 Hrs / Week	Term work: 50 Marks
Practical: 4 Hrs / Week	Practical: 50 Marks

Unit –I

Introduction to C - C Fundamentals, data types , constants , variables, Statements, operators, expressional, control statements.
Arrays - Representation and declaration of array one dimensional array, two dimensional array, multidimensional array.
Strings - Representation, array of string, operation on sitting.
Pointers - Fundaments, declaration, advantage, pointers to different data types , array and pointers, array to pointers, operations on pointers
Functions - Need function definition, prototype, function, parameter, recursion, scope of Variables in the function, library functions, passing array to function, pointer to function

Unit – II

Structure - Definition, declaration, array to structures, structures within structures, structures, and function, structures and pointers, self referential structures user defined data types – typedef .
Union - Need definition, operation, bit fields, difference between structure and union.
File Handling - Structure of file, file types, file operations
Macros - Substitution, File inclusion, complier, controlled directives.

Unit – III

Inter-conversion – Inter-conversion of Number system: decimal, binary, octal, hexadecimal.
System of liner equation - Gauss Elimination, Gauss Jordan, Jacobi or Gauss Siedel.
System of differential Equation - Taylor, Heun's method, Euler's modified method.

Unit – IV

Root of equations, Methods - Newton-Raphson, Raquel, faisi, Bolzano.
Interpolation - Newton backward, forward difference, table, divided difference.
Integration - Trapezoidal, Simpson's 1/3, 3/8 rule.

Unit – V

Permutation, Combination, powerset, Sorting - Insertion, Quick, Merge, Bubble, study of algorithms and implementation, analysis of sorting methods.

Searching - Linear search, binary search.

List of Laboratory Assignments -

1. Matrix Operation (Addition, Multiplication, Inverse)
2. Swapping of numbers using single pointer.
3. Processing student records using structure.
4. File manipulation opening closing, input and output operation files.
5. Program for macros.
6. Nesting of macro.
7. Macro with arguments
8. Inter conversion of number system.
9. To find value of unknown using Guass Elimination.
10. To find value of unknown using Guass Siedal.
11. To find root of equation using Newton Raphson.
12. To find root of equation using Regula-Falsi.
13. Find interpolating values using interpolation methods.
14. Find integral values using Simpson's 1/3, 3/8 rules.
15. Generation of Permutation for given list.
16. Generation of Combination for given list.
17. Generation of Power set.
18. String Operations.
19. Sorting using Bubble Sort.
20. Sorting using Quick Sort
21. Searching of given element using Linear search.
22. Searching of given element using Binary search.

The term work should include minimum 15 experiments from the above list.
The programs should be developed with integrated development environment (IDE) like Turbo C with emphasis on step by step development and debugging.

Reference Books -

1. M.K.Jain Iyanger "Numerical Method of Scientific and Engineering Computer" 3rd edition, New age publications.
2. E. Balaguruswami " programming in ANSI C" Tata McGraw Hill.
3. H. Schildt, " C The complete Reference" Tata McGraw Hill
4. Venugopal, K.R. and Prasad Sudeep R, "Programming With C" Tata McGraw Hill.
5. V. Rajaraman " Computer Oriented Numerical Methods" 3rd Edition Prentice Hall of India, Eastern Economy Edition.
6. Steven Chapra "Numerical Methods for Engineers" Tata McGraw Hill.
7. Ellis Horowitz and Sahani " Fundamentals of Data Structure" Tata McGraw Hill.
8. Kanetkar Y P, "Let us C" BPB Publications.

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TERM – II

MICROPROCESSOR - I

Teaching Scheme:	**Examination Scheme:**
Lectures: 4 Hrs / Week	Theory Paper: 100 Marks (3 Hrs)

Practical: 2 Hrs / Week

Term work: 25 Marks
Practical: 25 Marks

Unit – I

8086/ 8088 CPU architecture programming model Segmentation, Addressing modes, Instruction sets, Assembly language programming BIOS and DOS interrupts. (10 Hrs, 20 Marks)

Unit - II

BIOS AND DOS Interrupts:, Introduction to DOS, Assembly language Programming in MSDOS using BIOS and DOS Interrupts, programming Technique, Time delay loop, produce and macros. (10 Hrs, 20 Marks)

Unit – III

8086 Configuration:, Basic 8086 configuration, maximum and minimum modes, System bus timing, Interrupt priority management, programmable interrupt controller (PIC) 8259A 8089 (IOP) (10 Hrs, 20 Marks)

Unit – IV

Main memory design: 8086 CPU Read/ Write timing SRAM and ROM interfacing requirement, address decoding technique full partial block PROM, Troubleshooting the memory module. DMA: Basic DMA operation, 8237 DMA Controller

(10 Hrs, 20 Marks)

Unit – V

Multiprocessor Configuration: Queue status and block facility 8086 based multiprocessor system, co-processor configuration, closely coupled configuration Overview of loosely coupled configuration, 8087 NDP, 8087 Data types and processor architecture, 8087 programming. (10 Hrs, 20 Marks)

List of Experiments

Assembly language programming of 8086:

1. Study of BIOS and DOS interrupts
2. Study of MASM directives
3. Program for string manipulation
4. Program for password
5. HEX- BCD conversion
6. BCD- HEX conversion
7. BCD Addition
8. Program using MACRO
9. Program using NEAR procedure
10. Program using FAR procedure
11. Program to display Date and Time
12. Program using structures
13. Program using 8087 instruction set
14. Program using 8087 instruction set

The term work should include minimum 12 experiments. Program based on 8087 are compulsory.

Reference Book:

1. John E. Uffenbeck , “The 8086/ 8088 Family: Design, Programming and Interfacing, “ Pearson.
2. Douglas V. Hall “Microprocessor and Interfacing” Programming and Hardware” Pearson.
3. S.P. Dandomudi,“ Introduction to Assembly Language Programming – From 8086 to Pentium Processor” Springer.
4. Yu – Cheng Liu and Gleen A Gibson, “Microcomputer systems; The 8086 / 8088 Family Architecture, Programming and Design” 2nd Edition, Pearson.
5. Allen Wyatt, “Assembly Language Programming” QUE.
6. Peter Abel, “IBM PC Assembly Language and Programming” Pearson.
7. Barre B Brey “The Intel Microprocessor: 8085/ 8088, 80186/ 80286, 80386, 80186, Pentium, and Pentium Pro Processor- Architecture Programming and Interfacing” 4th Edition, Pearson.
8. A.K.Rai and K.M.Bhurchandi, “Advance Microprocessors and Principles- Architecture Programming and Interfacing” Tata McGraw Hill.
9. B.Ram “Advanced Microprocessors and Interfacing”, Tata McGraw Hill.

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TERM – II

DATA STRUCTURES AND FILES

Teaching Scheme:	**Examination Scheme:**
Lectures: 4 Hrs / Week	Theory Paper: 100 Marks (3 Hrs)
Practical: 4 Hrs / Week	Term work: 50 Marks
	Practical: 50 Marks

Unit – I

Introduction: Concept of data, data types, data objects, structure, abstract data type, (ADT) and study .Implementation of data structure.
Stack and Queues:- Fundamental of stacks and queues, Data Structure of stack and queues, Basic operations on stacks and queues, Disadvantages and applications of stacks and queues, Concept of circular queues, basic operation on stacks and queues, Multi-stack and queues, priority queues.
Applications of Stacks:- Polish notation (infix, postfix, prefix) Evaluation of prefix and postfix expression , inter conversion of infix, prefix and postfix expression. Use of stack by function call and recursive function call, Multi-stack machines, Parenthesis matching, Towers of Hanoi, Queue application. (10 Hrs, 20 Marks)

Unit – II

Linked list: Concept of Linked list, Basic Operations on a single linked list (Creation, insertion, deletion, traversing, concatenating, inverting and length finding) Linked stack and Queues, circular linked list, advantages of circular linked list, erasing circular linked list, Double linked list with basic operations like copy, storing polynomial using linked list, polynomial addition, and Generalized list, operations like copy, and equal depth on generalized list, Data representation for strings, pattern matching in string.

Storage Pool :- Initializing Storage Pool, allocating and (GETNODE) and deal locating (RET) a node Dynamic storage Management Procedure for allocation and freeing of blocks, First Fit, Best fit and Worst fit memory allocation Strategies. (10 Hrs, 20 Marks)

Unit – III

Binary Tree: Basic terminology, Data structure and representation of binary tree, Binary tree traversal, and recursive and non recursive procedure for tree traversal, basic operations on binary tree, (Creation, insertion, deletion, printing, copy, equal and depth finding) Threaded binary tree, insertion in order threaded binary tree, In order traversal of in order threaded binary tree, Concept of binary search tree, Static tree labels, Huffman, Algorithms, Constructions, of optimal binary search tree, Dynamic tree tables, Basic Operation on it-insertion, deletion, height balanced binary tree, LL, LR, RL, RR Rotations (10 Hrs, 20 Marks)

Unit – IV

Sorting - Algorithm for bubble sort, Insertion sort, Quick sort, selection sort, shell sort, merge sort, Heap sort, Radix sort, Radix exchange sort, Best average and worst case time complexity of each of the sorting and searching Algorithm
Hashing: Hashing function, overflow handling, collision, linear probing deletion, clustering re-hashing bucket and chaining selection of good hash function (10 Hrs, 20 Marks)

Unit – V

File Handing - Sequential and Relative Files: Description and organization, primitive operations on sequential and relative file.
Direct access file - Description and organization, primitive operations on direct access files
Indexed Sequential files and Indexes:-Description and organization, primitive operations on indexed sequential files, Indexed concept, linear indexes, tree indexes, algorithm for B-tree.
Multi Indexed files:- Description and organization of Inverted files, Multi list files, and algorithms for addition and deletion of records from the files. (10 Hrs, 20 Marks)

List of Experiments

List of programming assignments to be developed in C/C++ with emphasis on developing debugging abilities

1. Implementation of stack using array or linked list
2. Implementation of Queue using array or linked list
3. Implementation of circular Queue using array or linked list
4. Conversion of Infix expression to postfix expression
5. Conversion of postfix expression to infix expression
6. Addition of two single variable polynomial using linked list
7. Implementation of double linked list and perform insertion, deletion and searching
8. Creation of binary tree and perform all non-recursive traversals.
9. Creation of binary search tree and perform insertion, deletion printing and in a tree shape.
10. Implementation of pattern matching in starting using linked listed.
11. Create a hash table and handle the collisions using liner probing with or without replacement.
12. Implementation of simple index file.
13. Insertion and deletion of a record from a direct access file using changing with and without replacement.
14. Insertion and deletion of a record from a sequential file.
15. Insertion and deletion of a record from a relative file
16. Insertion and deletion of a record from a multi list file

Term work should be minimum 12 experiments from the above list.
The programs should be developed with integrated development environment (IDE) like Turbo C with emphasis on step by step development and debugging.

Reference Books -

1. Ellis Horowitz and Sahani, “Fundamentals of data Structure” Galgotia.
2. Thomas R. Harborn, “ File system and Algorithms”, Prentice- Hall International
3. Trembaly and Sorenson “An Introduction to Data structures with Applications” Tata McGraw Hill.
4. Tannenbaum, “Data Structure C and C++, Pearson.
5. Sahani, “Data Structures, Algorithms and Applications in C++ McGraw Hill.
6. Seymour Lipschutz, “Data Structures”, Schaum’s Outline.
7. Weiss, “Data structure and Algorithm analysis in C”, Pearson

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TERM – II

COMPUTER ORGANIZATION

Teaching Scheme:	Examination Scheme:
Lectures: 4 Hrs / Week	Theory Paper: 100 Marks (3 Hrs)

Unit – I

Introduction to system concepts: Functional Units, Basic operational concepts, instruction formats for machines, fixed and expanding opcodes, zero, two and three address schemes, concept of stack processor. General Addressing Modes.
Processor Organization: Instruction set design. 68000 architecture – Register structure and addressing modes, normal and exceptional processing. Bus structures. (10 Hrs, 20 Marks)

Unit – II

Information representation, Big-endian and little-endian, data types, fixed and floating point representation, IEEE format for floating point and decimal algorithm, Booths algorithm, bit pairing methods, Restoring and non-restoring division algorithm. Floating point operations, guard bits and rounding (10 Hrs, 20 Marks)

Unit – III

Control unit design, design levels, one / two / three bus CPU, hardwired control design methods and implementations, Microprogrammed control unit concepts and control unit design considerations, Wilkes design, Nano programmed computers, bit-slice architecture, 2900 family CPU designs, emulation. (10 Hrs, 20 Marks)

Unit – IV

Memory Organization: Memory hierarchies, memory interleaving, cache memories organization, virtual memory and organization, performance considerations, content addressable memories, memory management in 68000 family and cache designs, Introduction to SRAM, DRAM, RDRAM, Flash memory. (10 Hrs, 20 Marks)

Unit – V

System Organization: Buses, interconnection system bus, CPU and IO bus-bus operation, UNIBUS, multibus and IEEE 488 I/O addressing, data transfer, synchronization, serial and parallel ports, I/O interfaces, I/O channel, PCI bus, SCSI bus, Universal Serial Bus. RISC architecture, concepts, CISC versus RISC, advantages of RISC (10 Hrs, 20 Marks)

Reference Books –

1. Hamacher, Vransic, Zaky, "Computer Organization", 5th Ed., McGraw Hill international.
2. J. P. Hayes, "Computer Architecture and Organization", 3rd Ed. McGraw Hill international.
3. Tanenbaum, "Structured Computer Organization", Pearson.
4. William Stallings, "Computer Organization And Architecture", 6th ed., Pearson.
5. Nicholas Carter, "Computer Architecture", Schaum's Outline.

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TERM – II

DIGITAL SYSTSEM DESIGN

Teaching Scheme:
Lectures: 4 Hrs / Week

Examination Scheme:
Theory Paper: 100 Marks (3 Hrs)

Unit – I

Combinational Logic Design: Using MSI circuits, BCD Adder, BCD subtractor, BCD to 7 segment decoder . Adder / Subtractor using IC 7483.
Design of code Converter circuits: BCD to Binary, Binary to BCD, BCD to Gray, Gray to BCD, BCD to Ex-3, Etc.
Design of counter and shift register using IC 7493 & IC 7495. (10 Hrs, 20 Marks)

Unit – II

Design of ROM, PLA, PAL: Basic structure of ROM, size of Rom, Design of ROM, Structure of PLA, PAL, and their designs. Introductions to complex programmable Logic devices (CPLDs) & Field – Programmable Gate Array, (FPGA) (10 Hrs, 20 Marks)

Unit – III

Sequential Logic Design:- Review of excitation table of S-R, J-K, D & T flip flops. Analysis of clocked sequential circuit state table, state diagram, next stat equations, state reduction, state assignment. Design of register, shift resistor ripple counter, synchronous counters, sequence generator & detector. (10 Hrs, 20 Marks)

Unit – IV

Asynchronous sequential circuit : Asynchronous verses Synchronous sequential circuit, Application of Asynchronous sequential circuit.
Asynchronous sequential Machine modes, Analysis of Asynchronous sequential Machine, Design of Asynchronous Sequential circuit (10 Hrs, 20 Marks)

Unit – V

Algorithmic state Machines.
ASM chart, definition, standard symbols for ASM chart Method of implementation ASM chart by 'D' Flip Flop, Mux – Controller, Rom Controller, One hot controller.
Generation of ASM chart for different waveforms, Miscellaneous problem of ASM chart, e.g. Traffic light, Washing machine, Wending machine etc.
Introduction to VHDL : Entity, Architecture, configuration Declaration Generic, Data objects example of VHDL codes. (10 Hrs, 20 Marks)

Reference Books –

1. "Modern Digital Electronics" by R.P. Jain, 3rd Edition, TMH.
2. "Digital Logic and Microprocessor" by F.J. Hill, John Willy & sons.
3. "Digital Electronic circuit and system" by V.K.Puri, TMH.
4. "Digital Design" by M. Morris Mano, Pearson.

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TERM – II

DATA COMMUNICATION

Teaching Scheme:
Lectures: 4 Hrs / Week

Examination Scheme:
Theory Paper: 100 Marks (3 Hrs)

Unit – I

Introduction to data communication and networks –
Data communication – Components, data representation, direction of flow
Networks – network criteria, network hardware, network software, protocol hierarchy, design issues for the layer, ISO OSI reference model
Signals – Analog signals, digital signal, analog verses digital signal, data rate limits, transmission impairment, throughput, propagation speed, propagation time, wavelength etc.
(10 Hrs, 20 Marks)

Unit – II

Digital transmission and analog transmission –
Digital transmission – line coding, characteristics, schemes. Block coding, transformation and common block codes. Sampling – PAM, PCM, Nyquist's theorem, bit rate, transmission modes.

Analog transmission – Analog modulation, AM, FM, PM. Digital modulation, ASK, FSK, PSK, QAM. Bit/baud comparison.
Telephone modems – Modem standards, traditional modems, 56K modems etc.

(10 Hrs, 20 Marks)

Unit – III

Multiplexing – FDM – Multiplexing process, de-multiplexing process, applications of FDM, WDM, TDM – Time slots, frames, interleaving, synchronization, bit padding, DSS, T-Lines, inverse TDM, Applications of TDM.
Transmission media – Guided media, twisted pair, coaxial cable, fiber optics, unguided media, radio waves, microwaves, infrared.
Switching – Circuit switching, packet switching and message switching. Telephone networks – components, LATAs, making conections, analog services and digital services.

(10 Hrs, 20 Marks)

Unit – IV

Error detection and correction –
Types of errors, single bit burst errors. Detections – redundancy, parity, CRC, checksum. Error correction – Correction by retransmission, FEC, Burst error correction.
Flow control and error control – stop and wait ARQ, Go-back-N ARQ, selective repeat ARQ.

(10 Hrs, 20 Marks)

Unit – V

Ethernet – Traditional Ethernet, fast Ethernet, gigabit Ethernet.
Multiple access – random access, MA, CSMA, CSMA/CD, CSMA/CA, control access, FDMA, TDMA, and CDMA.
IEEE 802.3, 802.4, 802.5, X.21, X.25, SDLC/HDLC protocol standards.
Introduction to network connecting devices – repeater, bridge, router, gateway, hub etc.

(10 Hrs, 20 Marks)

Reference Books –

1. “Computer Networks” A S Tanenbaum 4th edition, Pearson
2. “Data Communication and Networking” B Forouzan, 3rd edition, TMH
3. “Data Communication and Networking” Achyut Godbole, TMH

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TERM – II

PROGRAMMING LABORATORY - II

Teaching Scheme:	**Examination Scheme:**
Lectures: 2 Hrs / Week	Term work: 50 Marks
Practical: 4 Hrs / Week	Practical: 50 Marks

Unit – I

Introduction to Object Oriented Programming - Need of Object Oriented Programming: A look at Procedure Oriented Programming, Object Oriented Programming Paradigm Basic Concept of OOP - Objects, classes, Data Abstraction, Encapsulation, Inheritance, Polymorphism, Data hiding ,Message Passing. Benefits of OOP, Application of OOP

Beginning with C++ : What is C++, Structure of C++ Program, A simple C++ program, comments, output using Cout, input using Cin, declaration of variables, Reference variables, Token, Keywords, Identifier, Constant, Basic data types, Derived data types.

Unit – II

Control structures , Classes and Objects - Control Structures: If statement, switch statement, Do while statement, while statement and For statement.
Classes and objects: Specifying a Class, Defining Member function, A C++ program with class, Nesting of member function, Private member function, Array within a class, memory allocation for objects, Static Data member, Static member function, Array of Objects, Objects as function argument, Friendly function, Returning objects.
Constructor and destructor - Constructor Parameterized Constructor ,Multiple Constructor in a class, Constructor with default argument, Dynamic Initialization of Objects,
Copy Constructor, Destructor

Unit – III

Functions and Operator overloading - Function in C++: The main function, Function prototype, Call by value, Call by reference, Return by reference, Inline Function, Default Argument, Function Overloading,
Operator - Operator in C++, Scope Resolution Operator, Operator Precedence
Operator Overloading - Defining Operator overloading, Overloading Unary Operator, Overloading Binary operator, Overloading binary operator using friend, Rules for operator overloading
Type conversion

Unit – IV

Inheritance and Pointer, Virtual function and Polymorphism, Inheritance: Introduction, Defining Derived classes, Single inheritance, Making a Private member inheritable, Multilevel Inheritance, Multiple Inheritance, Hierarchical Inheritance, Hybrid inheritance, Virtual base classes, Abstract classes, Constructor in derived class.
Pointer, Virtual Function and Polymorphism: Introduction, Pointer to Object, this pointer, Pointer to Derived classes, Virtual function.

Unit – V

Managing Console I/O operation and File Operation - Managing Console I/O operation: C++ Stream, C++ Stream Classes, Unformatted I/O Operation, Formatted Console I/O operation, Managing Output with manipulators
Working with files: Classes for File Stream Operations, Opening and Closing a File, Detecting End Of File ,More about Open() : File Modes, File Pointer and their manipulator, Sequential Input and Output Operations, Updating a File: Random Access. Error handling during file operation, Template: Function template, Class Template

Laboratory Assignment: -

1. One Simple C++ Program
2. C++ Simple Program using Control Structure.
3. Program to create array of Object.
4. Program that illustrate use of various types of constructor

5. Program for String Manipulation
6. Program for Unary Operator Overloading.
7. Program for Binary Operator Overloading
8. Program for Function Overloading
9. Program for Multilevel inheritance
10. Program for Run time polymorphism using Virtual Function
11. Program to format output using manipulator
12. Program for File Handling
13. Program using Template
14. Mini project in C++ (e.g. Banking system, Railway reservation system etc.)
15. Program for stack operations using class
16. Program for Queue operations using class

Term work should include minimum 12 experiments from the above list.
The programs should be developed with integrated development environment (IDE) like Borland C++ with emphasis on step by step development and debugging.

Reference Books –

1. E. Balgurusamy ," Object Oriented Programming with C++ ", III Edition TATA McGraw –Hill Publication
2. Kanetkar Y. , " Let Us C++" , BPB Publication
3. Schildt , " C++ The Complete Reference ", Tata McGraw Hill Publication.

North Maharashtra University, Jalgaon
New Syllabus with effect from Year 2006-07
TE Computer Term I

Sr. No	Subject	Teaching Scheme per Week			Examination Scheme				
		L	**T**	**P**	**Paper Hr.**	**Paper**	**TW**	**PR**	**OR**
1	Microprocessor II	4	-	2	3	100	25	25	-
2	Theory of Computer Science *	4	-	-	3	100	-	-	-
3	Computer Network *	4	-	2	3	100	25	-	25
4	Computer Graphics *	4	-	2	3	100	25	-	-
5	Systems Programming *	4	-	2	3	100	50	-	25
6	Advanced Development Tools Laboratory *	-	-	4	-	-	50	-	-
	Total	20	0	12		500	175	25	50
	Grand Total	**32**			**750**				

TE Computer Term II

Sr. No	Subject	Teaching Scheme per Week			Examination Scheme				
		L	**T**	**P**	**Paper Hr.**	**Paper**	**TW**	**PR**	**OR**
1	Microprocessor III	4	-	2	3	100	25	-	-
2	Operating Systems *	4	-	2	3	100	25	-	25
3	Software Engineering *	4	-	2	3	100	25	-	50
4	Database Management System *	4	-	2	3	100	25	25	-
5	Analysis and Design of Algorithms	4	-	2	3	100	25	-	-
6	Practical Training/Mini Project/Special Study		-		-	-	25	-	-
	Total	20	0	10		500	150	25	75
	Grand Total	**30**			**750**				

* Common subject with TE IT

NORTH MAHARASHTRA UNIVERSITY, JALGAON

TE (COMPUTER ENGINEERING)
(w.e.f. 2007-08)

TERM – I

MICROPROCESSOR II

Teaching Scheme:
Lectures: 4 Hrs / Week
Practical: 2 Hrs / Week

Examination Scheme:
Theory Paper: 100 Marks (3 Hrs)
Term work: 25 Marks
Practical: 25 Marks

Unit – I
Dos: File System, boot record, FAT, Device Drivers, Installable device drivers. Structure of device drivers, .com and .exe files.
Basic I/O Interface: Introduction. I/O Port Address decoding, 8255: Programmable Peripheral Interface.8254: Programmable Interval Timer.

(10 Hrs, 20 Marks)

Unit – II
Basic I/O Interface: 8251: Programmable Communication Interface. The Parallel Printer Interface (LPT). Interfacing 7-segment display, Stepper motor interfacing, Interfacing ADC & DAC. Disk Reading Method- FM,MFM. Introduction to CD recording. TSR programs: Concepts and implementation.

(10 Hrs, 20 Marks)

Unit – III
Hardware Organization of PC: Motherboard Component Logic.I/O Channels. Memory Map. Interrupts. DMA Channels. Reset Logic, CPU nucleus logic,DMA logic, NMI logic, RAM,ROM logic. RTC ,PC cards. Keyboard Interface block diagram.
CRT Controller 8275, PC Display Adapters-CGA.EGA.VGA.SVGA. Principles of AGP

(10 Hrs, 20 Marks)

Unit – IV
Bus Interface: The ISA Bus, the Extended ISA(EISA) and VESA Local Buses. The Peripheral Component Interconnect (PCI) bus, the Universal Serial Bus(USB). Floppy Disk Controller 8272,FDC system Interface, Overall operation of Floppy disk Subsystem. Overview of Hard Disk Controller Organization.HDC Commands.

(10 Hrs, 20 Marks)

Unit – V
Microcontrollers: Different Types of microcontrollers. 8051 microcontroller Architecture. 8051 hardware Feature. Input/output pins. Ports and Circuits.External memory. Counters and Timers. Serial dada I/O.Interrupts . 8051 programming.Addressing Modes.

(10 Hrs, 20 Marks)

Reference Books -

1. B.Govindarajalu, ”IBM PC and Clones” Tata McGrawHill
2. Mazidi,” The 8051 Microcontroller & Embedded Systems , “ Pearson LPE
3. Jeff Duntemann,”Assembly Language Progg. For IBM PC Family, 3rd edition,Dreamtech (Wiley India)
4. Antonakos, “ An Introduction to the Intel Family of Microprocessors,” – Pearson LPE

5. Douglas Hall, "Microprocessor and Interfacing", Tata McGrawHill, revised 2nd Ed.
6. Ray Duncan. "Advanced MS-DOS" BPB.
7. Peter Abel, Niyaz Nizamuddin, "IBM PC Assembly language and Programming", Pearson
8. Ray and Bhurchandi. "Advanced Microprocessors and Peripherals" Tata McGraw Hill, 2nd Ed.
9. Barry B Bray. "The Intel Microprocessors-Architecture.Programming and Interfacing". Pearson LPE/PHI, 7th Ed.
10. Kenneth J.Ayala. "8051 Microcontroller"Penram Internationals", Penram International, 2nd Ed
11. Manoharan, Kannan, "Microcontroller based System Design", Scitech
12. Badri Ram."Advanced Microprocessors and interfacing".Tata McGraw Hill.
13. Myke Predko."Programming and Customizing 8051 Micocontroller" Tata McGraw Hill
14. Korneev n kiselev,"ModernMicroprocessors",3rdedition,Dreamtech Press(WileyIndia)

List of experiments -

Group A:
1. Interfacing ADC with 8086.
2. Interfacing DAC with 8086.
3. Centronics parallel Printer interface.
4. PC to PC Communication using serial port in 8086.
5. Write a Device Driver Program.
6. Interfacing Stepper motor with 8086.
7. Reading partition table from Hard Disk.

Group B:
1. Read/Write/Format sector/Track of floppy.
2. Mouse Interfacing.
3. TSR Routine.
4. Program for Rolling Display using 8051.
5. Design of graphic editor.
6. Waveform generation using 8051.
7. Program for Generating Speaker tones by using PC.

The term work should include minimum of 10 Assignment.(5 from each group).Assignment no.5 from group A is compulsory.

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TERM – I

Theory of Computer Science

Teaching Scheme:
Lectures: 4 Hrs / Week

Examination Scheme:
Theory Paper: 100 Marks (3 Hrs)

Unit – I
Mathematical Preliminaries: Alphabets, Strings, Languages, States, Graphs and trees, Concept of basic machine.
Finite State Machines: State tables, Transition graph, Adjacency matrix, Moore and Mealy FSM's, Deterministic and Non-deterministic FSM's, Equivalence of DFA and NFA, FSM with Epsilon moves, Minimization of FSM

(10 Hrs, 20 Marks)

Unit – II
Regular Expressions: Definition, Building RE, Converting DFA's to RE, Conversion of RE to NFA.
Properties of Regular Sets: Pumping lemma for regular sets, Applications of Pumping lemma, Closure properties of Regular sets, and Decision algorithms for regular sets.

(10 Hrs, 20 Marks)

Unit – III
Grammars: Definition, Production rules, Formalization, Derivation trees, Ambiguous grammar, Removal of ambiguity, Reduced form grammar – Removal of unit productions, Epsilon productions, Useless symbols, Chomsky hierarchy.
Context Free Grammars: Definition, Simplification of CFG, Regular Grammar – Definition, Left linear and right linear regular grammar, Inter-conversion between left linear and right linear grammar, Reduced Forms – CNF and GNF, Reduction to CNF and GNF, Construction of regular grammar from DFA, Construction of FA from regular grammar.
Context Free Languages: Definition, Properties, Pumping lemma for CFL's, Decision algorithms for CFL's, CYK algorithm

(10 Hrs, 20 Marks)

Unit – IV
Pushdown Stack Memory Machines: Definition, PDM examples, Power of PDM, Deterministic and Non-deterministic PDM, PDA and CFL, Construction of PDA from CFG, Construction of CFG from PDA.
Production Systems: Definition, Post canonical system, PMT systems, Acceptors and Generators, Markov algorithm

(10 Hrs, 20 Marks)

Unit – V
Turing Machine: Definition, Notations, Transition diagram, Power of TM over FSM, PDM and PM, Design of TM, Universal TM, Church's Turing Hypothesis, Multi-stack TMs, TM limitations, Halting problem, Undecidability, Tractable and intractable problems

(10 Hrs, 20 Marks)

Reference Books -

1. E V Krishnamurthy, 'Theory of Computer Science', EWP.
2. Hopcroft, Ullman, 'Introduction to Automata Theory' Narosa.
3. K.L.P.Mishra, 'Theory of Computer Science', PHI.
4. Daniel Cohen, 'Introduction to computer Theory', Wiley India
5. John Martin, 'Introduction to Language and Theory of Computations', TMH.

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TERM – I

Computer Network

Teaching Scheme:
Lectures: 4 Hrs / Week
Practical: 2 Hrs / Week

Examination Scheme:
Theory Paper: 100 Marks (3 Hrs)
Term Work: 25

Oral: 25

Unit – I
Review of Data Communication and Introduction to computer networks.
Data Link layer: Data Link layer design issues, Elementary data link layer protocols, Sliding window protocols, Data Link Layer switching, Bridges 802.x to 802.y, Local inter-networking, Spanning tree and remote bridges.
Review of network connecting devices and multiple access protocols.
(10 Hrs, 20 Marks)

Unit – II
Network Layer: Logical Addressing - IPv4 addresses- Address space, notations, Classful addressing, Classless Addressing, Network Address Translation.IPv6 addresses- Structure and address space
Internet Protocols: Internetworking- Need of network layer, datagram network, connectionless network
IPv4- Datagram, Fragmentation, Checksum, Options
IPv6- Advantages, packet formats, extension headers
Transition from IPv4 to IPv6: Dual stack, Tunneling, Header Translation
(10 Hrs, 20 Marks)

Unit – III
Network Layer: Address Mapping - ARP, RARP, BOOTP and DHCP
ICMP: Types of messages, message formats, error reporting, query, debugging tools
IGMP: Group Management, messages, message format, IGMP operations, Encapsulation, Netstart utility.
ICMPv6: Error reporting and queries
Delivery: Direct versus Indirect delivery
Forwarding: Techniques, process, routing tables
(10 Hrs, 20 Marks)

Unit – IV
Unicast Routing Protocols: Optimization, Intra and Inter domain routing, distance vector routing, link state routing, path vector routing
Multicast Routing Protocols: Unicast, Multicast and Broadcast, applications, routing protocols
Transport Layer: Process to process delivery, UDP
(10 Hrs, 20 Marks)

Unit – V
TCP/IP Protocol Suite: Addressing
TCP: Services, features, segments, connections, flow control, error control, congestion control
Congestion control: Data Traffic, open- loop, closed- loop congestion control, congestion control in TCP and frame relay
Quality of Service: Flow characteristics and classes, techniques to improve QOS such as Scheduling, Traffic shaping, resource reservation, admission control
Integrated Services: Signaling, flow specification, admission, Service Classes, RSVP, problems with Integrated Services
(10 Hrs, 20 Marks)

Reference Books -

1. Andrew S. Tanenbaum, “Computer Networks”, 4th edition, Pearson LPE /PHI.
2. Behrouz Forouzan, “Data Communications and Networking”, TMH, 4th Ed.
3. Irvine,”Data Communication and Networks:An Engg. Approach” Wiley India
4. S. Keshav, “An Engineering Approach to Computer Networking”, Pearson Education, 5th Ed
5. Irvine Olifer,”Computer Networks:Principles,Technologies and Protocols” Wiley India

List of experiments -

1. Study of network resources and various components.
2. TCP/IP Socket Programming.
3. Implementation of Data link layer protocol.
4. Implementation of Network routing algorithm.

5. Implementation of data compression and decompression algorithm (Huffman Algorithm).
6. Implementation of Network security algorithm (Encryption and Decryption Algorithm).
7. Program using FTP to exchange files between computers,
8. Study of proxy server/DNS Server/mail server/NFS server.

1 to 6 assignments are compulsory.

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TERM – I

Computer Graphics

Teaching Scheme:
Lectures: 4 Hrs / Week
Practical: 2 Hrs / Week

Examination Scheme:
Theory Paper: 100 Marks (3 Hrs)
Term Work: 25

Unit – I
Basic Concepts: Introduction to computer graphics, Types of Computer Graphics, Application of Computer Graphics, Graphics Standards, Graphics file formats such as BMP, TIFF, PCX and GIF

Interactive Computer Graphics: Working of Interactive Computer Graphics, Graphics Hardware, CRT, display and controller, Interlaced and non interlaced display, Vector and raster scan display, Random scan display, Frame buffers, Display adapters, VGA, SVGA, Bios video support, Various input devices, Graphics device drivers, Graphics software, Co-ordinates representations, Graphical functions, Plotters, Scanners, Digitizers and Light Pen.

Linear and Circle Generation: Line generation – DDA and Bresenhams /algorithm Thick line generation, Antialiasing, Circle Generation – DDA and Bresenham's Algorithm, Character Generation – Stroke principal, Starburst principle, Bitmap method.

(10 Hrs, 20 Marks)

Unit – II
Polygons: Types, representations, entering polygon, Polygon filling: Fance fill, Edge flag, Seed fill, Edge fill, Scan conversion algorithm. Scan conversion algorithm. Scan conversion: Real time scan conversion, Solid area scan conversion, Run length encoding, Cell encoding.
Segments: Concepts, Segment table, Segment creation, Deletion, Renaming, Image Transformation.

(10 Hrs, 20 Marks)

Unit – III
2D & 3D Geometry: 2D transformation primitives and concepts Translation, Rotation, Rotation about an arbitrary point, Scaling and Shearing, 3 D transformations, Rotation about an arbitrary axis, 3D viewing transformation , Concept of parallel perspective projections, Viewing parameters.
Clipping Fundamentals, Types of clipping.

(10 Hrs, 20 Marks)

Unit – IV
Windowing and Clipping: Viewing transformation, 2 D clipping and 3D clipping, Sutherland Cohen line clipping algorithm, Mid-point subdivision algorithm, Generalized clipping, Cyrus-Beck Algorithm, Interior and Exterior clipping, Polygon Clipping, Sutherland-Hodgman algorithm.
Hidden Surfaces and Lines: Back face removal algorithm, Hidden line methods, Z-buffer, Warnock and Painter algorithm, Floating horizon.

(10 Hrs, 20 Marks)

Unit – V

Light, Color and Shading: Diffused Illumination, Point source illumination, Shading algorithm, Color Models – RGB, HVS, CYM etc Elimination back faces, Transparency, polygons, B-Splines and corner, Bezier Curves, Fractals, Fractal Surfaces and lines

Graphical User Interface: Concepts of X-Windows, Concept of client/server model, Protocols, Message passing (only GUI related) Motif – widget, gadget structure (Only GUI concept) Concept of MS Windows, Open GL, Why 3D? Why Open GL? OpenGL and Animation

Graphics Standard: Introduction to graphics kernel system with basic primitives

Graphics Applications: Scientific and engineering applications, Business applications, Application concept in Animation and concept in Animation and Simulation

(10 Hrs, 20 Marks)

Reference Books -

1. David F. Rogers, "Procedural Elements for Computer Graphics:, Tata McGraw Hill, 2nd Ed
2. Steven Harringtom, "Computer graphics A Programming Approach", MGH
3. Hill, "Computer Graphics using OpenGL", Pearson LPE/PHI, 2nd Ed
4. Foley, Vandam, Feiner, Hughes, "Computer Graphics Pricipals & Practice", Pearson, 2nd Ed
5. Donald Hearn and Pauline Baker," Computer Graphics", Pearson LPE, 2nd Ed
6. Rao and Prasad," Graphics user interface with X windows and MOTIF", New Age
7. ISRD, "Computer Graphics", Tata McGraw Hill
8. Mukherjee, "Fundamentals of Computer Graphics and Multimedia", PHI

List of experiments -

1. Study of various Graphics Commands
2. Line generation using DDA
3. Different Line Style using Bresenhams Algorithm
4. Circle Generation using Bresenhams Algorithm
5. Program for Polygon Filling
6. Program for 2D Transformations (Translation, Rotation and Scaling)
7. Program for Segmentation
8. Program for line clipping
9. Program for Polygon clipping
10. Program for 3D rotation
11. Program for Parallel Projections
12. Program for Perspective Projection
13. Program for Animation
14. Program for Bezier Curve
15. Mini Project: Developing some Graphics application
16. Study assignment on any latest GUI application or mini-project.

The term work should include a minimum of ten assignments.

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TERM – I

Systems Programming

Teaching Scheme:
Lectures: 4 Hrs / Week

Examination Scheme:
Theory Paper: 100 Marks (3 Hrs)

Practical: 2 Hrs / Week

Term Work: 50
Oral: 25

Unit – I
Introduction: Introduction to system programming, Types of s/w and application software, System programming and system programs, Need of system software, Assemblers, Loaders, Compilers, Interpreters, Macros, Operating system and formula system, Translators and its types.

Assemblers: Structure of assembler, Basic function, Machine dependent and machine independent features of assembler, Types of assemblers – single pass, multi-pass, cross assembler, General design procedure of assembler, Design of Pass-I and Pass-II assembler (with reference to 8086 assembler), Single pass assembler for IBM PC, Implementation examples – MASM example.

(10 Hrs, 20 Marks)

Unit – II
Macros and Macro Processors: Definition and function of Macro Processor, Features of macro facility, Macro expansion, Nested macros, Design of macro processor – single pass and two pass macro processor, Detailed design of two pass macro processor.

Loaders and Linkage Editors: Basic loader functions, Relocation and linking concepts, Various loader schemes with their advantages and disadvantages, Other loader schemes – binders, Linking loaders, Overlays, Dynamic binders, Design of direct linking loaders, Specification of problem, Specification of data structures, Format of databases.

(10 Hrs, 20 Marks)

Unit – III
Design of a linker, A linker for MS DOS, Linking for overlays
Grammar and scanner, Overview of compilation process, Programming language grammar, Derivation, Reduction and syntax tree, Ambiguity, Regular grammar and regular expression, Basic functions of complier, Machine dependent and machine independent features of compiler, Types of compilers – single pass, multi-pass, cross compiler and pseudo code compiler, Phases of compiler

(10 Hrs, 20 Marks)

Unit – IV
Design of lexical analyser, Software tools for program development YACC and LEX.

Functions of parser, Parsing techniques, Top-down and Bottom-up parsing, Limitations of top-down parsing, Shift reduce and recursive descent parser, Operator precedence parser, Predictive parser, L-R parser, Syntax directed translation (design of parser not expected)

(10 Hrs, 20 Marks)

Unit – V
Symbol table organization and memory allocation, Elementary symbol table organization, Hash tables, Linked list and tree structure symbol tables, Memory allocation – static and dynamic memory allocation.

Dynamic linking in Windows (only introduction and concepts only) – concept of clipboard, OLE terminology and technology, Dynamic Data Exchange, Dynamic Link Libraries (DLL)

(10 Hrs, 20 Marks)

Reference Books -

1. John J. Donovan “System Programming”, TMH
2. Dhamdhere “System Programming & Operating System”, TMH, 2nd Ed
3. L. Beck “System Software”, Pearson, 3rd Ed
4. Aho, Ulman “Compiler Construction” – Pearson LPE
5. J P Bennett, “Compiling Techniques”, TMH
6. Dick Grune,”Modern Compiler Design” Wiley India.

7. David Galles,"Starting out with Modern Compiler Design" Dreamtech Press(Wiley India)

List of experiments -

1. Develop an application to simulate first pass of 2-pass assembler
2. Develop an application to simulate second pass of 2-pass assembler
3. Design a simple loader
4. Develop an application to create a simple text editor
5. Develop an application for simulating Lexical phase of Compiler
6. Develop an application for simulating Syntax Analysis phase of Compiler

The term work should include a minimum of five assignments.

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TERM – I

Advanced Development Tools Laboratory

Teaching Scheme:
Practical: 4 Hrs / Week

Examination Scheme:
Term Work: 50

Part I: Windows Programming
Basic Windows SDK programming, Programming involving Dialog Boxes, Menus and standard GUI components, Writing of Windows Help file using "HC", Writing DLLs and VXDs (Win 95/98/2k)

Part II: Front-End Tools
Assignments based on packages like C# / .NET / VC++ / VB / Java. Assignments should cover basic GUI components, Database Access, ActiveX technology, Network applications.

Part III: Internet Programming Tools
HTML programming, Java Scripts or VB Scripts programming, Internet programming using Java / C# / .NET, (Assignments should cover dynamic page creation) database connectivity (e.g. search engine), online communication (e.g. chatting, email-editor)

Reference Books -

1. Charles Petzold "Programming Windows", Microsoft Press, 5th Ed
2. Andrew Troelson,"C# and .Net Platform, A Press (Wiley India)
3. Herbert Schildt, "Programming Windows 2000 – Ground Up", Tata McGraw Hill
4. Schurman and Pardi, "Dynamic HTML in Action", Microsoft Press, 2nd Ed
5. Sells, "Windows Forms Programming in Visual Basic .NET", Pearson
6. Deitel, "C# How to program", Pearson LPE
7. Steven Hozner," Java 2(Jdk 5) Progg. Black Book" Dreamtech Press(Wiley India)
8. Ivor Horton,"Beginning VC++" Wrox Press(Wiley India)
9. Steven Hozner ," VB.Net Progg. Black Book" Dreamtech Press(Wiley India)
10. Bakharia, "Microsoft C# fast and easy web development", PHI
11. Steven Hozner ,"HTML Black Book" Dreamtech Press(Wiley India)
12. Eric Brown,"Windows Forms in Action" Manning Press(Wiley India)

Term work -

Term work should include at least four assignments from each part.

NORTH MAHARASHTRA UNIVERSITY, JALGAON

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TERM – II

Microprocessor III

Teaching Scheme:
Lectures: 4 Hrs / Week
Practical: 2 Hrs / Week

Examination Scheme:
Theory Paper: 100 Marks (3 Hrs)
Term Work: 25

Unit – I
Architecture of the 80386: Functional DIP, Support for pipelining, Dynamic bus sizing, 80386 SX/DX differences, Programming model of 80386, Register model, Data types and addressing modes, New instructions of 80386, Bus cycles with 16 & 32 bit, Data bus with timing state diagram, INTA, HOLD, HALT and reset cycles.

(10 Hrs, 20 Marks)

Unit – II
Operating Modes and Memory Management: Segmentation, Paging, (Real, Protected and VM86 mode), Debugging support.

(10 Hrs, 20 Marks)

Unit – III
Privilege Levels: Privilege level protection (Call gates, Conforming code segments) in protected and VM86 mode.
Multitasking: TSS, Moving between tasks, Task scheduling, Busy bit, NT bit, Back link field, TS bit, Extension to TSS, I/O permission bit map, Changing privilege levels within a task, Changing LDTs.

(10 Hrs, 20 Marks)

Unit – IV
Faults and Interrupts: Exception processing in Real, Protected and VM86 Mode.

80387 NDP: Register set, Number system, Instruction Set, Programming.
Processor to co-processor interface, Difference among 80387, 80287, 8087

(10 Hrs, 20 Marks)

Unit – V
Study of 80386 and 80486 motherboard (block diagram treatment only), Overview of Intel Chipset, Pentium motherboards – PI to PIV (block diagram treatment only)

Pentium Microprocessor: Introduction, Salient features, System architecture, MMX architecture
Introduction to Pentium II, III, IV (block diagram treatment only)

(10 Hrs, 20 Marks)

Reference Books -

1. James Turley "Advanced 80386 Programming techniques", Tata McGraw Hill
2. Triebel, "Advanced 80386", Tata McGraw Hill
3. Uffenbeck, " the 80x86 Family: Design, Prog & Interfacing, 3/e"- Pearson LPE

4. Brey/Sarma, “The Intel Microprocessors-Architecture, Programming and Interfacing”, Pearson LPE
5. Douglas Hall, “Microprocessors and Interfacing”, Tata McGraw Hill
6. Badri Ram, “Advanced Microprocessors and Interfacing”, Tata McGraw Hill
7. Nelson, “The 80386 Book”, Microsoft Press
8. Hans Peter, “The Indispensable Pentium”, Pearson LPE
9. Murray Pappas, “The 80386 Programming Reference Manual”
10. B Govindarajalu, “IBM PC Clones”, Tata McGraw Hill, 2nd Ed.
11. James Antonakos, “The Pentium Microprocessor”, Pearson
12. Korneev n kiselev,”ModernMicroprocessors”,3rd edition,Dreamtech Press(WileyIndia)
13. Jeff Duntemann,”Assembly Language Progg. For IBM PC Family, 3rd edition,Dreamtech (Wiley India)

List of experiments -

Assembly language programming for 80386/80387

1. Generation of sine/cosine wave
2. Switching from real mode to protected mode and back
3. Solving arithmetic expression
4. 64 bit Arithmetic operations
5. Program using NDP

Study of 386, 486, Pentium motherboards

1. Layout of motherboard and minimum peripherals
2. Study of CMOS setup
3. Installation of peripherals
4. PC diagnostics using diagnostic tools
5. Study assignment on any latest GUI application or mini-project.

The term work should include a minimum of Six assignments.

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TERM – II

Operating Systems

Teaching Scheme:	**Examination Scheme:**
Lectures: 4 Hrs / Week	Theory Paper: 100 Marks (3 Hrs)
Practical: 2 Hrs / Week	Term Work: 25
	Oral: 25

Unit – I

Introduction: Need of OS, Evolution of OS, Types of OS like Batch, Timesharing, Multiprogramming, Multitasking, Real-time and Personal OS.
OS Views and Concepts: Shell command language, system calls, user view, OS components, OS structure like monolithic, layered, kernel based, micro-kernel based, virtual machine.
Process and Process management: Process concepts, interleaved CPU and IO operations, CPU burst, Process states, OS services for process management, threading.

(10 Hrs, 20 Marks)

Unit – II
Scheduling: Process scheduling, schedulers – long term, middle term and short term. Scheduling algorithms and performance evaluation.
Inter-process communication and synchronization needs: Mutual exclusion, semaphores, critical regions and monitor. Classical problems in concurrent programming.

(10 Hrs, 20 Marks)

Unit – III
Deadlock: Principles, detection, prevention, avoidance and recovery with Bankers algorithm.
Process management in UNIX: Structure of process, process control, process system calls – fork, join, exec, system boot (No algorithms).
Memory Management: Types, contiguous and non-contiguous, segmentation and paging concepts.

(10 Hrs, 20 Marks)

Unit – IV
Virtual memory management: Concepts, implementation, allocation, fetch and replacement.
Memory management in Unix: Policies, swapping and demand paging
File management: Organization, concepts, files and directories, hierarchical structures, space allocation, free space management
Security and protection: Overview, goals of security and protection, security and attacks, formal and practical aspects of security, authentication and password security.

(10 Hrs, 20 Marks)

Unit – V
File management in Unix: Internal representation of files, inodes
File structure in Unix: Structure of file and directories, super block, inode assignment to a new file.
Allocation of disk blocks, file creation, and pipes. (No algorithms)
Mass storage structures, disk scheduling, disk management and swap space management.
Distributed OS: Concepts, design issues and system models.

(10 Hrs, 20 Marks)

Reference Books -

1. Silberschatz, Galvin, Gagne, "Operating System Concepts", 7th Ed,Wiley India
2. D.M. Dhamdhere, "Operating Systems", Tata McGraw Hill, 2nd Ed.
3. Milenkovic, "Operating Systems Concepts and Design", Tata McGrawHill
4. M.J. Bach, "The design of Unix Operating System", Pearson LPE
5. Tenenbaum, "Modern Operating Systems", Pearson, 2nd Ed
6. William Stallings, "Operating systems-Internals and design principles", Pearson LPE/PHI, 5th Ed.
7. Deitel, "Operating systems", Pearson, 2nd Ed
8. Paul Love, " Beginning Unix", Wrox Press, (Wiley India)

List of experiments -

1. Study of Unix / Linux commands.
2. Implementation of command interpreter using system calls
3. Simulation of windows explorer
4. Implantation of CPU scheduling algorithm
5. Implementation of Memory Management algorithms – best fit, first fit, worst fit
6. Simulation of page replacement algorithm
7. Implementation of Bankers algorithm
8. Implementation of Inter process communication
9. Implementation of threading
10. Installation of Unix/Linux/Windows server installation with configuration of web-mail and proxy server systems

The term work should include a minimum of six assignments.

NORTH MAHARASHTRA UNIVERSITY, JALGAON

TE (COMPUTER ENGINEERING / INFORMATION TECHNOLOGY)
(w.e.f. 2007-08)

TERM – II

Software Engineering

Teaching Scheme:
Lectures: 4 Hrs / Week
Practical: 2 Hrs / Week

Examination Scheme:
Theory Paper: 100 Marks (3 Hrs)
Term Work: 25
Oral: 50

Unit – I
Introduction: What is and why software engineering? Product: Evolving role of software, Software Characteristics, Components, Applications, Software crisis and Myths, Software Engineering Process, Software development phases and Software Process Models, Prototyping and RAD Model, Water fall, Incremental Model, Spiral Model,4 GT Model, CASE tools.

(10 Hrs, 20 Marks)

Unit – II
Planning and Managing Software projects:

People, Problem and Process, Measures, Metrics and Indicators, Metrics for software quality, Scoping, Software Project Estimation, Make by decision, Software Acquisition Software risks - Identification, Projection, Assessment, Monitoring Project Scheduling and tracking tasks/Work break down structures, Time line charts, Project plan, CASE tools.

System Engineering: Computer based system, System engineering hierarchy.

Information engineering: Information strategy, Planning Enterprise modelling, Business area analysis, Information flow modelling, Product engineering, System analysis, Feasibility study, Economic and Technical feasibility analysis, Modelling system architecture diagram, CASE tools.

(10 Hrs, 20 Marks)

Unit – III
Requirement Analysis: Communication Techniques, FAST, Quality deployment, Analysis Principals: Modelling, partitioning, Prototyping, Specification,

SRS and SRS review analysis models: Data modelling, Functional modelling, Information flow, Data flow Diagrams, Extension to real time systems, Behavioural models, Mechanism of structural analysis, E-R diagrams, controlled modelling, Data dictionary, CASE tools.

(10 Hrs, 20 Marks)

Unit – IV
Design Fundamentals: Software Design and software design process, principals and concepts, Abstractions, Refinement and modularity, Software architecture, Control hierarchy, Partitioning, Data structure, Information hiding, Effective modular design,

Cohesion, coupling, Design Model, Design documents, CASE tools

Design Methods: Architectural design and design process, transform and transaction flow, design steps, interface design, procedural design, graphical and tabular design notations.

(10 Hrs, 20 Marks)

Unit – V
Software Testing Techniques and Strategies: Software testing fundamentals, Test case design, White box testing, Black box testing, Control structure testing, Strategic approach to testing, Strategic issues, Unit testing, Integration testing, Validation testing, System testing, CASE Tools

Introduction to OOSE.
Introduction Unified Modeling Language (UML)

(10 Hrs, 20 Marks)

Reference Books -

1. Pfleeger," Software Engineering : Theory & Practice",6th Edition-Pearson LPE
2. Pressman, "Software Engineering", McGraw Hill, 6th Ed
3. Peters," Software Engineering" Wiley India
4. Ghezzi, Jazayeri, Mandrioli, "Fundamentals of Software Engineering", Pearson/PHI, 2nd Ed
5. Sommervile, "Software Engineering", Pearson, 7th Ed
6. Rajib Mall, "Fundamentals of Software Engineering", PHI, 2nd Ed
7. Javadekar, "Software Engineering" Tata McGraw Hill
8. Thayer ,"Software Engineering Project Management "2nd edition, Wiley India
9. Tian ,"Software Quality Engineering" 2nd Edition, Wiley India

Term Work-

The term work should include a minimum of four software mini projects covering problem definition, analysis, design and documentation for each.

NORTH MAHARASHTRA UNIVERSITY, JALGAON

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TERM – I

Database Management System

Teaching Scheme:
Lectures: 4 Hrs / Week
Practical: 2 Hrs / Week

Examination Scheme:
Theory Paper: 100 Marks (3 Hrs)
Term Work: 25
Practical: 25

Unit – I

Introduction to DBMS: Basic concepts, advantages of a DBMS over file processing system, Data abstraction, Data models and data independence, components of a DBMS and overall structure.
Database terminology
Database administration issues: DBA role, indexes. Data dictionary, security, backups, Replication, SQL support for DBA, commercial RDBMS selection
Data modeling: Basic concepts, types of data models, E-R data model and Object oriented data model, relational, network and hierarchical data models and their comparison, E-R and ERR diagramming.

(10 Hrs, 20 Marks)

Unit – II

Relational Model: Basic concepts, attributes and domains, interaction and extensions of a relation, concept of integrity and referential constraints. Relational query languages (relational algebra, relational calculus), concepts of view and trigger

(10 Hrs, 20 Marks)

Unit – III

SQL: Structure of a SQL query, DDL and DML, SQL queries, set operations. Predicates and join membership, tuple variables, set comparison, ordering of tuples, aggregate functions, nested query. Database modification using SQL, Dynamic and embedded SQL and concepts of stored procedure, Query optimization

(10 Hrs, 20 Marks)

Unit – IV

Relational database design: Need of normalization, Notation of a normalized relation, Normalization using functional dependency, Multi-valued dependencies and join dependency, 1NF, 2NF, 3NF, BCNF, 4NF.
Transaction Management: Basic concepts of transaction, components of transaction management (concurrency control, Recovery system), Different concurrency control protocols such as Time stamps and locking, different crash recovery such as log based recovery and shadow paging, concepts of cascaded abort, Multi-version concurrency control methods.

(10 Hrs, 20 Marks)

Unit – V

Object oriented DBMS: Review of object oriented concepts: Objects, Classes, attributes, Messages, Inheritance, and Polymorphism etc. Object schemas, Class subclass relationships, inter-object relationships, features of object oriented DBMS and ORDBMS, concepts of OID, persistence of objects in OODBMS, Physical organization, object-oriented queries, schemas modifications, Temporal databases, Active databases.

(10 Hrs, 20 Marks)

Reference Books -

1. Singh,” Database Systems: Concepts,Design & Apllication”- Pearson LPE
2. Kahate, “ Introduction to Database Management Systems”- Pearson LPE
3. Henry F. Korth, Abraham silberschatz, “Database system concepts”, 5th Ed.Mc Graw Hill Inc.
4. Date, “Introduction to Database Management Systems”, 8/e Pearson LPE.
5. Rajesh Narang, “Database Management System”, PHI
6. Elmasri, Navathe, Somayajulu, Gupta, “Fundamantals of Database Systems”, Pearson
7. ISRD, “Introduction to Database Management System”, Tata McGraw Hill
8. Connolly, “ Database Systems” – Pearson LPE.
9. Bipin Desai, “Introduction to database management systems”, Galgotia.
10. Renu Vig, “Fundamentals of database management systems”, ISTE learning materials centre
11. Phillip Pratt, “Concepts of DBMS”, Thomson Learning, 3rd Ed.
12. Phillip Pratt, “A Guide to SQL”, Thomson Learning, 5th Ed.
13. V.K.Jain, “ Database Management System” Dreamtech Press (Wiley India)
14. Oracle Sql,Pl/Sql for 9i and 10 g, Dreamtech Press(Wiley India)

15. Andy Oppel, “ Rational Databases-Principles and Fundamentals, Dreamtech Press(Wiley India)
16. Paul Wilton,” Beginning SQL” Wrox Press, (Wiley India)

List of experiments -

1. Creating a sample database application using conventional file processing mechanism and “C” language. The program should provide facilities for retrieving, adding, deleting and modifying records
2. Prepare an E-R diagram for the given problem definition. Prepare and verify a relational database design using concepts of normalization techniques in appropriate normal form.
3. Creating a sample database file and indexes (for the design made in experiment No. 2) using any client server RDBMS (oracle/Sybase) package using SQL DDL queries. This will include constraints (key reference etc.) to be used while creating tables.
4. SQL DML queries: Use of SQL DML queries to retrieve, insert, delete and update the database created in experiment No. 3. The queries should involve all SQL features such as aggregate functions, group by, having, order by, sub queries and various SQL operators.
5. PL/SQL: Fundamentals of cursors, stored procedures, stored functions.
6. Screen design and Report generation: Sample forms and reports should be generated using Developer 2000 (in case of Oracle) or through Power builder or Visual basic front end tools or any prototyping software engineering tool.
7. Prototype of OODBMS/ Active database/ Temporal Database in C++

The term work should include a minimum of six assignments.

NORTH MAHARASHTRA UNIVERSITY, JALGAON

TE (COMPUTER ENGINEERING)
(w.e.f. 2007-08)

TERM – II

Analysis and Design of Algorithms

Teaching Scheme:
Lectures: 4 Hrs / Week
Practical: 2 Hrs / Week

Examination Scheme:
Theory Paper: 100 Marks (3 Hrs)
Term Work: 25

Unit – I
Introduction: Role of algorithms in computing, algorithm analysis, complexity issues, designing algorithms, algorithm strategies, methods for designing algorithms

(10 Hrs, 20 Marks)

Unit – II
Divide and Conquer method: Binary search, merge sort, quick sort, Starssen’s matrix multiplication.
Probabilistic analysis and randomised algorithms: The hiring problem, indicator random variables, randomised algorithms, probabilistic analysis.

(10 Hrs, 20 Marks)

Unit – III
Back tracking: Eight Queens Problem, graph coloring, Hamilton cycles, Knapsack problem, Maze Problem.
Branch and Bound: Traveling salesman’s problem, lower bound theory-comparison trees for sorting/searching, lower bound on parallel computation.

(10 Hrs, 20 Marks)

Unit – IV
Advanced Design And Analysis Techniques: Dynamic Programming: Elements of dynamic programming, multistage graph, optimal binary search tree(OBST), 0/1 knapsack problem, Traveling salesman problem
Greedy Algorithms: Elements of greedy algorithms, Theoretical foundation of greedy methods, Job sequencing optimal merge patterns

(10 Hrs, 20 Marks)

Unit – V
NP hard and NP complete Problem: Algorithm complexity, Intractability, Non-deterministic Polynomial times(NP),Decision problems, Cook's theorem.
NP-Complete Problems: Satisfiability Problem, vertex cover problem.
NP-Hard problems: code generation Problems, Simplified NP hard problems, approximation algorithm for NP-hard problems.

(10 Hrs, 20 Marks)

Reference Books -

1. Aho , "Design & Analysis of Computer Algorithms"- Pearson LPE
2. Russ Miller ," Algorithms: Sequencial and Parallel" Dreamtech Press(Wiley India)
3. Goodrich ," Algorithm Design: Foundation and Analysis, Wiley India.
4. Grama , "An Intro to Prarallel Computing : Design & Analysis of Algorithms, 2/e, "- Pearson LPE
5. Baase , " Computer Algorithms: Intro to Design & Analysis, 3/e,"- Pearson LPE
6. Thomas H. Cormen and charles E.L. Leiserson, " Introduction to Algorithm", PHI, 2^{nd} Ed
7. Horowitz/Sahani, "Fundamentals of Computer Algorithm", Galgotia, Reprint 1994
8. A.V. Aho and J.D. Ullman, "Design and Analysis of Algorithms", Pearson LPE.
9. Bressard, Bratly, " Fundamentals of Algorithm", Pearson LPE/PHI
10. Simon Harris, " Beginning Algorithms" Wrox Press (Wiley India)

Term Work -

The term work should consist of minimum six lab assignments covering the above syllabus.

NORTH MAHARASHTRA UNIVERSITY, JALGAON

TE (COMPUTER ENGINEERING / INFORMATION TECHNOLOGY)
(w.e.f. 2007-08)

TERM – I

Practical Training/Mini Project/Special Study

Examination Scheme:
Term Work: 25

Every student needs to complete following requirements for term work of Practical Training / Special Study / Mini Project.

Practical training in any industry for a period of minimum two weeks and submit training report certified by personnel manager or works manager or any other higher authority of that industry.

OR

Special study on a recent topic from reported literature and submit a report on it

OR

One mini Theoretical or development project and submit a report on it.

Notes:

1. Practical training is to be undergone in summer vacation after SE and / or in winter vacation after first term of TE.
2. Report should be typed on A4 size paper and two copies paper bounded are to be prepared, one copy for the candidate, and one for the library.

North Maharashtra University, Jalgaon
New Syllabus with effect from Year 2008-09
BE Computer
Term I

Sr. No	Subject	Teaching Scheme per Week			Examination Scheme				
		L	T	P	Paper Hr.	Paper	TW	PR	OR
1	Elective I	4	-	2	3	100	25	-	25
2	Artificial Intelligence	4	-	-	3	100	25	-	-
3	Advanced Unix Programming *	4	-	2	3	100	25	25	-
4	Object Oriented Modeling and Design *	4	-	2	3	100	25	-	25
5	Advanced Computer Network	4	-	-	3	100	-	-	-
6	Seminar	-	-	2	-	-	25	-	-
7	Project I			2	-	-	25	-	25
	Total	20	0	10		500	150	25	75
	Grand Total	**30**			**750**				

Elective I
Operation Research *
Embedded Systems *
Image Processing *

Term II

Sr. No	Subject	Teaching Scheme per Week			Examination Scheme				
		L	T	P	Paper Hr.	Paper	TW	PR	OR
1	Elective II	4	-	2	3	100	25	-	25
2	Data Warehousing and Mining *	4	-	2	3	100	25	-	25
3	Software Metrics and Quality Assurance *	4	-	2	3	100	25	-	25
4	Advanced Computer Architecture	4	-	2	3	100	25	-	-
5	Industrial Visit / Case Study		-				25	-	-
6	Project II		-	6	-		100	-	50
	Total	16	0	14		400	225	0	125
	Grand Total	**30**			**750**				

Elective II
Fuzzy Logic and Neural Networks
Mobile Network*
Compiler Construction

* Common subject with BE IT

NORTH MAHARASHTRA UNIVERSITY, JALGAON

BE (COMPUTER ENGINEERING / IT)
(w.e.f. 2008-09)

TERM – I

Elective – I
Operation Research

Teaching Scheme:	Examination Scheme:
Lectures: 4 Hrs./ Week	Theory Paper: 100 Marks (03 Hrs.)
Practical: 2 Hrs./ Week	Term Work: 25
	Oral: 25

Unit – I **(10 Hrs. 20 Marks)**

Introduction to Operation Research – Modeling in operation research, principles of modeling, Main phases of operation research, scope, role of operation research in decision making, linear programming, model formulation, graphical method, simplex method, advantages of Linear Programming.

Unit – II **(10 Hrs. 20 Marks)**

Dynamic Programming - Introduction, Basic concepts and applications, characteristics of dynamic programming approach, special techniques of Linear programming, Transportation problems, North – West corner rule, Least cost method, Vogel's approximation method, Balanced and unbalanced problems, Assignment problems, Hungarian method, balanced and unbalanced problems, traveling sales man problem.

Unit – III **(10 Hrs. 20 Marks)**

Project Planning Using PERT/CPM : Phases of project management, construction of network or arrow diagrams, time estimates, earliest expected time, latest allowable time and slack, critical path computations for PERT, calculations on CPM networks various floats for activities, critical path, Difference between CPM and PERT , Project time Vs project cost, use of CPM/PERT in project management.

Unit – IV **(10 Hrs. 20 Marks)**

Replacement Model – Deterministic and probabilistic considerations, Replacement of old equipment by the most efficient by the sudden failure items, failure trees, examples of failure trees, sequencing model Terminology and notations, Principles assumptions, Solution of sequencing problems, Processing of n jobs through two machines, Processing n jobs through three machines, Two jobs through m machines, Processing n jobs through m machines .

Unit – V **(10 Hrs. 20 Marks)**

Decision theory and game theory: Decision trees, classes of decision model, decision under certainty, uncertainty and risk.

Game Theory: Theory concept characteristics, maximum and minimum principles saddle points, dominance, basic concept, terminology of two persons zero sum game, MXZ and ZX games subgames methods, graphical method.

Reference Books:

1. N. D. Vohra, Quantitative Techniques in Management, TMH
2. Taha H. A., Operation Research – An Introduction PHI
3. S. D. Sharma, Operation Research, Kedarnath Ramnath Compay
4. N. G. Nair, Operation Research, Dhanpat Rai
5. Prem kumar Gupta, D. S. Hira, Operation Research, S. Chand & Company
6. L. S. Srinath, PERT and CPM Principles & Applications, EWP

Term work:

Assignment based on:

1. Implementation of Linear Programming Model
2. Implementation of Simplex Method
3. Implementation of Dynamic Programming
4. Implementation of transportation model
5. Implementation of assignment model
6. Implementation of Traveling Sales man problem
7. Implementation of sequencing model
8. Implementation for replacement model
9. Game playing with min / max search
10. Program for decision tree

Any Five Lab Assignment should be framed by concern staff member based on above list.

NORTH MAHARASHTRA UNIVERSITY, JALGAON

BE (COMPUTER ENGINEERING / IT)
(w.e.f. 2008-09)

TERM – I

Elective – I
Embedded Systems

Teaching Scheme:	**Examination Scheme:**
Lectures: 4 Hrs./ Week	Theory Paper: 100 Marks (03 Hrs.)
Practical: 2 Hrs./ Week	Term Work: 25
	Oral: 25

Unit – I **(10 Hrs. 20 Marks)**

Embedded system Introduction

Introduction to Embedded System, History, Design challenges, optimizing design metrics, time to market, applications of embedded systems and recent trends in embedded systems, embedded design concepts and definitions, memory management, hardware and software design and testing, communication protocols like SPI, SCI, I2C, CAN etc

Unit – II **(10 Hrs. 20 Marks)**

System Architecture

Introduction to ARM core architecture, ARM extension family, instruction set, thumb Instruction set, Pipeline, memory management, Bus architecture, study of on-chip peripherals like I/O ports, timers, counters, interrupts, on-chip ADC, DAC, RTC modules, WDT, PLL, PWM, USB etc.

Unit – III **(10 Hrs. 20 Marks)**

Interfacing and Programming

Basic embedded C programs for on-chip peripherals studied in system architecture. Need of interfacing, interfacing techniques, interfacing of different displays including Graphic LCD (320X240), interfacing of input devices including touch screen etc, interfacing of output devices like thermal printer etc., embedded communication using CAN and Ethernet, RF modules, GSM modem for AT command study etc.

Unit – IV **(10 Hrs. 20 Marks)**

Real time Operating System Concept

Architecture of kernel, task scheduler, ISR, Semaphores, mailbox, message queues, pipes, events, timers, memory management, RTOS services in contrast with traditional OS. Introduction to uCOSII RTOS, study of kernel structure of uCOSII, synchronization in uCOSII, Inter-task communication in uCOSII, memory management in uCOSII, porting of RTOS.

Unit – V **(10 Hrs. 20 Marks)**

Embedded Linux
Introduction to the Linux kernel, Configuring and booting the kernel, the root file system, Root file directories, /bin, /lib etc., Linux file systems, Types of file system: Disk, RAM, Flash, And Network. Some debug techniques- Syslog and strace, GDB, TCP/IP Networking- Network configuration, Device control from user space- Accessing hardware directly, Multi processing on Linux and Inter Process Communication- Linux process model and IPCs, Multithreading using pThreads - Threads vs. Processes and pThreads, Linux and Real-Time- Standard kernel problems and patches.

Reference Books:

1. Rajkamal, “Embedded Sytems “, TMH.
2. David Simon, “Embedded systems software primer”, Pearson
3. Steve Furber, “ARM System-on-Chip Architecture”, Pearson
4. DR.K.V.K.K. Prasad, “Embedded /real time system”, Dreamtech
5. Iyer,Gupta, “Embedded real systems Programming“, TMH

Laboratory exercise

- Integrated Development Environment Overview (Project creation, down load & debug)
- Study of JTAG Debugger/on-board debugger-emulator.
- ARM Instructions execution (Barrel Shifter, LDR/STR, SMT/LDM)

Term Work:

Group - A
1) Writing basic C-programs for I/O operations
2) C-Program to explore timers/counter
3) C-programs for interrupts
4) Program to demonstrate UART operation

Group - B
5) Program to demonstrate I2C Protocol.
6) Program to demonstrate CAN Protocol.

Group - C
7) Program to interface LCD
8) Program to interface Keyboard and display key pressed on LCD
9) Program to interface stepper motor

Group - D
10) Program to demonstrate RF communication
11) Program to implement AT commands and interface of GSM modem
12) Implementation of USB protocol and transferring data to PC.
13) Implementation of algorithm /program for the microcontroller for low power modes.
uCOSII /Embedded Linux RTOS Examples

Group - E
14) Interfacing 4 x 4 matrix keyboards and 16 x 2 character LCD display to microcontroller / microprocessor and writing a program using RTOS for displaying a pressed key.
15) Writing a scheduler / working with using RTOS for 4 tasks with priority. The tasks may be keyboard, LCD, LED etc. and porting it on microcontroller/ microprocessor.

Group - F
16) Implement a semaphore for any given task switching using RTOS on microcontroller board.
17) Create two tasks, which will print some characters on the serial port, Start the scheduler and observe the behavior.

Group – G
18) RTOS based interrupt handling using Embedded Real Time Linux.

19) Program for exploration of (Process creation, Thread creation) using Embedded Real Time Linux.

Group – H
20) Program for exploring Message Queues using Embedded Real Time Linux.
21) Ethernet Based Socket Programming using Embedded Real Time Linux.

Note: 1) At least one practical should be performed from each group.
2) Two practicals should be performed using the JTAG debugger/on-board Debugger-emulator.

Term work will be based on above list.

NORTH MAHARASHTRA UNIVERSITY, JALGAON

BE (COMPUTER ENGINEERING / IT)
(w.e.f. 2008-09)

TERM – I

Elective – I
Image Processing

Teaching Scheme:	Examination Scheme:
Lectures: 4 Hrs./ Week	Theory Paper: 100 Marks (03 Hrs.)
Practical: 2 Hrs./ Week	Term Work: 25
	Oral: 25

Unit – I **(10 Hrs. 20 Marks)**

Introduction - What is digital image processing?, Fundamental steps in digital image processing, A simple Image formation model, Image sampling and quantization , Representing Digital Images, Basic relationship between pixels,
Image Enhancement in the spatial domain: Basic Gray level transformations, Histogram Processing(Equalization, Matching), Basics of spatial filtering, Smoothing spatial filters, Sharpening spatial filters.

Unit – II **(10 Hrs. 20 Marks)**

Image Enhancement in the frequency domain: Fourier Transform and Frequency domain, Filtering in the frequency domain, Basics of filtering in the frequency domain, Basic filters and their properties, Smoothing Frequency domain filters, Sharpening Frequency domain filters, Homomorphic Filtering
Properties of 2 D Fourier Transform, The Convolution and Correlation Theorems

Unit – III **(10 Hrs. 20 Marks)**

Image Restoration: Model Of Image Restoration/ Degradation Process, Noise Models, Restoration in the presence of Noise- Spatial Filtering, Periodic Noise Reduction by Frequency Domain Filtering, Filtering Techniques to restore image.
Image Compression- Compression models- Lossy Compression- Lossless Compression.

Unit – IV **(10 Hrs. 20 Marks)**

Color Image Processing : Color Fundamentals, Color Models, Converting Colors from different color models, Gray Level to Color Transformations, Color Transformations, Color Slicing, Color Image Smoothing.
Morphological Image Processing
Basic Concepts, Dilation, Erosion, Thinning, Thickening, Pruning, Gray level Morphology

Unit – V **(10 Hrs. 20 Marks)**

Segmentaion- Edge linking and Boundary detection, Thresholding, Region Based Segmentation, Histogram Analysis,

Application of Image Processing,
Introduction to Content Based Image Retrieval.

Reference Books:

1. R.C. Gonzalez, R.R. Woods, Digital Image Processing Person Education, Pearson Education
2. B. Chanda, D.Datta Mujumdar, “Digital Image Processing And Analysis”, PHI ,
3. William Pratt, “Digital Image Processing”, John Willey & Sons
4. Anil Jain, “Fundamentals Of Digital Image Processing”, PHI

Term work:

1. Develop C/C++ code to create a simple image and save the same as bitmap image in .bmp file.
2. Develop C/C++ code to implement basic gray level transformations(Any One)
3. Develop C/C++ code to perform basic image enhancement operations
4. Develop C/C++ code to implement image histogram processing (Equalization or Matching)
5. Develop C/C++ code to find basic relationship between pixels.(Any One)
6. Develop C/C++ code to implement image compression (any one algorithm)
7. Implement gray scale thresholding to blur an image.
8. Implement C/C++ code to implement an algorithm for edge detection.
9. Implement C/C++ code to implement image morphological operations.(Any One)

The term work will be based on any 5 assignments from above list.

NORTH MAHARASHTRA UNIVERSITY, JALGAON

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(w.e.f. 2008-09)

TERM – I

Artificial Intelligence

Teaching Scheme:
Lectures: 4 Hrs./ Week

Examination Scheme:
Theory Paper: 100 Marks (03 Hrs.)
Term Work: 25

Unit – I **(10 Hrs. 20 Marks)**

Introduction to Artificial Intelligence: Definition, AI Problems, physical symbol system and hypothesis, AI Technique, Turing test, Problem as a state space search, production system, Problem characteristics, breadth first search, depth first search, AI representation, Properties of internal Representation, Heuristic search techniques, Best files search, A* and AO* Algorithms, Mean and ends analysis

Unit – II **(10 Hrs. 20 Marks)**

Knowledge Representation using Predicate Logic: Predicate calculus, Predicates and Arguments, ISA hierarchy, Frame notation, Resolution, Natural deduction.
Knowledge Representation using Non-monotonic Logic: TMS (Truth Maintenance System), Statistical and probabilistic reasoning, Fuzzy Logic, Knowledge representation, Semantic Net, Frames, Script, Conceptual dependency.

Unit – III **(10 Hrs. 20 Marks)**

Planning: Types of planning, Block world, strips, Implementation using goal stack, Nonlinear planning with goal stacks, Hierarchical planning, List commitment strategy.
Perception: Action, Robot architecture, Vision, Texture and images, Representing and recognizing scenes, Walzs algorithm, Constraint determination, Trihedral and Nontrihedral figures labeling.

Unit – IV **(10 Hrs. 20 Marks)**

Learning: By training neural networks, Introduction to neural networks, Neural net architecture and

applications.
Natural Language Processing and understanding, Pragmatic, Syntactic, and Semantic analysis, Finite State Machine, ATN, Understanding sentences.

Unit – V **(10 Hrs. 20 Marks)**

Expert System: Utilization and functionality, architectures of Expert system, Knowledge representation, Two case studies on expert systems.
Game Playing: Minimize search procedure, Alpha-beta cutoffs, Waiting for Quiescence, Secondary search.

Reference Books:

1. Elaine Rich, Kerin Knight, "Artificial Intelligence". TMH
2. B. Yegnanarayana, "Artificial Neural Network", PHI
3. Dan W. Patterson, "Introduction to artificial intelligence and expert system", PHI
4. Timothy J Ross, "Fuzzy Logic with Engineering Application", TMH

Term Work:

Assignments based on:

1. Implementation of single perceptron training algorithm.
2. Implementation of fuzzy membership function.
3. Implementation of Unification Algorithm.
4. Hill Climbing Algorithm.
5. Game playing with Min/Max Search.
6. Implementation of Dynamic database.
7. Parsing method implementation.
8. Development of Mini Expert System using Prolog.
9. Application development using Neural Network.
10. Development of Intelligent Perception System.

Any six lab assignments should be framed by concern staff member based on above list.

NORTH MAHARASHTRA UNIVERSITY, JALGAON

BE (COMPUTER ENGINEERING / IT)
(w.e.f. 2008-09)

TERM – I

Advanced Unix Programming*

Teaching Scheme:	**Examination Scheme:**
Lectures: 4 Hrs./ Week	Theory Paper: 100 Marks (03 Hrs.)
Practical: 2 Hrs./ Week	Term Work: 25
	Practical: 25

Unit – I **(10 Hrs. 20 Marks)**

UNIX System Overview – Introduction, UNIX Architecture, Logging In, Files and Directories, Input and Output, Programs and Processes, Error Handling, User Identification, Signals, Time Values, System Calls and Library Functions.

File I/O – Introduction, File Descriptors, open Function, creat Function, close Function, lseek Function, read Function, write Function, I/O Efficiency, File Sharing, Atomic Operations, dup and dup2 Functions, sync, fsync, and fdatasync Functions, fcntl Function, ioctl Function, /dev/fd.

Files and Directories – Introduction, stat, fstat, and lstat Functions, File Types, Set-User-ID and Set-

Group-ID, File Access Per missions, Ownership of New Files and Directories, access Function, umask Function, chmod and fchmod Functions, Sticky Bit, chown, fchown, and lchown Functions, File Size, File Truncation, File Systems, link, unlink, remove, and rename Functions, Symbolic Links, symlinkand readlink Functions, File Times, utime Function, mkdirand rmdir Functions, Reading Directories, chdir, fchdir, and getcwd Functions, Device Special Files, Summary of File Access Per mission Bits.

Unit – II **(10 Hrs. 20 Marks)**

System Data Files and Information – Introduction, Password File, Shadow Passwords, Group File, Supplementary Group Ids, Implementation Differences, Other Data Files, Login Accounting, System Identification, Time and Date Routines.

Process Environment – Introduction, main Function, Process Termination, Command-Line Arguments, Environment List, Memory Layout of a C Program, Shared Libraries, Memory Allocation, Environment Variables, setjmp and longjmp Functions, getrlimit and setrlimit Functions.

Process Control – Introduction, Process Identifiers, fork Function, vfork Function, exit Functions, wait and waitpid Functions, waitid Function, wait3 and wait4Functions, Race Conditions, exec Functions, Changing User IDs and Group IDs, Interpreter Files, system Function, Process Accounting, User Identification, Process Times.

Unit – III **(10 Hrs. 20 Marks)**

Signals – Introduction, Signal Concepts, signal Function, Unreliable Signals, Interrupted System Calls, Reentrant Functions, SIGCLD Semantics, Reliable-Signal Terminology and Semantics, kill and raise Functions, alarm and pause Functions, Signal Sets, sigprocmask Function, sigpending Function, sigaction Function, sigsetjmp and siglongjmp Functions, sigsuspend Function, abort Function, system Function, sleep Function, Job-Control Signals, Additional Features.

Advanced I/O – Introduction, Nonblocking I/O, Record Locking, STREAMS, I/O Multiplexing, 2 poll Function, Asynchronous I/O, readv and writev Functions, readn and written Functions, Memory-Mapped I/O.

Unit – IV **(10 Hrs. 20 Marks)**

Threads – Introduction, Thread Concepts, Thread Identification, Thread Creation, Thread Termination, Thread Synchronization.

Thread Control – Introduction, Thread Limits, hread Attributes, Synchronization Attributes, Reentrancy, Thread-Specific Data, Cancel Options, Threads and Signals, Threads and fork, Threads and I/O.

Daemon Processes – Introduction, Daemon Characteristics, Coding Rules, Error Logging, Single-Instance Daemons, Daemon Conventions, Client-Server Model.

Unit – V **(10 Hrs. 20 Marks)**

Interprocess Communication – Introduction, Pipes, popen and pclose Functions, Coprocesses, FIFOs, XSI IPC, Message Queues, Semaphores, Shared Memory, Client-Server Properties.

Network IPC: Sockets – Introduction, Socket Descriptors, Addressing, Connection Establishment, Data Transfer, Socket Options, Out-of-Band Data, Nonblocking and Asynchronous I/O.

Advanced IPC – Introduction, STREAMS-Based Pipes, Unique Connections, Passing File Descriptors, An Open Server, Version 1, An Open Server, Version 2.

Reference Books:

1. W. Richard Stevens and Stephen A. Rago, Advanced Programming in the UNIX Environment, 2/E, Pearson Education

2.W. Richard Stevens, Unix Network Programming - Interprocess Communications, Volume 2, 2/E, Pearson Education

Term Work:

Concerned staff members should suitably frame the term work (at least 6) based on above syllabus and implementation of Unix commands using library functions as well as implementation of shell scripts.

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TERM – I

Object Oriented Modeling and Design

Teaching Scheme:	**Examination Scheme:**
Lectures: 4 Hrs./ Week	Theory Paper: 100 Marks (03 Hrs.)
Practicals: 2 Hrs./Week	Term Work: 25 Marks
	Oral: 25 Marks

Unit – I **(10 Hrs. 20 Marks)**

Review of Object Modeling, New Paradigms, Object Oriented Thinking, UML Concepts: Overview of UML.
UML 2.0 New Features.
Rational Unified Process emphasizing Inception, Elaboration, Construction, Transition Phases. 4+1 View architecture, Architectural approaches: Use case Centric, Architecture driven, Iterative approach, OO Concepts Review.

Unit – II **(10 Hrs. 20 Marks)**

Introduction to UML. UML MetaModel. Extensibility mechanisms like stereotypes, tagged values, constraints and profiles. OCL. Overview of all diagrams in UML 2.0.

Unit – III **(10 Hrs. 20 Marks)**

Object diagrams, CRC method, Review of OO concepts. Class diagrams, Classes and Relationships, Interfaces and ports, Templates, Active Objects, Advanced relationships generalization, association, aggregation, dependencies. Composite structure diagrams including composite structures, collaborations.

Unit – IV **(10 Hrs. 20 Marks)**

Interaction diagrams. Interaction Overview diagrams including interactions, signals, exceptions, regions, partitions, Sequence diagrams, Communication diagrams.
State Machine diagrams, States, encapsulation of states, transitions, submachine, state generalization. Timing diagrams, Activity diagrams, Activities, sub activities, signals, exceptions, partitions, regions.

Unit – V **(10 Hrs. 20 Marks)**

Support for modeling Architecture in UML. Package diagrams, Component diagrams, Deployment diagrams. Applications of UML in embedded systems, Web applications, commercial applications.

Reference Books:

1. Grady Booch, James Rumbaugh, Ivar Jacobson “Unified Modeling Language User Guide”, Addison-Wesley
2. Joseph Schmuller “SAMS Teach yourself UML in 24 Hours”, Third edition.
3. Martin Fowler, “UML Distilled: A Brief Guide to the Standard Object Modeling Language”, Third Edition (Paperback) ,Addision Wesley
4. Dan Pilone, Neil Pitman “UML 2.0 in a Nutshell”, O'Reilly
5. Rambaugh, “Object Oriented Modeling and Designing”. PHI

6. Bouch. “Object Oriented Analysis and Design with Applications”. Addison Wesley.
7. Schah, “Introduction to OOAD with UML and Unified Process”, TMH

Term Work:
Concerned staff members should suitably frame the term work at least 5 assignments based on above syllabus. Each assignment must consider definition, analysis, design and modeling of a project.

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TERM – I

Advanced Computer Network

Teaching Scheme:
Lectures: 4 Hrs./ Week

Examination Scheme:
Theory Paper: 100 Marks (03 Hrs.)

Unit – I **(10 Hrs. 20 Marks)**
Introduction to wireless Networking: Why Wireless? What makes Wireless Network different? A Network by Any other name.
Overview of 802.11 Networks: IEEE 802 Network Technology Family tree, 802.11 Nomenclature and design, 802.11 Network Operation, Mobility Support.

802.11 MAC Fundamentals: Challenges for the MAC,MAC Access Modes and Timing, Contention-Based Access Using the DCF, Fragmentation and Reassembly, Frame Format, Encapsulation of Higher-Layer Protocols Within 802.11,Contention-Based Data Service, Frame Processing and Bridging.

802.11 Framing in Detail: Data Frames, Control Frames, Management Frames, Frame Transmission and Association and Authentication States

Unit – II **(10 Hrs. 20 Marks)**
Management Operations: Management Architecture, Scanning, Authentication, Pre-authentication, Association, Power Conservation, Timer Synchronization, Spectrum Management

Contention-Free Service with the PCF: Contention-Free Access Using the PCF, Detailed PCF Framing, Power Management and the PCF

Physical Layer Overview: Physical-Layer Architecture , The Radio Link , RF Propagation with 802.11, RF Engineering for 802.11

Unit – III **(10 Hrs. 20 Marks)**
The Frequency-Hopping (FH) PHY: Frequency-Hopping Transmission ,Gaussian Frequency Shift Keying (GFSK) FH PHY Convergence Procedure (PLCP), Frequency-Hopping PMD Sublayer, Characteristics of the FH PHY

The Direct Sequence PHYs: DSSS and HR/DSSS (802.11b): Direct Sequence Transmission, Differential Phase Shift Keying (DPSK), The "Original" Direct Sequence PHY, Complementary Code Keying, High Rate Direct Sequence PHY
802.11a and 802.11j: 5-GHz OFDM PHY: Orthogonal Frequency Division Multiplexing (OFDM), OFDM as Applied by 802.11a, OFDM PLCP, OFDM PMD Characteristics of the OFDM PHY

Unit – IV **(10 Hrs. 20 Marks)**
Wired Equivalent Privacy (WEP): Cryptographic Background to WEP, WEP Cryptographic Operations, Problems with WEP, Dynamic WEP

User Authentication with 802.1X: The Extensible Authentication Protocol, EAP Methods, 802.1X: Network Port, Authentication, 802.1X on Wireless LANs
802.11i: Robust Security Networks, TKIP, and CCMP: The Temporal Key Integrity Protocol (TKIP), Counter Mode with CBC-MAC (CCMP), Robust Security Network (RSN) Operations

Unit – V **(10 Hrs. 20 Marks)**

Ad Hoc Wireless Networks: Introduction, Issues in Ad Hoc Wireless Networks, Ad Hoc Wireless Internet
Routing Protocols for Ad Hoc Wireless Networks: Introduction, Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks, Classifications of Routing Protocols, Table-Driven Routing Protocols, On Demand Routing Protocols, Hybrid Routing Protocols, Routing Protocols with Efficient Flooding Mechanisms, Hierarchical Routing Protocols, Power-Aware Routing Protocols
Wireless Sensor Networks: Introduction, Sensor Networks Architecture, Data Dissemination, Data Gathering, MAC Protocols for Sensor Networks, Location Discovery, Quality of a Sensor Network.

Reference Books:

1. Matthew Gast, 802.11 Wireless Networks: The Definitive Guide, Second Edition, O'Reilly
2. C.Siva Ram Murthy, B.S. Manoj, Ad Hoc Wireless Networks: Architectures and Protocols, Pearson

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TERM – I

Seminar

Teaching Scheme:	**Examination Scheme:**
Practical: 2 Hrs./ Week	Term Work: 25 Marks

1. For seminar every student will individually study a topic assigned to him / her and submit a report and shall deliver a short lecture / Seminar on the topic at the end of term.
2. Selection of topic should be done by students in consultation with concerned guide
    a. Topic should be related to branch but it should be extended part of the branch (latest and advance topic).
    b. The topic should be such that the student can gain latest knowledge. Student should preferably refer at least one research paper
3. Seminar topic should not be repeated in the department and registration of the same should be done on first come first served basis
4. Seminar report should be submitted in paper bound copy prepared with computer typing
    a. Size of report depends on advancement of topic.
    b. Student should preferably refer minimum 5 reference books / magazines.
    c. Format of content
        i. Introduction.
        ii. Literature survey.
        iii. Theory
            1. Implementation
            2. Methodology
            3. Application
            4. Advantages, Disadvantages.
        iv. Future scope.
        v. Conclusion.
5. ASSESSMENT OF SEMINAR for TERM WORK

Title of seminar : ______________________________
Name of guide : ______________________________

Sr. No.	Exam Seat No.	Name of Student	Assessment by examiners					Grand Total
			Topic Selection	Literature Survey	Report Writing	Depth of understanding	Presentation	
			5	5	5	5	5	25

6. Assessment of Literature survey will be based on
    a. collection of material regarding history of the topic,
    b. implementation,
    c. recent applications.

7. Assessment of Depth of understanding will be based on
    a. Questioning by examiners.
    b. Questioning by students.
    c. What the student understands i.e. conclusion regarding seminar.

8. Assessment of presentation will be based on;
    a. Presentation time (10 minutes)
    b. Presentation covered (full or partial)
    c. Way of presentation
    d. Questioning and answering (5 minutes)
9. Examiners should be a panel of two one of them must be guide. Examiner must have experience at least 3 years. Examiners will be appointed by HOD in consultation with Principal.

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TERM – I

Project - I

Teaching Scheme:
Practical: 2 Hrs./ Week

Examination Scheme:
Term Work: 25
Oral: 25

1. Every student individually or in a group (group size is of 3 students. However, if project complexity demands a maximum group size of 4 students, the committee should be convinced about such complexity and scope of the work) shall take a project in the beginning of the (B.E. first Term) seventh term in consultation with the guide and the project must be completed in the (B.E. Second Term) eighth term.

2. The project proposal must be submitted in the institute in the beginning of the (B.E. first Term) seventh term. While submitting project proposal care is to be taken that project will be completed within the available time of two term i.e 2 Hrs per week for (B.E. first Term) seventh term and 4 Hrs per week for (B.E. Second Term) eighth semester (total time become 12*2 + 12*4 = 72 Hrs per project partner). The final title of

the project work should be submitted at the beginning of the (B.E. Second Term) eighth semester. .

3. Project title should be precise and clear. Selection and approval of topic:
Topic should be related to real life or commercial application in the field of Computer Engineering

OR

Investigation of the latest development in a specific field of Computer Engineering

OR

Commercial and Interdisciplinary projects should be encouraged. The examination will be conducted independently in respective departments.

4. The group should maintain a logbook of activities. It should have entries related to the work done, problems faced, solution evolved etc., duly signed by guide.
5. The group is expected to complete details system/problem definition, analysis, design, etc. in (B.E. first Term) seventh term, as a part of term work in the form of a joint report. Project report must be submitted in the prescribed format only. No variation in the format will be accepted.
6. One guide will be assigned at the most three project groups.
7. The guides should regularly monitor the progress of the project work.
8. Assessment of the project for award of term work marks shall be done by the guide and a departmental committee (consisting of minimum two teachers with experience more than three years) as per the guidelines given in the following table.

A) ASSESSMENT OF PROJECT I TERMWORK B.E. FIRST TERM

NAME OF THE PROJECT: ______________________
NAME OF THE GUIDE: ________________________

Sr No	Exam Seat No	Name Of Student	Assessment by guide (70%)					Assessment by Departmental committee (30%)			Grand Total	Out of 25 Marks
			Literature survey	Topic Selection	Docum-entation	Attendance	Total	Evaluation (10%)	Pres-ntaion (20%)	Total		
		Marks	10	05	15	05	35	05	10	15	50	25

Sign of Guide Sign. of Committee Members Sign. of H. O. D.

9. The guide should be internal examiner for oral examination (If experience is greater than three years).
10. The external examiner should be from the related area of the concerned project. He should have minimum of five years of experience at degree level / industry.
11. The evaluations at final oral examination should be done jointly by the internal and external examiners.

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TERM – II

Elective – II
Fuzzy Logic and Neural Networks

Teaching Scheme:
Lectures: 4 Hrs./ Week
Practical: 2 Hrs./ Week

Examination Scheme:
Theory Paper: 100 Marks (03 Hrs.)
Term Work: 25
Oral: 25

Unit – I **(10 Hrs. 20 Marks)**

Introduction to Biological Neurons: Neurons, Axon, Synaptic links, Dendrites, Working,
Artificial Neuron Model: McCulloch-Pitts Neuron Model, Neuron Modeling for Artificial Neural Systems, Activation Functions.
Models of Artificial Neural Networks: Feed forward Network, Feedback Network, Neural Processing, Learning and Adaptation, Supervised and Unsupervised Learning.

Unit – II **(10 Hrs. 20 Marks)**

Neural Network Learning Rules: Hebbian Learning, Perceptron Learning, Delta Learning, Widrow-Hoff Learning, Correlation Learning, Winner-Take-All Learning, Single Layer Perceptron Classifier: Classification Model, Features, Decision Regions, Discriminants Functions, Linear Machine and Minimum Distance Classification, Nonparametric Training Concept.

Unit – III **(10 Hrs. 20 Marks)**

Training and Classification using Discrete Perceptron, Single Layer Continuous Perceptron Networks for Linearly Separable Classifications, Multi-category Single Perceptron Networks.
Multilayer Feedforward Networks: Linearly Nonseparable Pattern Classification, Delta Learning Rule for Multiperceptron Layer, Generalized Delta Learning Rule.

Unit – IV **(10 Hrs. 20 Marks)**

Feed Forward Recall and Error Back Propagation Training, Learning Factors, Single Layer Feedback Networks, Basic Concepts, Hopfield Networks, Boltzmann Machine, Kohonens self organizing maps.
Applications of Neural Networks: Pattern Recognition, Classification and clustering.

Unit – V **(10 Hrs. 20 Marks)**

Fundamentals of ‘Fuzzy System, Crisp Sets, Membership Functions, Fuzzy Sets, Fuzzy Set Properties and Manipulation, Linguistic Variables, Fuzzy System Architecture, Fuzzy System Design and implementation.
Fuzzy Neural Networks: Introduction to Neuro – Fuzzy Systems, Types of Fuzzy-Neural Nets, Nero-Fuzzy Systems Design and implementation.

Reference Books:

1. Robert J. Schalkoff, “Artificial Neural Networks”, McGraw – Hill
2. B. Yegnarayan, “ Artificial Neural Networks”, PHI
3. Timoty J Ross, “Fuzzy Logic with Engineering Applications”, McGraw-Hill
4. Satish Kumar, “Neural Network:A Classroom Approach”, TMH
5. J. M. Zurada, “Introduction to Artificial Neural Networks”, Jaico Publishing House.

Term Work:

1. Implementation of basic learning rules using single neuron
2. Implementation of Single layer discrete perceptron

3. Implementation of Single layer continues perceptron
4. Implementation of operations of fuzzy sets
5. Design and Implementation of fuzzy sets and its membership functions
6. Mini application development using fuzzy sets
7. Mini application development using neural network

Any six-lab assignments should be frame by the concern staff based on above list.

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TERM – II

Elective – II
Mobile Network

Teaching Scheme:	**Examination Scheme:**
Lectures: 4 Hrs./ Week	Theory Paper: 100 Marks (03 Hrs.)
Practical: 2 Hrs./ Week	Term Work: 25
	Oral: 25

Unit – I **(10 Hrs. 20 Marks)**

Introduction – PCS Architecture, Cellular Telephony, Cordless Telephony and Low-tier PCS, Third Generation wireless system

Mobility Management – Handoff, Inter - BS handoff, Intersystem handoff, Roaming management, Roaming management under SS7 and Roaming management for CT2.

Handoff Management – Detection and Assignments, Handoff detection, Strategies for handoff detection, Mobile controlled handoff, Network controlled handoff, Mobile assisted handoff, Handoff failure, Channel assignment, Non- prioritized scheme and Reserved channel scheme, Queuing priority scheme, Sub rating scheme, Implementation issues, Hard handoff – MCHO link transfer, MAHO/NCHO link transfer, Sub rating MCHO link transfer, Soft handoff – adding new BS, dropping a BS.

Unit – II **(10 Hrs. 20 Marks)**

GSM Overview – GSM Architecture, location tracking and call setup, Security, Data Services – HSCSD, GPRS, Unstructured supplementary service data.
GSM Network Signaling – GSM MAP service frame work, MAP protocol machine, MAP dialogue.
GSM Mobility management – GSM location update, Mobility databases, Failure restoration, VLR Identification algorithm, VLR Overflow control.

Unit – III **(10 Hrs. 20 Marks)**

GSM short message service – SMS architecture, SMS protocol hierarchy, Mobile originated messaging, Mobile terminated Messaging.
International Roaming for GSM – International GSM call setup, Reducing the International call delivery cost
GSM Operations, Administration, and Maintenance – Call recording functions, Performance Measurement and Management, Subscriber and Service data Management.
Mobile number portability – Fixed network number portability, Number portability for Mobile networks, Mobile number portability mechanism.

Unit – IV **(10 Hrs. 20 Marks)**

VoIP Service for mobile networks – GSM on the Net, iGSM wireless VoIP solution, iGSM procedures and Message flows.

General Packet Radio Services – Architecture, Network nodes, Interfaces, Procedures, Billing, Evolving from GSM to GPRS.

Unit – V **(10 Hrs. 20 Marks)**

Wireless Application Protocol – WAP Model, WAP Gateway, WAP Protocol – WDP, WTLS, WTP, WSP, WAE, Mobile station Application execution environment.
Third Generation Mobile Services – Paradigm shifts in 3G Systems, W-CDMA, cdma 2000, Improvements on core network, Quality of service in 3G, Wireless Operating System for 3G Handset.
Paging Systems – Paging Network Architecture, User Access Interface – Telocator Alphanumeric Input Protocol (TAP), Telocator Message Entry Protocol (TME), Intersystem Interface.
Wireless Local Loop – WLL Architecture, WLL technologies.

Reference Books:

1. Yi-Bing Lin and Imrich Chlamtac "Wireless and Mobile Network Architecture", Wiley Publication.
2. Kasera Sumit, Narang Nishit, "3G Networks: Architecture, Protocols and Procedures", TMH

Term Work:

1. Setting up wireless network with and without infrastructure support.
2. Configuring Access Point with bridging mode (Point to Point and Point to Multi Point).
3. Configuring Routing between wired and wireless Networks.
4. Configuring Security in wireless network with and without infrastructure support.
5. At least 3 lab assignments based on above syllabus using any network simulator such as NS2, OPNET, OMNET etc.

Concerned staff members should suitably frame the term work (at least 6) based on above syllabus. Oral will be conducted based on the above syllabus and the term work submitted in the form of journal.

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TERM – II

Elective – II
Compiler Construction

Teaching Scheme:	Examination Scheme:
Lectures: 4 Hrs./ Week	Theory Paper: 100 Marks (03 Hrs.)
Practical: 2 Hrs./ Week	Term Work: 25
	Oral: 25

Unit – I **(10 Hrs. 20 Marks)**

Introduction to Compiling: System software's introduction: Assembler, Loader, Linker. The phases of compiler, preprocessors, overview of simple one pass compiler.

Lexical Analysis: Role of lexical analyzer, input buffering, token specification, token recognition, language for lexical analysis specification, Finite Automata, NFA to DFA, RE to NFA, RE to DFA, state minimization of DFA. LEX tools

Unit – II **(10 Hrs. 20 Marks)**

Syntax Analysis: The role of the parser, context free grammar, ambiguity in grammar and it's elimination, Top down parsing: recursive descent, predictive, LL(1) parsers. Construction of predictive parsing tables, FIRST and FOLLOW, LL(1) grammar, Error recovery in Predictive parsing . Bottom up parsing: Handle pruning, stack implementation and conflicts of shift reduce parsing, LR parsers: LR parsing algorithm, constructing SLR, canonical LR, LALR parsing tables. Error recovery in LR parsing, YACC tools.

Unit – III **(10 Hrs. 20 Marks)**

Syntax Directed Translation: Syntax directed definition, inherited attributes, construction of syntax tree, directed acyclic graphs for expressions, Bottom up evaluation of S-attributed definitions, L-attributed definitions, top down translation, bottom up evaluation of inherited attributes.

Intermediate Code Generation: Intermediate language, various intermediate forms, TAC, syntax directed translation into TAC, Declaration, Assignment statements, Boolean expressions, case statements, Back patching, Procedure calls.

Unit – IV **(10 Hrs. 20 Marks)**

Code generation: Design issues of code generation, the target machine, run time storage management, basic blocks and flow graphs, a simple code generator, the DAG representation of basic blocks, Peephole optimization, Generating code for DAGs.

Code Optimization: Criteria for code improving transformation, code optimization sources: Local and global common sub-expression elimination, dead code elimination, Induction variable reduction, loop invariant computation, Optimization of basic blocks, loops in flow graph, reducible flow graph, code improving transformations.

Unit – V **(10 Hrs. 20 Marks)**

Run time environments: activation trees, control stacks, storage organization, subdivision of run time memory, activation records, storage allocation strategies: static allocation, stack allocation, heap allocation, symbol table management: hash tables, dynamic storage allocation techniques, explicit allocation of fixed size and variable size blocks.

Reference Books:

1. Aho, Sethi, Ulman, “Compilers Principles, Techniques and Tools”, Addision Wesley
2. Dhamdhere, “Compiler Construction- Principles and Practices”, MacMillan India.
3. Andrew Appel, “Modern Compiler Implementation in C”, Cambridge University Press
4. J.P.Bennett, “Introduction to Compiling Techniques”, TMH
5. Holub A.J., “Complier Design In ‘C’”, Prentice Hall

Term Work:

1. Study of LEX and YACC.
2. Calculator (text or graphics) using LEX and YACC.
3. Lexical analyzer for a subset of a C using LEX.
4. Design of a Predictive parser.
5. Implementation of code generator
6. Implementation of code optimization for

   Common sub-expression elimination, Loop invariant code movement.

Any 5 laboratory assignments should be framed by concern staff member based on above list.

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TERM – II

Data Warehousing and Mining

Teaching Scheme:	**Examination Scheme:**
Lectures: 4 Hrs./ Week	Theory Paper: 100 Marks (03 Hrs.)
Practical: 2 Hrs./ Week	Term Work: 25

Oral: 25

Unit – I **(10 Hrs. 20 Marks)**

Evolution of database technology, What is data mining?, Data Mining Applications, Steps in Knowledge Discovery, Architecture of typical data mining System, Data mining- On What kind of data, Data mining Functionalities, Classification of data mining systems, Major Issues in Data Mining.

What is Data Warehouse? Difference between Operational Database systems and Data Warehouse (OLTP and OLAP), Why Separate Data Warehouse?

A Multidimensional Data Model, Schemas for Multidimensional Databases: Stars, Snowflakes, and Fact Constellations. Measures, Concept Hierarchies, OLAP Operations in the Multidimensional Data Model.

Unit – II **(10 Hrs. 20 Marks)**

Data Warehouse Architecture, Process of Data Warehouse design, A Three tier Data Warehouse Architecture., Types Of OLAP servers.

Data Preprocessing: Why Preprocess Data? Data Cleaning Techniques, Data Integration and Transformation, Data Reduction Techniques, Discretization and Concept Hierarchy Generation for numeric and categorical data.

Data mining Primitives, A Data Mining Query Language.

Unit – III **(10 Hrs. 20 Marks)**

Concept Description: What is Concept Description? Data Generalization and Summarization-Based Characterization, Attribute Oriented Induction, Analytical Characterization: Attribute Relevance Analysis, Methods, Mining Descriptive Statistical Measures in Large Databases.

Mining Association Rules: Association Rule Mining, Market Basket Analysis, Association Rule classification, Mining Single-Dimensional Boolean Association Rules from Transactional Databases, The Apriori Algorithm, Mining Multilevel Association Rules, Constraint-Based Association Mining.

Unit – IV **(10 Hrs. 20 Marks)**

Classification and Prediction: What is Classification and Prediction? Data Classification Process, Issues Regarding Classification and Prediction., Classification by Decision Tree Induction, Bayesian Classification, , Classification by Back propagation, A Multilayer Feed Forward Neural Network, Classification Based on Association Rule Mining, Other Classification Methods

Cluster Analysis: What is Cluster Analysis? Types of Data in Cluster Analysis, A Categorization of Clustering Methods, Partitioning Methods, Hierarchical Methods, Density Based Methods, Grid Based Methods, Model Based Clustering Methods.

Unit – V **(10 Hrs. 20 Marks)**

Cluster Analysis: What is Cluster Analysis? Types of Data in Cluster Analysis, A Categorization of Clustering Methods, Partitioning Methods, Hierarchical Methods, Density Based Methods, Grid Based Methods, Model Based Clustering Methods

Mining Complex Types Of Data: Multidimensional Analysis and Descriptive Mining of Complex Data Objects, Mining Multimedia Databases, Mining Text Databases, Mining the World Wide Web.

Reference Books:

1. Han and Kamber, “Data Mining: Concepts and Techniques”, Morgan Kaufmann Publishers
2. Alex and Berson, “Data warehousing, Data Mining and OLAP”, TATA McGraw Hill

Term Work:

1. Develop a application to construct a multidimensional data model (Star, Snowflake or Fact constellations)
2. Develop a application to perform OLAP operations.
3. Develop a application to implement data preprocessing techniques.
4. Develop a application to implement data integration techniques.
5. Develop a application to implement data generalization and summarization techniques
6. Develop a application to extract association mining rules.
7. Develop a application for classification of data.
8. Develop a application for implementing one of the clustering technique.
9. Study of commercial data mining tools.

Any 6 laboratory assignments should be framed by concern staff member based on above list.

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TERM – II

Software Metrics and Quality Assurance

Teaching Scheme:
Lectures: 4 Hrs./ Week
Practical: 2 Hrs./ Week

Examination Scheme:
Theory Paper: 100 Marks (03 Hrs.)
Term Work: 25
Oral: 25

Unit – I **(10 Hrs. 20 Marks)**

Software Measurements: Measurement in Software Engineering, Scope of Software Matrices, The representational theory of measurements, Measurement and Models, Measurements Scales and scale types, Meaningfulness in measurement, Classifying software measures, Applying the framework, Software measurement validation.

Unit – II **(10 Hrs. 20 Marks)**

Measuring internal product attributes: Size- Aspects of software size, Length, Reuse, Functionality, Complexity.
Measuring internal product attributes: Structure- Types of structural measures, Control-flow structure, Modularity and information flow attributes, Data structure, Difficulties with general “complexity” measures.
Measuring internal product attributes: Modeling software quality, Measuring aspects of quality.

Unit – III **(10 Hrs. 20 Marks)**

Software Reliability: Basics of reliability theory, software reliability problem, parametric reliability growth models, predictive accuracy, importance of operational environment.

Good estimates, cost estimation: problems and approaches, models of effort and cost, problem with existing modeling methods, dealing with problems of current estimation methods, implication for process predictions.

Unit – IV **(10 Hrs. 20 Marks)**

Software documentation, Standards, Practices, Conventions and metrics, The software inspection process, The walkthrough process, Audit process, Document verification, The ISO 9000 Quality Standards, Comparison of the ISO 9000 model with SEI’s CMM.

Unit – V **(10 Hrs. 20 Marks)**

Cleanroom Software Engineering: The cleanroom approach, Functional Specification, Cleanroom design, Cleanroom testing.
Reengineering: Business process reengineering, Software reengineering, Reverse reengineering, Reconstructing, Forward engineering, The economics of reengineering.

Reference Books:

1. Flanton, Pfleeger, “Software Metrics- A Rigorous and Practical Approach”, Thompson Learning
2. Mordechai Ben-menachem/Garry S.Marliss, “Software Quality”, Thompson Learning
3. Roger S. Pressman, “Software Engineering- A Practitioner’s Approach”, TMH
4. Swapna Kishore and Rajesh Naik, “ISO 9001:2000 for Software Organizations”, TMH

Term Work:

Concerned staff members should suitably frame the term work at least 5 assignments based on above syllabus.

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TERM – II

Advanced Computer Architecture

Teaching Scheme:
Lectures: 4 Hrs./ Week
Practical: 2 Hrs./ Week

Examination Scheme:
Theory Paper: 100 Marks (03 Hrs.)
Term Work: 25

Unit – I **(10 Hrs. 20 Marks)**
Introduction to Parallel Processing: Evolution of computer Systems, Parallelism in uni-processor Systems, Parallel Computer Structure, Architectural Classification Schemes, Clock rate and CPI, performance factors, system Attributes MIPS rate ,Throughput rate, Implicit parallelism, Explicit parallelism, Parallel processing applications.
Program and Network Properties: Condition of Parallelism, Program partitioning and Scheduling, Program flow mechanism, system Interconnect architectures.

Unit – II **(10 Hrs. 20 Marks)**
Processor and Memory Hierarchy: Design space of processors, Instruction set architectures, CISC scalar processors, RISC scalar Processors, Super scalar and Vector Processors.
Inclusion, coherence and Locality, memory capacity planning. Bus, cache and shared memory.
Back, plane Bus System: Back plane bus specification, addressing and timing protocol, Arbitration and Interrupt, shared memory organization: Interleaved memory organization, Bandwidth and fault tolerance, memory allocation schemes.
Principles of Pipelining: Principles of Linear pipelining, classification of pipeline processor, General pipelines and Reservation tables.

Unit – III **(10 Hrs. 20 Marks)**
Pipelining and Super scalar Techniques: Linear pipeline processors, nonlinear pipeline processors, Instruction pipeline design, Arithmetic pipeline design, Super scalar and Super pipeline design.
Array Processors: SIMD Array processors: SIMD Computer Organization, Masking and data Routing Mechanism, Inter-PE Communications SIMD Interconnection networks.
Parallel Algorithms for array processor: SIMD Matrix Multiplication, Parallel sorting.
Associated array processing: Associative search Algorithms.

Unit – IV **(10 Hrs. 20 Marks)**
Multiprocessor Architecture: Loosely Coupled Multiprocessors, Tightly Coupled multiprocessors, Processor characteristics for multiprocessing.
Parallel Algorithms for Multiprocessing: Classification of parallel Algorithms, Synchronized and Asynchronous parallel Algorithms, Multiprocessor OS.
Vector Processing: Vector processing principles , vector access memory schemes, characteristics of vector processing.

Unit – V **(10 Hrs. 20 Marks)**
Data Flow Computers: Data driven computing and languages, data flow computer architectures.
Principles of Multithreading: Issues and solution, multiple context processor, Multidimensional Architectures, Multithreading.
Parallel Programming Modules: Shared-variable model, message- passing model, data- parallel model, object- oriented model, Functional and logic models.
Parallel languages: languages features for parallelism, parallel language construction.

Reference Books:

1. Kai Hwang, “Advance Computer Architecture, Parallelism, Scalability, Programmability”, Mc-Graw Hill Publication
2. Kai Hwang and Faye A Briggs, “Computer Architecture and Parallel Processing”

Term Work:

Any five lab assignments should be framed by concern staff member based on above syllabus.

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BE (COMPUTER ENGINEERING)
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TERM – II

Industrial Visit / Case Study

Teaching Scheme:

Examination Scheme:
Term Work: 25

EDUCATION TOUR / TECHNICAL VISITS / CASE STUDY AND ITS EVALUATION

1. During (B.E. First Term / Second Term) seventh and / or eighth terms or during vacation between (B.E. First Term / Second Term) seventh and eighth terms, every student; shall visit minimum two industries, factories arranged by colleges and accompanied by teachers. There shall be at least one teacher for a group of 20 students and at least one non-teaching staff accompanied with the students.

2. The colleges should obtain appropriate certificates of visit from the concerned organizations just after the visits.

3. Students should submit written report about the visits individually at the end of (B.E. Second Term) eighth term.

4. The report should contain information about the following points:

   (a) The organization - activities of organization and administrative setup technical personnel and their main duties.
   (b) The project / industry brief description with sketches and salient technical information.
   (c) The work / processes observed with specification of materials, products, equipments etc. and role of engineers in that organization.
   (d) Suggestions (if any) for improvement in the working of those organizations.

5. The evaluation of the report of technical visits will be made by panel of two teachers appointed by principal based on following points:

   (a) Coverage aspect: All above points should be covered.
   (b) Detailed observations: System / Process / Product explained with data, diagram specifications.
   (c) Quality of presentation: Report should be very objective and should consist of clear

and systematic organization of topics and information.

(d) Viva - voce: A viva -voce shall be conducted on the technical visit report by the teachers to assess the specific knowledge gained by the students for technical applications.

6. The case study should include the study problem in Computer Engineering branch.

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TERM – II

Project - II

Teaching Scheme:
Practical: 6 Hrs./ Week

Examination Scheme:
Term Work: 100
Oral: 50

1. The Project group in (B.E. first Term) seventh term will continue the project work in (B.E. Second Term) eighth term and complete project.
2. The group should maintain a logbook of activities. It should have entries related to the work done, problems faced, solution evolved etc., duly signed by guide.
3. The guides should regularly monitor the progress of the project work.
4. The project work along with project report should be submitted as part of term work in (B.E. Second Term) eighth term on or before the last day of the (B.E. Second Term) eighth term.
5. Project report must be submitted in the prescribed format only. No variation in the format will be accepted.
6. Assessment of the project for award of TW marks shall be done by the guide and a departmental committee (consisting of minimum two teachers with experience more than three years) as per the guidelines given in the following table.

B) ASSESSMENT OF PROJECT II TERMWORK (B.E. SECOND TERM)

NAME OF THE PROJECT: ____
NAME OF THE GUIDE: ____

Sr. No	Exam. Seat No	Name Of Students	Assessment by guide (70%)						Assessment by department (30%)			Grand Total
			Fabrication /software / actual work	Execution of project	Project report	Scope/ Cost / Utility	Attende-nece	Total	Evaluation (10%)	Prese-ntaion (20%)	Total	
		Marks	20	10	20	10	10	70	10	20	30	100

Sign of Guide   Sign. of Committee Members   Sign. of H. O. D.

7. The guide should be internal examiner for oral examination (If experience is greater than three years).
8. The external examiner should be from the related area of the concerned project. He should have minimum of five years of experience at degree level / industry.
9. The evaluation at final oral examination should be done jointly by the internal and external examiners.
10. The Project work should be kept in department for one academic year after University Examination.

NORTH MAHARASHTRA UNIVERSITY, JALGAON
STRUCTURE OF TEACHING AND EVALUATION
S.E.(I.T.)

First term

W.E.F. 2006-07

Sr. No.	Subject	Teaching Scheme Hours/week			Examination Scheme				
		Lectures	Tutorial	Practical	Paper Duration Hours	Paper	TW	PR	OR
1	Programming Paradigm and Methodology	4	--	--	3	100	25	--	25
2	*Discrete Structure and Graph Theory	4	--	--	3	100	--	--	--
3	*Digital Systems and Microprocessor	4	--	2	3	100	50	25	--
4	*Industrial Management and Economics	4	--	--	3	100	- -	--	--
5	*Engineering Mathematics –III	4	1	--	3	100	25	--	--
6	*Programming Laboratory I	3	--	4	--	--	50	50	--
	Total	**23**	**1**	**6**	**- -**	**500**	**150**	**75**	**25**
	Grand Total	**30**			**750**				

SECOND TERM

Sr. No.	Subject	Teaching Scheme Hours/week			Examination Scheme				
		Lectures	Tutorial	Practical	Paper Duration Hours	Paper	TW	PR	OR
1	*Microprocessor I	4	--	2	3	100	25	25	--
2	*Data Structure and Files	4	--	4	3	100	50	50	--
3	*Computer Organization	4	--	--	3	100	--	--	--
4	Information Theory	4	--	--	3	100	--	--	--
5	*Data Communication	4	--	--	3	100	--	--	--
6	*Programming Laboratory II	2	--	4	--	--	50	50	--
	Total	**22**	**0**	**10**	**--**	**500**	**125**	**125**	**--**
	Grand Total	**32**			**750**				

* Common Subject with SE(Computer)

NORTH MAHARASHTRA UNIVERSITY, JALGAON

SE (INFORMATION TECHNOLOGY)
(w.e.f. 2006-07)

TERM – I

PROGRAMMING PARADIGMS AND METHODOLOGY

Teaching Scheme:
Lectures: 4 Hrs / Week

Examination Scheme:
Theory Paper: 100 Marks (3 Hrs)
Term work: 25 Marks
Oral: 25 Marks

Unit – I

Introduction: Different types of programming languages .i.e. Machine level, Assembly ,high level, 4GL, characteristics of HLL, programming languages ,role seed ,Genealogy of programming languages ,software Engineering and programming languages , characteristics of good programming languages , programming languages paradigms.
Languages description –character set ,tokens (lexical issue) ,sentence –syntax and semantics , grammar ,types and representation..

(10 Hrs, 20 Marks)

Unit – II

Implementation of Basics Blocks of a languages: Data types, classification, structure and Nonstructural data types, variables and constants, Derived and abstract data types, Data types-character, integer, float double, array, set, enum, Boolean, void, pointer, structure, class, union, sub range etc. with respect to programmer view, implementation, storage representation, values associated and boundary(range). operation on data types–arithmetic, conditional, logical, programming languages and control statements–expression, assignments, control flow statements, iterative statements, introduction to function call and definition, macro.

(10 Hrs, 20 Marks)

Unit – III

Procedures: Need of procedure referencing environment's-local, no local, global for block structure and non block structure language, procedure v/s block scope virility and life time OS variable static and dynamic scope. Activation record, study of procedure call in C and Pascal, Different parameter passing method, storage management – static and dynamic.

(10 Hrs, 20 Marks)

Unit – IV

Object Oriented programming – limitations of procedural programming, characteristics and application of object oriented programming, Genealogy of OOP, basic concepts in oop such as information hiding, abstraction

(10 Hrs, 20 Marks)

Unit – V

Functional programming –procedural programming V/s functional programming, mathematic function v/s functional programming, elements of functional programming, Genealogy of functional programming, various operation functional programming, function call, recursive function, data v/s function in context of functional programming, scooping issue.

(10 Hrs, 20 Marks)

Reference Books –

1. Ravi Sethi, “Programming Languages, Concept and Principles ”, Addison Wesley
2. Horowitz Sahani, “Principles of Programming Languages”
3. Sebesta,”Principles of Programming Languages”.
4. Balguruswamy,”Object Oriented Programming in C/C++.
5. R.D.Tennet,”Principles of Programming languages”.
6. T.W.Pratt,M.V.Zelkowtz,”Programming languages:Design and implementation”,Pearson
7. C.Ghezzi,M.Jazayeri,Programming Language concepts,Wiley

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SE (COMPUTER ENGINEERING / INFORMATION TECHNOLOGY)
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TERM – I

DISCRETE STRUCTURE AND GRAPH THEORY

Teaching Scheme:
Lectures: 4 Hrs / Week

Examination Scheme:
Theory Paper: 100 Marks (3 Hrs)

Unit - I

Sets, Logic and Proofs
Propositions, proposition and logical operations, Conditional Statements, Propositional Calculus, Quantifiers: universal and existential quantifiers, methods of proofs, Set Theory: Set, Combinations of Sets, Finite and Infinite sets, uncountably infinite sets, Mathematical Induction, Principle of inclusion and Exclusion.
Discrete Probability, Information and Mutual information (10 Hrs, 20 Marks)

Unit - II

Relations, functions, Recurrence Relations
Definitions, properties of Binary relations, Equivalence Relations and partitions, Partial ordering relations and lattice, chains and antichains, Transitive Closure and Warshall’s Algorithm.
Functions Definitions, Pigeonhole principle.
Recurrence Relation, Linear Recurrence Relations with constant Coefficients, Homogeneous Solutions, Particular Solutions, total solutions, Solution by the method of generating functions.
(10 Hrs, 20 Marks)

Unit - III

Graphs
Basic terminology, multigraphs and weighted graph , paths and circuits , shortest path algorithms, Euler and Hamiltonian Paths and circuits , factors of a graph, Planer graph and Kuratowski theorem, graph coloring.
Trees
Trees, rooted trees, path length in rooted trees, prefix code, binary search trees, spanning trees and cut set, minimum spanning trees, kruskal’s and prim’s algorithms for minimum spanning tree.
(10 Hrs, 20 Marks)

Unit - IV

Analysis of Algorithm and Algebraic systems - Time Complexity of algorithms, shortest path algorithms, complexity of problems, tractable and intractable problem.
Algebraic system - Groups, subgroups, Isomorphisms and Automorphisms, Homomorphisms and Normal subgroup, Rings, Integral domains and fields. (10 Hrs, 20 Marks)

Unit - V

Boolean algebra - Lattice and Algebraic systems, Principle of duality, basic properties of lattice defined by lattices, distributive and complemented lattices, Boolean lattices and Boolean algebras, Boolean functions and Boolean Expressions.
Binary Number systems- binary, octal, hex conversion. Application of Boolean algebra.
(10 Hrs, 20 Marks)

Reference Books

1. C.L. Liu , " Elements of Discrete Mathematics", 2nd edition, Tata McGraw-Hill, 2002
2. Kenneth H. Rosen, Discrete Mathematices and its Application, 5th edition, TMH
3. Lipschutz, lipson, " Discrete Mathematics", 2nd edition, Tata McGraw- Hill, 1999.
4. V. K. Balakrishnan, " Graph Theory", Tata McGraw- Hill
5. B. Kolman , R. Busby and S. Ross, "Discrete Mathematical Structures" 4th edition, Pearson education,2002
6. J. Treamblay , R. Manohar ," Discrete Mathematical structures with application to computer science" , Tata McGraw-Hill

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NORTH MAHARASHTRA UNIVERSITY, JALGAON

SE (COMPUTER ENGINEERING / INFORMATION TECHNOLOGY)
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TERM – I

DIGITAL SYSTEMS AND MICROPROCESSOR

Teaching Scheme:
Lectures: 4 Hrs / Week
Practical: 2 Hrs / Week

Examination Scheme:
Theory Paper: 100 Marks (3 Hrs)
Term work: 50 Marks
Practical: 25 Marks

Unit – I

Review of fundamental concepts: Basic gates, universal gates & Exclusive gates. Digital Signal, Positive & Negative logic,
Boolean Algebra: Boolean postulate and Theorems, Examples of realization of Boolean functions using Boolean algebra.
Introduction to digital logic families: DTL, TTL & CMOS (10 Hrs, 20 Marks)

Unit – II

Combination logic design: Standard representation of logical function, K map representation of logical function, simplification of logical function using K map, for 2, 3 & 4 variables. K map with Don't care condition. Introduction to five and six variable K map with don't care condition. Design of half adder, full adder, half sub tractor, full sub tractor (10 Hrs, 20 Marks)

Unit – III

Combination logic design examples: Various Example of combinations logic circuit (truth table – K map – circuit diagram) with the help of K map and their implementation with the help of Basic/Universal gates.
Design of multiplexer & Demultiplexer: Design of comparator circuits using logic gates. Design of parity generator & checker circuit using logic gates
Introduction to sequential logic circuit: function of one bit memory cell, Truth table and excitation tables of S – R, JK, D & T Flip – Flop. (10 Hrs, 20 Marks)

Unit – IV

8085 Microprocessor
Introduction to 8085 Microprocessor - Architecture, functional pin diagram, register model , programming model , Bus architecture
Instruction Set of 8085 - Instruction cycle, fetch operation, execute operation machine timing diagram for op code fetch cycle, memory read, I/O read, memory write, I/O write, various addressing modes, various instruction set such as data transfer group, arithmetic group, logical group, branch group, stack, input, output and machine control group, instruction format, various addressing modes (10 Hrs, 20 Marks)

Unit – V

8085 assembly programming - Assembly Language, comparison of high level language and assembly language, role of assembler, Assembly language programming of 8085: addition and subtraction of 8 and 16 bit numbers, one's and two's complements of 8 and 16 bit numbers, multiplication and division of 8 and 16 bit numbers, largest and smallest number using array, sorting of numbers using array, finding square from look up table, square root of number, program related to shift and masking operation of 8 and 16 bit numbers.

(10 Hrs, 20 Marks)

List of Experiments

Group A

1. Verity the truth table of logic gates and verification of DeMorgance theorem.
2. Construction on of basic gates using universal gate (NAND / NOR)
3. Construction of half adder & full adder circuit. Also implement full adder with the help of two half adder circuit & one OR gate.
4. Construction of Half subtractor & full subtractor Circuit.
5. Gray to Binary and Binary to gray code converter.
6. Verification of truth table of multiplexes & flip flops.

Group B (8085 Assembly Language Programming)

1. Addition and subtraction of 8 and 16 bit numbers
2. Determining maximum and minimum elements in array
3. Look up table for BCD to 7 Segment conversions
4. HEX To BCD and BCD to HEX conversion
5. Arranging the numbers in ascending and descending order
6. Shift and mask off operation of 8 bit number

The term work should include minimum four experiments from Group A and minimum four experiments from Group B.

Reference Books

1. Modern Digital Electronics by R.P. Jain, 3rd Edition, TMH.

2. Digital Logic and Computer Design by M. Morris Mano, Pearson.
3. Fundamentals of Digital Circuits by A Anandkumar, Pearson.
4. Microprocessor and Interfacing , 2nd edition ,Douglas V Hall
5. Advanced Microprocessors and Interfacing , B Ram, TMH
6. Microprocessor architecture, programming and applications , 2nd ed , Ramesh Gaonkar
7. Introduction to Switching Theory and Logic Design, Hill and Peterson , John Wiley and Sons.
8. Digital system, James E Palmer, David E Parlman, McGraw Hill.

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TERM – I

INDUSTRIAL MANAGEMENT AND ECONOMICS

Teaching Scheme:
Lectures: 4 Hrs / Week

Examination Scheme:
Theory Paper: 100 Marks (3 Hrs)

Unit - I

History of Management, Scientific Management, & its Principles, Administration Management, Neo – Classical Theory, Gilberth's contribution, Modern management Theories, Relation between Administration and organization, Levels of managements, Function of Management.

(10 Hrs, 20 Marks)

Unit – II

Organizational structures: Line, functional, Line staff forms of Business ownerships: Proprietorship, partnership Joint stock Co - Pvt. Ltd. Co., public Ltd Co., Co-operative organizations, public sector, joint ventures, Their meanings, formation, Advantage, Limitations & Applications.

(10 Hrs, 20 Marks)

Unit – III

Engineering Economics. Wants, Utility, Demand, Supply, Elasticity of demand & supply. Capital: Fixed, Working capital, sources of finance Credit, shares, Debentures, ploughing Back, Loans from banks, Trade Public Deposits, financial Institution, foreign capital. Cost Estimating, Cost Accounting, Fixed costs, veriable costs selling price. (No Numericals)

(10 Hrs, 20 Marks)

Unit – IV

Manpower planning, factors affecting manpower planning sources of Recruitment, Need, objectives & benefits of Training, Method of Training workers, supervisors and Executives. Job Evaluation & Merit rating (Concept Only) Selling & Marketing Concept, Sales promotion, Advertising.

(10 Hrs, 20 Marks)

Unit – V

Quality (International Standard Organization of standards) ISO certificate Intellectual property rights (IPR), patents, Trademarks, copyrights, Management information system (MIS), Definition, Need & objectives of MIS, MIS & Computer, Designing of MIS, Application of MIS.

(10 Hrs, 20 Marks)

Reference Books –

1. Industrial Engineering & Production Management by M. Mahajan.
2. Engineering Management by Mazda, Pearson
3. Industrial Organization and Management by O.P. Khanna, Dhanpat Rai & Sons
4. Management Information system by Jawdekar, THM
5. Information systems: Foundation of eBusiness by Alter, Pearson
6. Management by Stoner, Pearson

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TERM – I

ENGINEERING MATHEMATICS - III

Teaching Scheme:
Lectures: 4 Hrs / Week
Tutorial: 1 Hr / Week

Examination Scheme:
Theory Paper: 100 Marks (3 Hrs)
Term work: 25 Marks

Unit – I

Linear Differential Equation – Linear differential equation of order n, solution of LDE with constant coefficient, method of variation of parameters, equation reducible to linear form with constant coefficients, Cauchy's linear equation, Legendre's linear equation, Solution of simultaneous and symmetric simultaneous differential equation, applications to electric circuits.

(10 Hrs, 20 Marks)

Unit – II

Fourier and Z-transforms –
Fourier Transform (FT) – Fourier integral theorem, sine and cosine integrals, Fourier transform, Fourier cosine transform, Fourier sine transform and their inverses, Problems on wave equation.
Z-Transform – definitions, standard properties (without proofs), ZT of standard sequences and inverse, Solution of simple differential equations, Applications of Z-transform to discrete system analysis.

(10 Hrs, 20 Marks)

Unit – III

Laplace Transform (LT) – definition of LT, inverse LT, properties and theorems, LT of standard functions, LT of some special functions, (1^{st} order Bessel's periodic, unit step, unit impulses and ramp), Problems on finding LT and inverse LT, initial and final value theorems, applications of LT for network analysis.

(10 Hrs, 20 Marks)

Unit – IV

Statistics – mean, mode, median, standard deviation, variance, co-efficient of variation, Moments, skewness and kurtosis, Bivariate distribution, correlation and regression, rediability of regression estimates

Probability – Theorems on probability, Binomial distribution, Poisson distribution, Normal distribution

(10 Hrs, 20 Marks)

Unit – V

Probability – Beta distribution, Gamma distribution, Chi-square distribution

Theory of sampling – Sampling, types of sampling, sampling distribution, testing Hypothesis, Null hypothesis, level of significance, Test of significance, test of significance of large sample, decision quality control.

(10 Hrs, 20 Marks)

Text Books –

1. Advanced Engineering Mathematics – Erwin Kreyszig (Wiley Eastern Ltd)
2. Advanced Engineering Mathematics – H K Dass (S Chand)

Reference Books –

1. Advanced Engineering Mathematics – Wylie C R and Barrett, McGraw Hill
2. Higher Engineering Mathematics – B S Grewal, Kanna Publication
3. Engineering Mathematics – B V Raman, Tata McGraw Hill
4. Applied Mathematics Vol 1 and 2 – P N Wartikar and J N Wartikar (Pune Vidharthi Griha Prakashan Pune)
5. Advanced Engineering Mathematics with MatLab, 2nd Edition – Thomas L Harman, James Dabney and Norman Richert , Thomson Learning
6. Engineering Mathematics – III – Dr. Gokhale, Dr. Chaudhary and Dr. Singh

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TERM – I

PROGRAMMING LABORATORY - I

Teaching Scheme:
Lectures: 3 Hrs / Week
Practical: 4 Hrs / Week

Examination Scheme:
Term work: 50 Marks
Practical: 50 Marks

Unit –I

Introduction to C - C Fundamentals, data types , constants , variables, Statements, operators, expressional, control statements.
Arrays - Representation and declaration of array one dimensional array, two dimensional array, multidimensional array.
Strings - Representation, array of string, operation on sitting.
Pointers - Fundaments, declaration, advantage, pointers to different data types , array and pointers, array to pointers, operations on pointers
Functions - Need function definition, prototype, function, parameter, recursion, scope of Variables in the function, library functions, passing array to function, pointer to function

Unit – II

Structure - Definition, declaration, array to structures, structures within structures, structures, and function, structures and pointers, self referential structures user defined data types – typedef .
Union - Need definition, operation, bit fields, difference between structure and union.
File Handling - Structure of file, file types, file operations
Macros - Substitution, File inclusion, complier, controlled directives.

Unit – III

Inter-conversion – Inter-conversion of Number system: decimal, binary, octal, hexadecimal.
System of liner equation - Gauss Elimination, Gauss Jordan, Jacobi or Gauss Siedel.
System of differential Equation - Taylor, Heun's method, Euler's modified method.

Unit – IV

Root of equations, Methods - Newton-Raphson, Raquel, faisi, Bolzano.
Interpolation - Newton backward, forward difference, table, divided difference.
Integration - Trapezoidal, Simpson's 1/3, 3/8 rule.

Unit – V

Permutation, Combination, powerset, Sorting - Insertion, Quick, Merge, Bubble, study of algorithms and implementation, analysis of sorting methods.
Searching - Linear search, binary search.

List of Experiments -

1. Matrix Operation (Addition, Multiplication, Inverse)
2. Swapping of numbers using single pointer.
3. Processing student records using structure.
4. File manipulation opening closing, input and output operation files.
5. Program for macros.
6. Nesting of macro.
7. Macro with arguments
8. Inter conversion of number system.
9. To find value of unknown using Guass Elimination.
10. To find value of unknown using Guass Siedal.
11. To find root of equation using Newton Raphson.
12. To find root of equation using Regula-Falsi.
13. Find interpolating values using interpolation methods.
14. Find integral values using Simpson's 1/3, 3/8 rules.
15. Generation of Permutation for given list.
16. Generation of Combination for given list.
17. Generation of Power set.
18. String Operations.
19. Sorting using Bubble Sort.
20. Sorting using Quick Sort
21. Searching of given element using Linear search.
22. Searching of given element using Binary search.

The term work should include minimum 15 experiments from the above list.
The programs should be developed with integrated development environment (IDE) like Turbo C with emphasis on step by step development and debugging.

Reference Books -

1. M.K.Jain Iyanger "Numerical Method of Scientific and Engineering Computer" 3rd edition, New age publications.
2. E. Balaguruswami " programming in ANSI C" Tata McGraw Hill.
3. H. Schildt, " C The complete Reference" Tata McGraw Hill

4. Venugopal, K.R. and Prasad Sudeep R, “Programming With C” Tata McGraw Hill.
5. V. Rajaraman “ Computer Oriented Numerical Methods” 3rd Edition Prentice Hall of India, Eastern Economy Edition.
6. Steven Chapra “Numerical Methods for Engineers” Tata McGraw Hill.
7. Ellis Horowitz and Sahani “ Fundamentals of Data Structure” Tata McGraw Hill.
8. Kanetkar Y P, “Let us C” BPB Publications.

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TERM – II

MICROPROCESSOR - I

Teaching Scheme:
Lectures: 4 Hrs / Week
Practical: 2 Hrs / Week

Examination Scheme:
Theory Paper: 100 Marks (3 Hrs)
Term work: 25 Marks
Practical: 25 Marks

Unit – I

8086/ 8088 CPU architecture programming model Segmentation, Addressing modes, Instruction sets, Assembly language programming BIOS and DOS interrupts. (10 Hrs, 20 Marks)

Unit - II

BIOS AND DOS Interrupts:, Introduction to DOS, Assembly language Programming in MSDOS using BIOS and DOS Interrupts, programming Technique, Time delay loop, produce and macros.
(10 Hrs, 20 Marks)

Unit – III

8086 Configuration:, Basic 8086 configuration, maximum and minimum modes, System bus timing, Interrupt priority management, programmable interrupt controller (PIC) 8259A 8089 (IOP)
(10 Hrs, 20 Marks)

Unit – IV

Main memory design: 8086 CPU Read/ Write timing SRAM and ROM interfacing requirement, address decoding technique full partial block PROM, Troubleshooting the memory module. DMA: Basic DMA operation, 8237 DMA Controller
(10 Hrs, 20 Marks)

Unit – V

Multiprocessor Configuration: Queue status and block facility 8086 based multiprocessor system, co-processor configuration, closely coupled configuration Overview of loosely coupled configuration, 8087 NDP, 8087 Data types and processor architecture, 8087 programming.
(10 Hrs, 20 Marks)

List of Experiments -

Assembly language programming of 8086:

1. Study of BIOS and DOS interrupts
2. Study of MASM directives
3. Program for string manipulation
4. Program for password
5. HEX- BCD conversion
6. BCD- HEX conversion
7. BCD Addition
8. Program using MACRO
9. Program using NEAR procedure
10. Program using FAR procedure
11. Program to display Date and Time
12. Program using structures
13. Program using 8087 instruction set
14. Program using 8087 instruction set

The term work should include minimum 12 experiments. Program based on 8087 are compulsory.

Reference Book:

1. John E. Uffenteck , "The 8086/ 8088 Family: Design, Programming and Interfacing, " Pearson.
2. S.P. Dandomudi," Introduction to Assembly Language Programming – From 8086 to Pentium Processor" Springer.
3. Yu – Cheng Liu and Gleen A Gibson, "Microcomputer systems; The 8086 / 8088 Family Architecture, Programming and Design" 2nd Edition, Pearson.
4. Allen Wyatt, "Assembly Language Programming" QUE.
5. Peter Abel, "IBM PC Assembly Language and Programming" Pearson.
6. Douglas V. Hall "Microprocessor and Interfacing" Programming and Hardware" Pearson.
7. Barre B Brey "The Intel Microprocessor: 8085/ 8088, 80186/ 80286, 80386, 80186, Pentium, and Pentium Pro Processor- Architecture Programming and Interfacing" 4th Edition, Pearson.
8. A.K.Rai and K.M.Bhurchandi, "Advance Microprocessors and Principles- Architecture Programming and Interfacing" Tata McGraw Hill.
9. B.Ram "Advanced Microprocessors and Interfacing", Tata McGraw Hill.

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TERM – II

DATA STRUCTURES AND FILES

Teaching Scheme:
Lectures: 4 Hrs / Week
Practical: 4 Hrs / Week

Examination Scheme:
Theory Paper: 100 Marks (3 Hrs)
Term work: 50 Marks
Practical: 50 Marks

Unit – I

Introduction: Concept of data, data types, data objects, structure, abstract data type, (ADT) and study .Implementation of data structure.
Stack and Queues:- Fundamental of stacks and queues, Data Structure of stack and queues, Basic operations on stacks and queues, Disadvantages and applications of stacks and queues, Concept of circular queues, basic operation on stacks and queues, Multi-stack and queues, priority queues.
Applications of Stacks:- Polish notation (infix, postfix, prefix) Evaluation of prefix and postfix expression , inter conversion of infix, prefix and postfix expression. Use of stack by function call and recursive function call, Multi-stack machines, Parenthesis matching, Towers of Hanoi, Queue application. (10 Hrs, 20 Marks)

Unit – II

Linked list: Concept of Linked list, Basic Operations on a single linked list (Creation, insertion, deletion, traversing, concatenating, inverting and length finding) Linked stack and Queues, circular linked list, advantages of circular linked list, erasing circular linked list, Double linked list with basic operations like copy, storing polynomial using linked list, polynomial addition, and Generalized list, operations like copy, and equal depth on generalized list, Data representation for strings, pattern matching in string.
Storage Pool :- Initializing Storage Pool, allocating and (GETNODE) and deal locating (RET) a node Dynamic storage Management Procedure for allocation and freeing of blocks, First Fit, Best fit and Worst fit memory allocation Strategies. (10 Hrs, 20 Marks)

Unit – III

Binary Tree: Basic terminology, Data structure and representation of binary tree, Binary tree traversal, and recursive and non recursive procedure for tree traversal, basic operations on binary tree, (Creation, insertion, deletion, printing, copy, equal and depth finding) Threaded binary tree, insertion in order threaded binary tree, In order traversal of in order threaded binary tree, Concept of binary search tree, Static tree labels, Huffman, Algorithms, Constructions, of optimal binary search tree, Dynamic tree tables, Basic Operation on it-insertion, deletion, height balanced binary tree, LL, LR, RL, RR Rotations (10 Hrs, 20 Marks)

Unit – IV

Sorting - Algorithm for bubble sort, Insertion sort, Quick sort, selection sort, shell sort, merge sort, Heap sort, Radix sort, Radix exchange sort, Best average and worst case time complexity of each of the sorting and searching Algorithm
Hashing: Hashing function, overflow handling, collision, linear probing deletion, clustering re-hashing bucket and chaining selection of good hash function (10 Hrs, 20 Marks)

Unit – V

File Handing - Sequential and Relative Files: Description and organization, primitive operations on sequential and relative file.
Direct access file - Description and organization, primitive operations on direct access files
Indexed Sequential files and Indexes:-Description and organization, primitive operations on indexed sequential files, Indexed concept, linear indexes, tree indexes, algorithm for B-tree.
Multi Indexed files:- Description and organization of Inverted files, Multi list files, and algorithms for addition and deletion of records from the files. (10 Hrs, 20 Marks)

List of Experiments -

List of programming assignments to be developed in C/C++ with emphasis on developing debugging abilities

1. Implementation of stack using array or linked list
2. Implementation of Queue using array or linked list
3. Implementation of circular Queue using array or linked list
4. Conversion of Infix expression to postfix expression
5. Conversion of postfix expression to infix expression
6. Addition of two single variable polynomial using linked list
7. Implementation of double linked list and perform insertion, deletion and searching
8. Creation of binary tree and perform all non-recursive traversals.
9. Creation of binary search tree and perform insertion, deletion printing and in a tree shape.
10. Implementation of pattern matching in starting using linked listed.
11. Create a hash table and handle the collisions using liner probing with or without replacement.
12. Implementation of simple index file.
13. Insertion and deletion of a record from a direct access file using changing with and without replacement.
14. Insertion and deletion of a record from a sequential file.
15. Insertion and deletion of a record from a relative file
16. Insertion and deletion of a record from a multi list file

Term work should be minimum 12 experiments from the above list.
The programs should be developed with integrated development environment (IDE) like Turbo C with emphasis on step by step development and debugging.

Reference Books -

1. Ellis Horowitz and Sahani, "Fundamentals of data Structure" Galgotia.
2. Thomas R. Harborn, " File system and Algorithms", Prentice- Hall International
3. Trembaly and Sorenson "An Introduction to Data structures with Applications" Tata McGraw Hill.
4. Tannenbaum, "Data Structure C and C++, Pearson.
5. Sahani, "Data Structures, Algorithms and Applications in C++ McGraw Hill.
6. Seymour Lipschutz, "Data Structures", Schaum's Outline.
7. Weiss, "Data structure and Algorithm analysis in C", Pearson

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NORTH MAHARASHTRA UNIVERSITY, JALGAON
SE (COMPUTER ENGINEERING / INFORMATION TECHNOLOGY)
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TERM – II

COMPUTER ORGANIZATION

Teaching Scheme:	**Examination Scheme:**
Lectures: 4 Hrs / Week	Theory Paper: 100 Marks (3 Hrs)

Unit – I

Introduction to system concepts: Functional Units, Basic operational concepts, instruction formats for machines, fixed and expanding opcodes, zero, two and three address schemes, concept of stack processor. General Addressing Modes.

Processor Organization: Instruction set design. 68000 architecture – Register structure and addressing modes, normal and exceptional processing. Bus structures. (10 Hrs, 20 Marks)

Unit – II

Information representation, Big-endian and little-endian, data types, fixed and floating point representation, IEEE format for floating point and decimal algorithm, Booths algorithm, bit pairing methods, Restoring and non-restoring division algorithm. Floating point operations, guard bits and rounding (10 Hrs, 20 Marks)

Unit – III

Control unit design, design levels, one / two / three bus CPU, hardwired control design methods and implementations, Microprogrammed control unit concepts and control unit design considerations, Wilkes design, Nano programmed computers, bit-slice architecture, 2900 family CPU designs, emulation. (10 Hrs, 20 Marks)

Unit – IV

Memory Organization: Memory hierarchies, memory interleaving, cache memories organization, virtual memory and organization, performance considerations, content addressable memories, memory management in 68000 family and cache designs, Introduction to SRAM, DRAM, RDRAM, Flash memory. (10 Hrs, 20 Marks)

Unit – V

System Organization: Buses, interconnection system bus, CPU and IO bus-bus operation, UNIBUS, multibus and IEEE 488 I/O addressing, data transfer, synchronization, serial and parallel ports, I/O interfaces, I/O channel, PCI bus, SCSI bus, Universal Serial Bus. RISC architecture, concepts, CISC versus RISC, advantages of RISC (10 Hrs, 20 Marks)

Reference Books –

1. Hamacher, Vransic, Zaky, "Computer Organization", 5th Ed., McGraw Hill international.
2. J. P. Hayes, "Computer Architecture and Organization", 3rd Ed. McGraw Hill international.
3. Tanenbaum, "Structured Computer Organization", Pearson.
4. William Stallings, "Computer Organization And Architecture", 6th ed., Pearson.
5. Nicholas Carter, "Computer Architecture", Schaum's Outline.

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TERM – II

INFORMATION THEORY

Teaching Scheme:	**Examination Scheme:**
Lectures: 4 Hrs / Week	Theory Paper: 100 Marks (3 Hrs)

Unit – I

Foundation - Terminology, stegnography, substitution cipher & transposition cipher, simple X-OR, one-time pads.

Cryptographic protocol-Introduction to protocol, communication using symmetric cryptography, one-way hash function, communication using public key cryptography.

(10 Hrs, 20 Marks)

Unit - II

Cryptographic Techniques - Key management – Generating, Transferring & Verifying keys, Lifetime of keys, Destroying keys.
Algorithmic types & modes- Electronic codebook, Cipher block chaining mode, Stream cipher, Public key algorithm-RSA.

(10 Hrs, 20 Marks)

Unit - III

Cryptographic algorithm - Information theory-entropy & uncertainty, rate of language, unicity distance, confusion & diffusion, Complexity theory, Number theory-modular arithmetic, Chinese remainder theorem, Factoring, Prime number generation, Data Encryption Standards (DES)-description of DES.

(10 Hrs, 20 Marks)

Unit – IV

Compression Algorithm – Entropy, Huffman algorithm, Adaptive Huffman coding – Adaptive coding, Updating Huffman tree, Statistical modeling, Dictionary based model Compression.

(10 Hrs, 20 Marks)

Unit - V

Sliding window compression – algorithm, LZSS Compression, Speech compression – Digital Audio concept, Lossless compression of sound, Lossy graphics compression – Lossy compression, JPEG Standards, implementing DCT.

(10 Hrs, 20 Marks)

Reference Book:

1. Bruce Schneider, “Applied cryptography”, Protocols, Algorithms and sources code in C, John Wiely and Sons.
2. Mark Nelson, “The Data compression Book”, 2nd Edition M & T book.
3. Darrel Hankerson , Grey A Harrige , Peter D. Johnson Jr, Introduction to Information Theory & Data compression CRC .
4. Alfred Menezes , Paul Van Oorschot, Vanstone , Handbook of applied cryptography , CRC

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TERM – II

DATA COMMUNICATION

Teaching Scheme:
Lectures: 4 Hrs / Week

Examination Scheme:
Theory Paper: 100 Marks (3 Hrs)

Unit – I

Introduction to data communication and networks –
Data communication – Components, data representation, direction of flow
Networks – network criteria, network hardware, network software, protocol hierarchy, design issues for the layer, ISO OSI reference model
Signals – Analog signals, digital signal, analog verses digital signal, data rate limits, transmission impairment, throughput, propagation speed, propagation time, wavelength etc.
(10 Hrs, 20 Marks)

Unit – II

Digital transmission and analog transmission –
Digital transmission – line coding, characteristics, schemes. Block coding, transformation and common block codes. Sampling – PAM, PCM, Nyquist's theorem, bit rate, transmission modes.
Analog transmission – Analog modulation, AM, FM, PM. Digital modulation, ASK, FSK, PSK, QAM. Bit/baud comparison.
Telephone modems – Modem standards, traditional modems, 56K modems etc.
(10 Hrs, 20 Marks)

Unit – III

Multiplexing – FDM – Multiplexing process, de-multiplexing process, applications of FDM, WDM, TDM – Time slots, frames, interleaving, synchronization, bit padding, DSS, T-Lines, inverse TDM, Applications of TDM.
Transmission media – Guided media, twisted pair, coaxial cable, fiber optics, unguided media, radio waves, microwaves, infrared.
Switching – Circuit switching, packet switching and message switching. Telephone networks – components, LATAs, making conections, analog services and digital services.
(10 Hrs, 20 Marks)

Unit – IV

Error detection and correction –
Types of errors, single bit burst errors. Detections – redundancy, parity, CRC, checksum. Error correction – Correction by retransmission, FEC, Burst error correction.
Flow control and error control – stop and wait ARQ, Go-back-N ARQ, selective repeat ARQ.
(10 Hrs, 20 Marks)

Unit – V

Ethernet – Traditional Ethernet, fast Ethernet, gigabit Ethernet.
Multiple access – random access, MA, CSMA, CSMA/CD, CSMA/CA, control access, FDMA, TDMA, and CDMA.
IEEE 802.3, 802.4, 802.5, X.21, X.25, SDLC/HDLC protocol standards.
Introduction to network connecting devices – repeater, bridge, router, gateway, hub etc.
(10 Hrs, 20 Marks)

Reference Books –

1. "Computer Networks" A S Tanenbaum 4th edition, Pearson
2. "Data Communication and Networking" B Forouzan, 3rd edition, TMH
3. "Data Communication and Networking" Achyut Godbole, TMH

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TERM – II

PROGRAMMING LABORATORY - II

Teaching Scheme:
Lectures: 2 Hrs / Week
Practical: 4 Hrs / Week

Examination Scheme:
Term work: 50 Marks
Practical: 50 Marks

Unit – I

Introduction to Object Oriented Programming - Need of Object Oriented Programming:
A look at Procedure Oriented Programming, Object Oriented Programming Paradigm
Basic Concept of OOP - Objects, classes, Data Abstraction, Encapsulation, Inheritance, Polymorphism, Data hiding ,Message Passing. Benefits of OOP, Application of OOP

Beginning with C++ : What is C++, Structure of C++ Program, A simple C++ program, comments, output using Cout, input using Cin, declaration of variables, Reference variables, Token, Keywords, Identifier, Constant, Basic data types, Derived data types.

Unit – II

Control structures , Classes and Objects - Control Structures: If statement, switch statement, Do while statement, while statement and For statement.
Classes and objects: Specifying a Class, Defining Member function, A C++ program with class, Nesting of member function, Private member function, Array within a class, memory allocation for objects, Static Data member, Static member function, Array of Objects, Objects as function argument, Friendly function, Returning objects.
Constructor and destructor - Constructor Parameterized Constructor ,Multiple Constructor in a class, Constructor with default argument, Dynamic Initialization of Objects,
Copy Constructor, Destructor

Unit – III

Functions and Operator overloading - Function in C++: The main function, Function prototype, Call by value, Call by reference, Return by reference, Inline Function, Default Argument, Function Overloading,
Operator - Operator in C++, Scope Resolution Operator, Operator Precedence
Operator Overloading - Defining Operator overloading, Overloading Unary Operator, Overloading Binary operator, Overloading binary operator using friend, Rules for operator overloading
Type conversion

Unit – IV

Inheritance and Pointer, Virtual function and Polymorphism, Inheritance: Introduction, Defining Derived classes, Single inheritance, Making a Private member inheritable, Multilevel Inheritance, Multiple Inheritance, Hierarchical Inheritance, Hybrid inheritance, Virtual base classes, Abstract classes, Constructor in derived class.
Pointer, Virtual Function and Polymorphism: Introduction, Pointer to Object, this pointer, Pointer to Derived classes, Virtual function.

Unit – V

Managing Console I/O operation and File Operation - Managing Console I/O operation: C++ Stream, C++ Stream Classes, Unformatted I/O Operation, Formatted Console I/O operation, Managing Output with manipulators
Working with files: Classes for File Stream Operations, Opening and Closing a File, Detecting End Of File ,More about Open() : File Modes, File Pointer and their manipulator, Sequential Input and Output Operations, Updating a File: Random Access. Error handling during file operation, Template: Function template, Class Template

List of Experiments -

1. One Simple C++ Program
2. C++ Simple Program using Control Structure.
3. Program to create array of Object.
4. Program that illustrate use of various types of constructor
5. Program for String Manipulation
6. Program for Unary Operator Overloading.
7. Program for Binary Operator Overloading
8. Program for Function Overloading
9. Program for Multilevel inheritance
10. Program for Run time polymorphism using Virtual Function
11. Program to format output using manipulator
12. Program for File Handling
13. Program using Template
14. Mini project in C++ (e.g. Banking system, Railway reservation system etc.)
15. Program for stack operations using class
16. Program for Queue operations using class

Term work should include minimum 12 experiments from the above list.
The programs should be developed with integrated development environment (IDE) like Borland C++ with emphasis on step by step development and debugging.

Reference Books –

1. E. Balgurusamy ," Object Oriented Programming with C++ ", III Edition TATA McGraw –Hill Publication
2. Kanetkar Y. , " Let Us C++" , BPB Publication
3. Schildt , " C++ The Complete Reference " ,Tata McGraw Hill Publication.

North Maharashtra University, Jalgaon
New Syllabus with effect from Year 2006-07
TE IT Term I

Sr. No	Subject	Teaching Scheme per Week			Examination Scheme				
		L	**T**	**P**	**Paper Hr.**	**Paper**	**TW**	**PR**	**OR**
1	Multimedia Techniques	4	-	2	3	100	25	25	-
2	Theory of Computer Science *	4	-	-	3	100	-	-	-
3	Computer Network *	4	-	2	3	100	25	-	25
4	Computer Graphics *	4	-	2	3	100	25	-	-
5	Systems Programming *	4	-	2	3	100	50	-	25
6	Advanced Development Tools Laboratory *	-	-	4	-	-	50	-	-
	Total	20	0	12		500	175	25	50
	Grand Total	**32**			**750**				

TE IT Term II

Sr. No	Subject	Teaching Scheme per Week			Examination Scheme				
		L	**T**	**P**	**Paper Hr.**	**Paper**	**TW**	**PR**	**OR**
1	Management Information Systems	4	-	-	3	100	-	-	-
2	Operating Systems *	4	-	2	3	100	25	-	-
3	Software Engineering *	4	-	2	3	100	25	-	50
4	Database Management System *	4	-	2	3	100	25	25	-
5	Web Design	4	-	4	3	100	25	-	50
6	Practical Training/Mini Project/Special Study		-		-	-	25	-	-
	Total	20	0	10		500	125	25	100
	Grand Total	**30**			**750**				

* Common subject with TE Computer

NORTH MAHARASHTRA UNIVERSITY, JALGAON

TE (INFORMATION TECHNOLOGY)
(w.e.f. 2007-08)

TERM – I

Multimedia Techniques

Teaching Scheme:
Lectures: 4 Hrs / Week
Practical: 2 Hrs / Week

Examination Scheme:
Theory Paper: 100 Marks (3 Hrs)
Term Work: 25
Practical: 25

Unit – I
What is Multimedia? Medium, Types of media, Properties of multimedia system, Data stream characteristics Multimedia applications, Multimedia system architecture, Objects for multimedia system: text, images, audio, video. Basic sound concepts, Computer representation of sound, Music: MIDI, MIDI Devices, MIDI Messages, MIDI Software.

(10 Hrs, 20 Marks)

Unit – II
Image and Graphics : Digital Image representation, Computer image processing, Dithering, Image recognition steps.
Rich Text Format (RTF), Introduction to TIFF and RIFF.
Video: Video Signal Representation, Properties of Visual representation,
Animation: Computer based animation, Basic concepts, Methods of controlling animation.

(10 Hrs, 20 Marks)

Unit – III
Data Compression: Need of compression, Coding requirements, Classification of compression techniques, Major steps of data compression,
Basic compression techniques: Run length Encoding, arithmetic, Huffman coding, DCT
JPEG: Steps of JPEG Image Compression, Image Preparation, Lossy sequential DCT based mode, Expanded Lossy DCT based mode., lossless, hierarchical mode.
H.261, MPEG, MPEG audio encoding

(10 Hrs, 20 Marks)

Unit – IV
Multimedia database management system, Characteristics of MDBMS, Data analysis, data structure, operations on data, Integration in database model.
User interfaces : General design issues, Video at the user interface, audio at the user interface

(10 Hrs, 20 Marks)

Unit – V
Multimedia Network communications: Quality of multimedia data communication, , Multimedia over IP, Multimedia over ATM Networks, Transport of MPEG-4, Media on demand, Multimedia over wireless networks.

(10 Hrs, 20 Marks)

Reference Books -

1. Steinmetz & Klara Nahrstedt, “Multimedia Computing Communication & Applications”, Innorative Tech Series.
2. Chapman,” Digital Multimedia” Wiley India.
3. Prabhat, Kiran Thakar, “Multimedia System Design”, PHI

4. Ze-Nian Li, Mark S Drew, “Fundamentals of Multimedia Systems”, Pearson
5. Ranajan Parekh, “Principles of Multimedia”, Tata McGraw Hill
6. Tay Vaughan - “Multimedia, Making it Work.” Vth Ed, Tata McGraw Hill
7. Buford – “Multimedia Systems”, Pearson
8. Vikas Gupta,” Multimedia and Web Design with Tutor CD” Dreamtech Press(Wiley India)

Term Work / List of experiments -

Any six lab assignments should be framed by concern staff member based on above syllabus.

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TERM – I

Theory of Computer Science

Teaching Scheme:
Lectures: 4 Hrs / Week

Examination Scheme:
Theory Paper: 100 Marks (3 Hrs)

Unit – I
Mathematical Preliminaries: Alphabets, Strings, Languages, States, Graphs and trees, Concept of basic machine.
Finite State Machines: State tables, Transition graph, Adjacency matrix, Moore and Mealy FSM’s, Deterministic and Non-deterministic FSM’s, Equivalence of DFA and NFA, FSM with Epsilon moves, Minimization of FSM

(10 Hrs, 20 Marks)

Unit – II
Regular Expressions: Definition, Building RE, Converting DFA’s to RE, Conversion of RE to NFA.
Properties of Regular Sets: Pumping lemma for regular sets, Applications of Pumping lemma, Closure properties of Regular sets, and Decision algorithms for regular sets.

(10 Hrs, 20 Marks)

Unit – III
Grammars: Definition, Production rules, Formalization, Derivation trees, Ambiguous grammar, Removal of ambiguity, Reduced form grammar – Removal of unit productions, Epsilon productions, Useless symbols, Chomsky hierarchy.
Context Free Grammars: Definition, Simplification of CFG, Regular Grammar – Definition, Left linear and right linear regular grammar, Interconversion between left linear and right linear grammar, Reduced Forms – CNF and GNF, Reduction to CNF and GNF, Construction of regular grammar from DFA, Construction of FA from regular grammar.
Context Free Languages: Definition, Properties, Pumping lemma for CFL’s, Decision algorithms for CFL’s, CYK algorithm

(10 Hrs, 20 Marks)

Unit – IV
Pushdown Stack Memory Machines: Definition, PDM examples, Power of PDM, Deterministic and Non-deterministic PDM, PDA and CFL, Construction of PDA from CFG, Construction of CFG from PDA.
Production Systems: Definition, Post canonical system, PMT systems, Acceptors and Generators, Markov algorithm

(10 Hrs, 20 Marks)

Unit – V
Turing Machine: Definition, Notations, Transition diagram, Power of TM over FSM, PDM and PM, Design of TM, Universal TM, Church's Turing Hypothesis, Multi-stack TMs, TM limitations, Halting problem, Undecidability, Tractable and intractable problems

(10 Hrs, 20 Marks)

Reference Books -

1. E V Krishnamurthy, 'Theory of Computer Science', EWP.
2. Hopcroft, Ullman, 'Introduction to Automata Theory' Narosa.
3. K.L.P.Mishra, 'Theory of Computer Science', PHI.
4. Daniel Cohen, 'Introduction to computer Theory', Wiley India.
5. John Martin, 'Introduction to Language and Theory of Computations', TMH.

NORTH MAHARASHTRA UNIVERSITY, JALGAON

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TERM – I

Computer Network

Teaching Scheme:
Lectures: 4 Hrs / Week
Practical: 2 Hrs / Week

Examination Scheme:
Theory Paper: 100 Marks (3 Hrs)
Term Work: 25
Oral: 25

Unit – I
Review of Data Communication and Introduction to computer networks.
Data Link layer: Data Link layer design issues, Elementary data link layer protocols, Sliding window protocols, Data Link Layer switching, Bridges 802.x to 802.y, Local inter-networking, Spanning tree and remote bridges.
Review of network connecting devices and multiple access protocols.

(10 Hrs, 20 Marks)

Unit – II
Network Layer: Logical Addressing - IPv4 addresses- Address space, notations, Classful addressing, Classless Addressing, Network Address Translation.IPv6 addresses- Structure and address space
Internet Protocols: Internetworking- Need of network layer, datagram network, connectionless network
IPv4- Datagram, Fragmentation, Checksum, Options
IPv6- Advantages, packet formats, extension headers
Transition from IPv4 to IPv6: Dual stack, Tunneling, Header Translation

(10 Hrs, 20 Marks)

Unit – III
Network Layer: Address Mapping - ARP, RARP, BOOTP and DHCP
ICMP: Types of messages, message formats, error reporting, query, debugging tools
IGMP: Group Management, messages, message format, IGMP operations, Encapsulation, Netstart utility.
ICMPv6: Error reporting and queries
Delivery: Direct versus Indirect delivery
Forwarding: Techniques, process, routing tables

(10 Hrs, 20 Marks)

Unit – IV
Unicast Routing Protocols: Optimization, Intra and Inter domain routing, distance vector routing, link state routing, path vector routing
Multicast Routing Protocols: Unicast, Multicast and Broadcast, applications, routing protocols
Transport Layer: Process to process delivery, UDP

(10 Hrs, 20 Marks)

Unit – V
TCP/IP Protocol Suite: Addressing+
TCP: Services, features, segments, connections, flow control, error control, congestion control
Congestion control: Data Traffic, open- loop, closed- loop congestion control, congestion control in TCP and frame relay
Quality of Service: Flow characteristics and classes, techniques to improve QOS such as Scheduling, Traffic shaping, resource reservation, admission control
Integrated Services: Signaling, flow specification, admission, Service Classes, RSVP, problems with Integrated Services

(10 Hrs, 20 Marks)

Reference Books -

1. Andrew S. Tanenbaum, “Computer Networks”, 4th edition, Pearson.
2. Behrouz Forouzan, “Data Communications and Networking”, TMH, 4^{th} Ed.
3. Irvine,”Data Communication and Networks:An Engg. Approach” Wiley India
4. S. Keshav, “An Engineering Approach to Computer Networking”, Pearson Education, 5^{th} Ed
5. Irvine Olifer,”Computer Networks:Principles,Technologies and Protocols” Wiley India

List of experiments -

1. Study of network resources and various components.
2. TCP/IP Socket Programming.
3. Implementation of Data link layer protocol.
4. Implementation of Network routing algorithm.
5. Implementation of data compression and decompression algorithm (Huffman Algorithm).
6. Implementation of Network security algorithm (Encryption and Decryption Algorithm).
7. Program using FTP to exchange files between computers,
8. Study of proxy server/DNS Server/mail server/NFS server.

1 to 6 assignments are compulsory.

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TERM – I

Computer Graphics

Teaching Scheme:
Lectures: 4 Hrs / Week
Practical: 2 Hrs / Week

Examination Scheme:
Theory Paper: 100 Marks (3 Hrs)
Term Work: 25

Unit – I
Basic Concepts: Introduction to computer graphics, Types of Computer Graphics, Application of Computer Graphics, Graphics Standards, Graphics file formats such as BMP, TIFF, PCX and GIF

Interactive Computer Graphics: Working of Interactive Computer Graphics, Graphics Hardware, CRT, display and controller, Interlaced and non interlaced display, Vector and raster scan display, Random scan display, Frame buffers, Display adapters, VGA, SVGA, Bios video support, Various input devices, Graphics device drivers, Graphics software, Co-ordinates representations, Graphical functions, Plotters, Scanners, Digitizers and Light Pen.

Linear and Circle Generation: Line generation – DDA and Bresenhams /algorithm Thick line generation, Antialiasing, Circle Generation – DDA and Bresenham's Algorithm, Character Generation – Stroke principal, Starburst principle, Bitmap method.

(10 Hrs, 20 Marks)

Unit – II
Polygons: Types, representations, entering polygon, Polygon filling: Fance fill, Edge flag, Seed fill, Edge fill, Scan conversion algorithm. Scan conversion algorithm. Scan conversion: Real time scan conversion, Solid area scan conversion, Run length encoding, Cell encoding.
Segments: Concepts, Segment table, Segment creation, Deletion, Renaming, Image Transformation.

(10 Hrs, 20 Marks)

Unit – III
2D & 3D Geometry: 2D transformation primitives and concepts Translation, Rotation, Rotation about an arbitrary point, Scaling and Shearing, 3 D transformations, Rotation about an arbitrary axis, 3D viewing transformation , Concept of parallel perspective projections, Viewing parameters.
Clipping Fundamentals, Types of clipping.

(10 Hrs, 20 Marks)

Unit – IV
Windowing and Clipping: Viewing transformation, 2 D clipping and 3D clipping, Sutherland Cohen line clipping algorithm, Mid-point subdivision algorithm, Generalized clipping, Cyrus-Beck Algorithm, Interior and Exterior clipping, Polygon Clipping, Sutherland-Hodgman algorithm.
Hidden Surfaces and Lines: Back face removal algorithm, Hidden line methods, Z-buffer, Warnock and Painter algorithm, Floating horizon.

(10 Hrs, 20 Marks)

Unit – V
Light, Color and Shading: Diffused Illumination, Point source illumination, Shading algorithm, Color Models – RGB, HVS, CYM etc Elimination back faces, Transparency, polygons, B-Splines and corner, Bezier Curves, Fractals, Fractal Surfaces and lines
Graphical User Interface: Concepts of X-Windows, Concept of client/server model, Protocols, Message passing (only GUI related) Motif – widget, gadget structure (Only GUI concept) Concept of MS Windows, Open GL, Why 3D? Why Open GL? OpenGL and Animation
Graphics Standard: Introduction to graphics kernel system with basic primitives
Graphics Applications: Scientific and engineering applications, Business applications, Application concept in Animation and concept in Animation and Simulation

(10 Hrs, 20 Marks)

Reference Books -

1. David F. Rogers, "Procedural Elements for Computer Graphics:, Tata McGraw Hill, 2nd Ed
2. Steven Harringtom, "Computer graphics A Programming Approach", MGH
3. Hill, "Computer Graphics using OpenGL", Pearson, 2nd Ed
4. Foley, Vandam, Feiner, Hughes, "Computer Graphics Pricipals & Practice", Pearson LPE, 2nd Ed
5. Donald Hearn and Pauline Baker," Computer Graphics", Pearson LPE, 2nd Ed
6. Rao and Prasad," Graphics user interface with X windows and MOTIF", New Age
7. ISRD, "Computer Graphics", Tata McGraw Hill
8. Mukherjee, "Fundamentals of Computer Graphics and Multimedia", PHI

List of experiments -

1. Study of various Graphics Commands
2. Line generation using DDA
3. Different Line Style using Bresenhams Algorithm
4. Circle Generation using Bresenhams Algorithm
5. Program for Polygon Filling
6. Program for 2D Transformations (Translation, Rotation and Scaling)
7. Program for Segmentation
8. Program for line clipping
9. Program for Polygon clipping
10. Program for 3D rotation
11. Program for Parallel Projections
12. Program for Perspective Projection
13. Program for Animation
14. Program for Bezier Curve
15. Mini Project: Developing some Graphics application
16. Study assignment on any latest GUI application or mini-project.

The term work should include a minimum of ten assignments.

NORTH MAHARASHTRA UNIVERSITY, JALGAON

TE (COMPUTER ENGINEERING / INFORMATION TECHNOLOGY)
(w.e.f. 2007-08)

TERM – I

Systems Programming

Teaching Scheme:
Lectures: 4 Hrs / Week
Practical: 2 Hrs / Week

Examination Scheme:
Theory Paper: 100 Marks (3 Hrs)
Term Work: 50
Oral: 25

Unit – I
Introduction: Introduction to system programming, Types of s/w and application software, System programming and system programs, Need of system software, Assemblers, Loaders, Compilers, Interpreters, Macros, Operating system and formula system, Translators and its types.

Assemblers: Structure of assembler, Basic function, Machine dependent and machine independent features of assembler, Types of assemblers – single pass, multi-pass, cross assembler, General design procedure of assembler, Design of Pass-I and Pass-II assembler (with reference to 8086 assembler), Single pass assembler for IBM PC, Implementation examples – MASM example.

(10 Hrs, 20 Marks)

Unit – II
Macros and Macro Processors: Definition and function of Macro Processor, Features of macro facility, Macro expansion, Nested macros, Design of macro processor – single pass and two pass macro processor, Detailed design of two pass macro processor.

Loaders and Linkage Editors: Basic loader functions, Relocation and linking concepts, Various loader schemes with their advantages and disadvantages, Other loader schemes – binders, Linking loaders, Overlays, Dynamic binders, Design of direct linking loaders, Specification of problem, Specification of data structures, Format of databases.

(10 Hrs, 20 Marks)

Unit – III
Design of a linker, A linker for MS DOS, Linking for overlays
Grammar and scanner, Overview of compilation process, Programming language grammar, Derivation, Reduction and syntax tree, Ambiguity, Regular grammar and regular expression, Basic functions of complier, Machine dependent and machine independent features of compiler, Types of compilers – single pass, multi-pass, cross compiler and pseudo code compiler, Phases of compiler

(10 Hrs, 20 Marks)

Unit – IV
Design of lexical analyser, Software tools for program development YACC and LEX.

Functions of parser, Parsing techniques, Top-down and Bottom-up parsing, Limitations of top-down parsing, Shift reduce and recursive descent parser, Operator precedence parser, Predictive parser, L-R parser, Syntax directed translation (design of parser not expected)

(10 Hrs, 20 Marks)

Unit – V
Symbol table organization and memory allocation, Elementary symbol table organization, Hash tables, Linked list and tree structure symbol tables, Memory allocation – static and dynamic memory allocation.

Dynamic linking in Windows (only introduction and concepts only) – concept of clipboard, OLE terminology and technology, Dynamic Data Exchange, Dynamic Link Libraries (DLL)

(10 Hrs, 20 Marks)

Reference Books -

1. John J. Donovan “System Programming”, TMH
2. Dhamdhere “System Programming & Operating System”, TMH, 2nd Ed
3. L. Beck “System Software”, Pearson, 3rd Ed
4. Aho, Ulman “Compiler Construction” Pearson LPE
5. J P Bennett, “Compiling Techniques”, TMH
6. Dick Grune,”Modern Compiler Design” Wiley India
7. David Galles,”Starting out with Modern Compiler Design” Dreamtech Press(Wiley India

List of experiments -

1. Develop an application to simulate first pass of 2-pass assembler
2. Develop an application to simulate second pass of 2-pass assembler
3. Design a simple loader
4. Develop an application to create a simple text editor
5. Develop an application for simulating Lexical phase of Compiler
6. Develop an application for simulating Syntax Analysis phase of Compiler

The term work should include a minimum of five assignments.

NORTH MAHARASHTRA UNIVERSITY, JALGAON

TE (COMPUTER ENGINEERING / INFORMATION TECHNOLOGY)
(w.e.f. 2007-08)

TERM – I

Advanced Development Tools Laboratory

Teaching Scheme:	**Examination Scheme:**
Practical: 4 Hrs / Week	Term Work: 50

Part I: Windows Programming
Basic Windows SDK programming, Programming involving Dialog Boxes, Menus and standard GUI components, Writing of Windows Help file using "HC", Writing DLLs and VXDs (Win 95/98/2k)

Part II: Front-End Tools
Assignments based on packages like C# / .NET / VC++ / VB / Java. Assignments should cover basic GUI components, Database Access, ActiveX technology, Network applications.

Part III: Internet Programming Tools
HTML programming, Java Scripts or VB Scripts programming, Internet programming using Java / C# / .NET, (Assignments should cover dynamic page creation) database connectivity (e.g. search engine), online communication (e.g. chatting, email-editor)

Reference Books -

1. Charles Petzold "Programming Windows", Microsoft Press, 5th Ed
2. Herbert Schildt, "Programming Windows 2000 – Ground Up", Tata McGraw Hill
3. Andrew Troelson,"C# and .Net Platform, A Press (Wiley India)
4. Schurman and Pardi, "Dynamic HTML in Action", Microsoft Press, 2nd Ed
5. Sells, "Windows Forms Programming in Visual Basic .NET", Pearson
6. Deitel, "C# How to program", Pearson
7. Bakharia, "Microsoft C# fast and easy web development", PHI
8. Steven Hozner," Java 2(Jdk 5) Progg. Black Book" Dreamtech Press(Wiley India)
9. Ivor Horton,"Beginning VC++" Wrox Press(Wiley India)
10. Steven Hozner ," VB.Net Progg. Black Book" Dreamtech Press(Wiley India)
11. Steven Hozner ,"HTML Black Book" Dreamtech Press(Wiley India)
12. Eric Brown,"Windows Forms in Action" Manning Press(Wiley India

Term work -

Term work should include at least four assignments from each part.

NORTH MAHARASHTRA UNIVERSITY, JALGAON

TE (INFORMATION TECHNOLOGY)
(w.e.f. 2007-08)

TERM – II

Management Information Systems

Teaching Scheme:
Lectures: 4 Hrs / Week

Examination Scheme:
Theory Paper: 100 Marks (3 Hrs)

Unit – I
Introduction to information system: Why study information system, Functions of management, Managerial roles, Levels of management, Overview of management system, Operation support system, Management support system, Other classification of IS system, Alternative framework for information system as operational system

(10 Hrs, 20 Marks)

Unit – II
Introduction to concept of system and organization: System concepts, System & their environments, How system works, system approach for problem solving, Importance of feedback, Learning organizations. Internet, Intranet & Enterprise collaboration: Business value of internet, Interactive marketing, Customer value of internet, Internet and Intranet in business, Applications,
Resource business value, Roles, Future enterprise collaboration, System concepts & tools

(10 Hrs, 20 Marks)

Unit – III
Operational information system: Accounting & finance, Marketing, Production, Human resource. Management information system & Design support system, Data warehouses, OLTP Vs OLAP, Overview of data mining, Management information system: DSS model and application using decision system, Executive information systems, Characteristics of Decision making process, Features, Components, Tools, Case studies Benefits & Risks of a DSS, GDSS.

(10 Hrs, 20 Marks)

Unit – IV
Planning & Development of MIS. MIS planning strategies, problems in determining information requirement, Business system planning (BSP),BSP study activities, assessment of business problems, Management strategies, organizing the information system plan, application development, Organization & management of information processing.

(10 Hrs, 20 Marks)

Unit – V
Tactical and Strategic information system: Nature of tactical and strategic information systems, Tactical & Strategic information system in Marketing & human resources.
Security & Ethical issues & challenges: Risks, Common control, Common threats, Protection of information system, Ethical issues.

(10 Hrs, 20 Marks)

Reference Books -

1. James A. O'Brien, "Management Information Systems", Tata McGraw Hill
2. W. S. Jawadekar, "Management Information System", Tata McGraw Hill
3. S. Sadagopan, "Management Information System", PHI
4. Robert Schulthesis and Mary Summer, "Management Information System", Tata McGraw Hill

5. Kenneth C Laudon and Jane Laudon, “Management Information System”, Pearson LPE
6. Gerald V. Post &David L. Anderson, “Management Information Systems”, Tata McGraw Hill
7. Mcnurlin, “Information Systems Management in Practice, 6th Ed., Pearson LPE

NORTH MAHARASHTRA UNIVERSITY, JALGAON

TE (COMPUTER ENGINEERING / INFORMATION TECHNOLOGY)
(w.e.f. 2007-08)

TERM – II

Operating Systems

Teaching Scheme:
Lectures: 4 Hrs / Week
Practical: 2 Hrs / Week

Examination Scheme:
Theory Paper: 100 Marks (3 Hrs)
Term Work: 25

Unit – I
Introduction: Need of OS, Evolution of OS, Types of OS like Batch, Timesharing, Multiprogramming, Multitasking, Real-time and Personal OS.
OS Views and Concepts: Shell command language, system calls, user view, OS components, OS structure like monolithic, layered, kernel based, micro-kernel based, virtual machine.
Process and Process management: Process concepts, interleaved CPU and IO operations, CPU burst, Process states, OS services for process management, threading.

(10 Hrs, 20 Marks)

Unit – II
Scheduling: Process scheduling, schedulers – long term, middle term and short term. Scheduling algorithms and performance evaluation.
Inter-process communication and synchronization needs: Mutual exclusion, semaphores, critical regions and monitor. Classical problems in concurrent programming.

(10 Hrs, 20 Marks)

Unit – III
Deadlock: Principles, detection, prevention, avoidance and recovery with Bankers algorithm.
Process management in UNIX: Structure of process, process control, process system calls – fork, join, exec, system boot (No algorithms).
Memory Management: Types, contiguous and non-contiguous, segmentation and paging concepts.

(10 Hrs, 20 Marks)

Unit – IV
Virtual memory management: Concepts, implementation, allocation, fetch and replacement.
Memory management in Unix: Policies, swapping and demand paging
File management: Organization, concepts, files and directories, hierarchical structures, space allocation, free space management
Security and protection: Overview, goals of security and protection, security and attacks, formal and practical aspects of security, authentication and password security.

(10 Hrs, 20 Marks)

Unit – V
File management in Unix: Internal representation of files, inodes
File structure in Unix: Structure of file and directories, super block, inode assignment to a new file. Allocation of disk blocks, file creation, and pipes. (No algorithms)
Mass storage structures, disk scheduling, disk management and swap space management.

Distributed OS: Concepts, design issues and system models.

(10 Hrs, 20 Marks)

Reference Books -

1. Silberschatz, Galvin, Gagne, “Operating System Concepts”, John Wiley and Sons, 7th Ed, Wiley India
2. D.M. Dhamdhere, “Operating Systems”, Tata McGraw Hill, 2nd Ed.
3. Milenkovic, “Operating Systems Concepts and Design”, Tata McGrawHill
4. M.J. Bach, “The design of Unix Operating System”, Pearson LPE.
5. Tenenbaum, “Modern Operating Systems”, Pearson, 2nd Ed
6. William Stallings, “Operating systems-Internals and design principles”, Pearson LPE, 5th Ed.
7. Deitel, “Operating systems”, Pearson, 2nd Ed
8. Paul Love, “ Beginning Unix”, Wrox Press, Wiley India

List of experiments -

1. Study of Unix / Linux commands.
2. Implementation of command interpreter using system calls
3. Simulation of windows explorer
4. Implantation of CPU scheduling algorithm
5. Implementation of Memory Management algorithms – best fit, first fit, worst fit
6. Simulation of page replacement algorithm
7. Implementation of Bankers algorithm
8. Implementation of Inter process communication
9. Implementation of threading
10. Installation of Unix/Linux/Windows server installation with configuration of web-mail and proxy server systems

The term work should include a minimum of six assignments.

NORTH MAHARASHTRA UNIVERSITY, JALGAON

TE (COMPUTER ENGINEERING / INFORMATION TECHNOLOGY)
(w.e.f. 2007-08)

TERM – II

Software Engineering

Teaching Scheme:
Lectures: 4 Hrs / Week
Practical: 2 Hrs / Week

Examination Scheme:
Theory Paper: 100 Marks (3 Hrs)
Term Work: 25
Oral: 50

Unit – I
Introduction: What is and why software engineering? Product: Evolving role of software, Software Characteristics, Components, Applications, Software crisis and Myths, Software Engineering Process, Software development phases and Software Process Models, Prototyping and RAD Model, Water fall, Incremental Model, Spiral Model, 4 GT Model, CASE tools.

(10 Hrs, 20 Marks)

Unit – II
Planning and Managing Software projects:

People, Problem and Process, Measures, Metrics and Indicators, Metrics for software quality, Scoping, Software Project Estimation, Make by decision, Software Acquisition Software risks - Identification, Projection, Assessment, Monitoring Project Scheduling and tracking tasks/Work break down structures, Time line charts, Project plan, CASE tools.

System Engineering: Computer based system, System engineering hierarchy.

Information engineering: Information strategy, Planning Enterprise modelling, Business area analysis, Information flow modelling, Product engineering, System analysis, Feasibility study, Economic and Technical feasibility analysis, Modelling system architecture diagram, CASE tools.

(10 Hrs, 20 Marks)

Unit – III
Requirement Analysis: Communication Techniques, FAST, Quality deployment, Analysis Principals: Modelling, partitioning, Prototyping, Specification,

SRS and SRS review analysis models: Data modelling, Functional modelling, Information flow, Data flow Diagrams, Extension to real time systems, Behavioural models, Mechanism of structural analysis, E-R diagrams, controlled modelling, Data dictionary, CASE tools.

(10 Hrs, 20 Marks)

Unit – IV
Design Fundamentals: Software Design and software design process, principals and concepts, Abstractions, Refinement and modularity, Software architecture, Control hierarchy, Partitioning, Data structure, Information hiding, Effective modular design,

Cohesion, coupling, Design Model, Design documents, CASE tools

Design Methods: Architectural design and design process, transform and transaction flow, design steps, interface design, procedural design, graphical and tabular design notations.

(10 Hrs, 20 Marks)

Unit – V
Software Testing Techniques and Strategies: Software testing fundamentals, Test case design, White box testing, Black box testing, Control structure testing, Strategic approach to testing, Strategic issues, Unit testing, Integration testing, Validation testing, System testing, CASE Tools

Introduction to OOSE.
Introduction Unified Modeling Language (UML)

(10 Hrs, 20 Marks)

Reference Books -

1. Pressman, “Software Engineering”, McGraw Hill, 6th Ed
2. Ghezzi, Jazayeri, Mandrioli, ”Fundamentals of Software Engineering”, Pearson/PHI, 2nd Ed
3. Peters,” Software Engineering” Wiley India
4. Sommervile, “Software Engineering”, Pearson, 7th Ed
5. Rajib Mall, “Fundamentals of Software Engineering”, PHI, 2nd Ed

6. Javadekar, “Software Engineering” Tata McGraw Hill
7. Pfleeger,” Software Engineering : Theory & Practice”,6th Edition-Pearson LPE
8. Thayer ,”Software Engineering Project Management “2nd edition, Wiley India
9. Tian ,”Software Quality Engineering” 2nd Edition, Wiley India

Term Work-

The term work should include a minimum of four software mini projects covering problem definition, analysis, design and documentation for each.

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TERM – I

Database Management System

Teaching Scheme:
Lectures: 4 Hrs / Week
Practical: 2 Hrs / Week

Examination Scheme:
Theory Paper: 100 Marks (3 Hrs)
Term Work: 25
Practical: 25

Unit – I
Introduction to DBMS: Basic concepts, advantages of a DBMS over file processing system, Data abstraction, Data models and data independence, components of a DBMS and overall structure.
Database terminology
Database administration issues: DBA role, indexes. Data dictionary, security, backups, Replication, SQL support for DBA, commercial RDBMS selection
Data modeling: Basic concepts, types of data models, E-R data model and Object oriented data model, relational, network and hierarchical data models and their comparison, E-R and ERR diagramming.

(10 Hrs, 20 Marks)

Unit – II
Relational Model: Basic concepts, attributes and domains, interaction and extensions of a relation, concept of integrity and referential constraints. Relational query languages (relational algebra, relational calculus), concepts of view and trigger

(10 Hrs, 20 Marks)

Unit – III
SQL: Structure of a SQL query, DDL and DML, SQL queries, set operations. Predicates and join membership, tuple variables, set comparison, ordering of tuples, aggregate functions, nested query. Database modification using SQL, Dynamic and embedded SQL and concepts of stored procedure, Query optimization

(10 Hrs, 20 Marks)

Unit – IV
Relational database design: Need of normalization, Notation of a normalized relation, Normalization using functional dependency, Multi-valued dependencies and join dependency, 1NF, 2NF, 3NF, BCNF, 4NF.
Transaction Management: Basic concepts of transaction, components of transaction management (concurrency control, Recovery system), Different concurrency control protocols such as Time stamps

and locking, different crash recovery such as log based recovery and shadow paging, concepts of cascaded abort, Multi-version concurrency control methods.

(10 Hrs, 20 Marks)

Unit – V

Object oriented DBMS: Review of object oriented concepts: Objects, Classes, attributes, Messages, Inheritance, and Polymorphism etc. Object schemas, Class subclass relationships, inter-object relationships, features of object oriented DBMS and ORDBMS, concepts of OID, persistence of objects in OODBMS, Physical organization, object-oriented queries, schemas modifications, Temporal databases, Active databases.

(10 Hrs, 20 Marks)

Reference Books -

1. Singh," Database Systems: Concepts,Design & Apllication"- Pearson LPE
2. Kahate, " Introduction to Database Management Systems"- Pearson LPE
3. Henry F. Korth, Abraham silberschatz, "Database system concepts", 5th Ed.Mc Graw Hill Inc.
4. Date, "Introduction to Database Management Systems", 8/e Pearson LPE.
5. Rajesh Narang, "Database Management System", PHI
6. Elmasri, Navathe, Somayajulu, Gupta, "Fundamantals of Database Systems", Pearson
7. ISRD, "Introduction to Database Management System", Tata McGraw Hill
8. Connolly, " Database Systems" – Pearson LPE.
9. Bipin Desai, "Introduction to database management systems", Galgotia.
10. Renu Vig, "Fundamentals of database management systems", ISTE learning materials centre
11. Phillip Pratt, "Concepts of DBMS", Thomson Learning, 3rd Ed.
12. Phillip Pratt, "A Guide to SQL", Thomson Learning, 5th Ed.
13. V.K.Jain, " Database Management System" Dreamtech Press (Wiley India)
14. Oracle Sql,Pl/Sql for 9i and 10 g, Dreamtech Press(Wiley India)
15. Andy Oppel, " Rational Databases-Principles and Fundamentals, Dreamtech Press(Wiley India)
16. Paul Wilton," Beginning SQL" Wrox Press, (Wiley India)

List of experiments -

1. Creating a sample database application using conventional file processing mechanism and "C" language. The program should provide facilities for retrieving, adding, deleting and modifying records
2. Prepare an E-R diagram for the given problem definition. Prepare and verify a relational database design using concepts of normalization techniques in appropriate normal form.
3. Creating a sample database file and indexes (for the design made in experiment No. 2) using any client server RDBMS (oracle/Sybase) package using SQL DDL queries. This will include constraints (key reference etc.) to be used while creating tables.
4. SQL DML queries: Use of SQL DML queries to retrieve, insert, delete and update the database created in experiment No. 3. The queries should involve all SQL features such as aggregate functions, group by, having, order by, sub queries and various SQL operators.
5. PL/SQL: Fundamentals of cursors, stored procedures, stored functions.
6. Screen design and Report generation: Sample forms and reports should be generated using Developer 2000 (in case of Oracle) or through Power builder or Visual basic front end tools or any prototyping software engineering tool.
7. Prototype of OODBMS/ Active database/ Temporal Database in C++

The term work should include a minimum of six assignments.

NORTH MAHARASHTRA UNIVERSITY, JALGAON

TE (INFORMATION TECHNOLOGY)
(w.e.f. 2007-08)

TERM – II

Web Design

Teaching Scheme:
Lectures: 4 Hrs / Week
Practical: 4 Hrs / Week

Examination Scheme:
Theory Paper: 100 Marks (3 Hrs)
Term Work: 25
Oral: 50

Unit – I
Basic of Web Design, Web design process, Web site evaluation procedure, website design principles, Developing Effective Web Strategy, Server Issues : Discuss Pros and Cons of having own server with hiring server, Domain name issues (Choosing registration etc.) Website User Requirements and Interaction, Marketing on Internet.

(10 Hrs, 20 Marks)

Unit – II
Website Organisation, Site Types and Architecture, Navigation Theory and Practice, Use of Graphics, Marketing Site Appealing, Search and Design, Site Maps Indexes, Other Navigational and Use Aids, Basic of Web Page Design : Page Types, Layouts, Text and Fonts, Colour, Images and Backgrounds. Making Use of Mail Delivery Systems, Online Customer Services, Online payments

(10 Hrs, 20 Marks)

Unit – III
History of HTML, DTD, CSS, HTML Documents Representation, Character Encoding Set, HTML Elements, Attributes, Entity References (Numeric, Character)

Structure of HTML Documents, Discuss all Block Level Tags, Text Level Tags, Linking Tags, Images Maps, Tables, Frames, Forms, Integration With CGI, Integrating Components in a HTML Page

(10 Hrs, 20 Marks)

Unit – IV
Web Mastering Skills and Roles: Internet Specialist, Information Design Scientist, Media Designer, Technical Designer, Technical Manager Etc. Web Site Security Issues, Website publishing and maintaining Procedure

(10 Hrs, 20 Marks)

Unit – V
Introduction to XML, XML Advantages, XML implementations, XML Approach to Web Designing, Logical and Physical Structures of XML Documents, XML Prolog, DTD, Elements, Attributes, Entities, Linking in XML, Style Sheets, XML Processor, Morphing HTML into XML.

(10 Hrs, 20 Marks)

Reference Books -

1. Thomas A Powell, "The Complete Reference – Web Design", TMH, 2nd Ed

2. Daniel Gary,"Web Design Fundamental Handbook" Dreamtech Press(Wiley india)
3. Wynkoop, "Running a perfect web site", PHI
4. Lehnert,"Web 101: making the Network for You",- Pearson LPE
5. James L Mohler, "Teach Yourself How to Become a Webmaster in 14 Days", Samsnet, Techmedia
6. Richard Light, "Presenting XML", Sams, Macmillan Computer Publishing
7. Joel Sklar, "Principles of Web Design", Thomson Learning
8. James L. Mohler, Jon M. Duff, "Designing Interactive Web Sites", Thomson Learning
9. Kathleen Kalata, "Internet Programming with VBScript and JavaScript", Thomson Learning
10. Vikas Gupta," Comdex multimedia and Web Design with Tutor CD," Dreamtech Press(Wiley India)
11. Jon Duckett," Beginning Web Proggramming" Wrox Press(Wiley India)
12. Bryan, "HTML,XHTML and CSS Bible", Wiley India.

List of experiments -

1. Detail Study of at least one of the Web Servers like PWS, IIS, Apache, Java Webserver.
2. Detail Study of and HTML Authoring Tool: Netscape Composer/Front page/First Page etc.
3. Detail Study of One Imaging Tool
4. Design, Publish a Website with not less than 15 full size pages for a selected topic (Commercial, Institute, Portal or decided jointly by the student and teacher). Exercise the Web Mastering Skills in various phases of the development of the site.
5. Develop an XML application for Inventory Control, Museum Information System or on the topic given by the teacher
6. Design Active Web Page Using any Scripting Language.

The term work should include a minimum of Five assignments.

NORTH MAHARASHTRA UNIVERSITY, JALGAON

TE (COMPUTER ENGINEERING / INFORMATION TECHNOLOGY)
(w.e.f. 2007-08)

TERM – II

Practical Training/Mini Project/Special Study

Examination Scheme:
Term Work: 25

Every student needs to complete following requirements for term work of Practical Training / Special Study / Mini Project.

Practical training in any industry for a period of minimum two weeks and submit training report certified by personnel manager or works manager or any other higher authority of that industry.

OR

Special study on a recent topic from reported literature and submit a report on it

OR

One mini Theoretical or development project and submit a report on it.

Notes:

1. Practical training is to be undergone in summer vacation after SE and / or in winter vacation after first term of TE.

2. Report should be typed on A4 size paper and two copies paper bounded are to be prepared, one copy for the candidate, and one for the library.

North Maharashtra University, Jalgaon
New Syllabus with effect from Year 2008-09
BE (Information Technology)
Term I

Sr. No	Subject	Teaching Scheme per Week			Examination Scheme				
		L	**T**	**P**	**Paper Hr.**	**Paper**	**TW**	**PR**	**OR**
1	Elective I	4	-	2	3	100	25	-	25
2	Enterprise Resource Planning	4	-	-	3	100	25	-	-
3	Advanced Unix Programming *	4	-	2	3	100	25	25	-
4	Object Oriented Modeling and Design *	4	-	2	3	100	25	-	25
5	E-Commerce	4	-	-	3	100	-	-	-
6	Seminar	-	-	2	-	-	25	-	-
7	Project I			2		-	25	-	25
	Total	20	0	10		500	150	25	75
	Grand Total	**30**			**750**				

Elective I
1. Operational Research * 2. Embedded Systems *
3. Image Processing *

BE IT
Term II

Sr. No	Subject	Teaching Scheme per Week			Examination Scheme				
		L	**T**	**P**	**Paper Hr.**	**Paper**	**TW**	**PR**	**OR**
1	Elective II	4	-	2	3	100	25	-	25
2	Data Warehousing and Mining *	4	-	2	3	100	25	-	25
3	Software Metrics and Quality Assurance *	4	-	2	3	100	25	-	25
4	Internet Security	4	-	2	3	100	25	-	-
5	Industrial Visit / Case Study		-			-	25	-	-
6	Project II		-	6	-	-	100	-	50
	Total	16	0	14		400	225		125
	Grand Total	**30**			**750**				

Elective II
1. Artificial Intelligence and Neural Networks 2. Mobile Network *
3. Information Retrieval

* Common subject with BE Computer

NORTH MAHARASHTRA UNIVERSITY, JALGAON

BE (COMPUTER ENGINEERING / IT)
(w.e.f. 2008-09)

TERM – I

Elective – I
Operation Research

Teaching Scheme:
Lectures: 4 Hrs./ Week
Practical: 2 Hrs./ Week

Examination Scheme:
Theory Paper: 100 Marks (03 Hrs.)
Term Work: 25
Oral: 25

Unit – I **(10 Hrs. 20 Marks)**
Introduction to Operation Research – Modeling in operation research, principles of modeling, Main phases of operation research, scope, role of operation research in decision making, linear programming, model formulation, graphical method, simplex method, advantages of Linear Programming.

Unit – II **(10 Hrs. 20 Marks)**
Dynamic Programming - Introduction ,Basic concepts and applications, characteristics of dynamic programming approach, special techniques of Linear programming, Transportation problems, North – West corner rule, Least cost method, Vogel's approximation method, Balanced and unbalanced problems, Assignment problems, Hungarian method, balanced and unbalanced problems, traveling sales man problem.

Unit – III **(10 Hrs. 20 Marks)**
Project Planning Using PERT/CPM : Phases of project management, construction of network or arrow diagrams, time estimates, earliest expected time, latest allowable time and slack, critical path computations for PERT, calculations on CPM networks various floats for activities, critical path, Difference between CPM and PERT , Project time Vs project cost, use of CPM/PERT in project management.

Unit – IV **(10 Hrs. 20 Marks)**
Replacement Model – Deterministic and probabilistic considerations, Replacement of old equipment by the most efficient by the sudden failure items, failure trees, examples of failure trees, sequencing model Terminology and notations, Principles assumptions, Solution of sequencing problems, Processing of n jobs through two machines, Processing n jobs through three machines, Two jobs through m machines, Processing n jobs through m machines .

Unit – V **(10 Hrs. 20 Marks)**
Decision theory and game theory: Decision trees, classes of decision model, decision under certainty, uncertainty and risk.
Game Theory: Theory concept characteristics, maximum and minimum principles saddle points, dominance, basic concept, terminology of two persons zero sum game, MXZ and ZX games subgames methods, graphical method.

Reference Books:
1. N. D. Vohra, Quantitative Techniques in Management, TMH
2. Taha H. A., Operation Research – An Introduction PHI
3. S. D. Sharma, Operation Research, Kedarnath Ramnath Compay
4. N. G. Nair, Operation Research, Dhanpat Rai
5. Prem kumar Gupta, D. S. Hira, Operation Research, S. Chand & Company
6. L. S. Srinath, PERT and CPM Principles & Applications, EWP

Term work:
Assignment based on:
1. Implementation of Linear Programming Model

2. Implementation of Simplex Method
3. Implementation of Dynamic Programming
4. Implementation of transportation model
5. Implementation of assignment model
6. Implementation of Traveling Sales man problem
7. Implementation of sequencing model
8. Implementation for replacement model
9. Game playing with min / max search
10. Program for decision tree

Any Five Lab Assignment should be framed by concern staff member based on above list.

NORTH MAHARASHTRA UNIVERSITY, JALGAON

BE (COMPUTER ENGINEERING / IT)
(w.e.f. 2008-09)

TERM – I

Elective – I
Embedded Systems

Teaching Scheme:
Lectures: 4 Hrs./ Week
Practical: 2 Hrs./ Week

Examination Scheme:
Theory Paper: 100 Marks (03 Hrs.)
Term Work: 25
Oral: 25

Unit – I **(10 Hrs. 20 Marks)**

Embedded system Introduction

Introduction to Embedded System, History, Design challenges, optimizing design metrics, time to market, applications of embedded systems and recent trends in embedded systems, embedded design concepts and definitions, memory management, hardware and software design and testing, communication protocols like SPI, SCI, I2C, CAN etc

Unit – II **(10 Hrs. 20 Marks)**

System Architecture

Introduction to ARM core architecture, ARM extension family, instruction set, thumb Instruction set, Pipeline, memory management, Bus architecture, study of on-chip peripherals like I/O ports, timers, counters, interrupts, on-chip ADC, DAC, RTC modules, WDT, PLL, PWM, USB etc.

Unit – III **(10 Hrs. 20 Marks)**

Interfacing and Programming

Basic embedded C programs for on-chip peripherals studied in system architecture. Need of interfacing, interfacing techniques, interfacing of different displays including Graphic LCD (320X240), interfacing of input devices including touch screen etc, interfacing of output devices like thermal printer etc., embedded communication using CAN and Ethernet, RF modules, GSM modem for AT command study etc.

Unit – IV **(10 Hrs. 20 Marks)**

Real time Operating System Concept

Architecture of kernel, task scheduler, ISR, Semaphores, mailbox, message queues, pipes, events, timers, memory management, RTOS services in contrast with traditional OS. Introduction to uCOSII RTOS, study of kernel structure of uCOSII, synchronization in uCOSII, Inter-task communication in uCOSII, memory management in uCOSII, porting of RTOS.

Unit – V **(10 Hrs. 20 Marks)**

Embedded Linux

Introduction to the Linux kernel, Configuring and booting the kernel, the root file system, Root file directories, /bin, /lib etc., Linux file systems, Types of file system: Disk, RAM, Flash, And Network. Some debug techniques- Syslog and strace, GDB, TCP/IP Networking- Network configuration, Device control from user space- Accessing hardware directly, Multi processing on Linux and Inter Process Communication- Linux process model and IPCs, Multithreading using pThreads - Threads vs. Processes and pThreads, Linux and Real-Time- Standard kernel problems and patches.

Reference Books:

1. Rajkamal, “Embedded Sytems “, TMH.
2. David Simon, “Embedded systems software primer”, Pearson
3. Steve Furber, “ARM System-on-Chip Architecture”, Pearson
4. DR.K.V.K.K. Prasad, “Embedded /real time system”, Dreamtech
5. Iyer,Gupta, “Embedded real systems Programming“, TMH

Laboratory exercise

- Integrated Development Environment Overview (Project creation, down load & debug)
- Study of JTAG Debugger/on-board debugger-emulator.
- ARM Instructions execution (Barrel Shifter, LDR/STR, SMT/LDM)

Term Work:

Group - A

1) Writing basic C-programs for I/O operations
2) C-Program to explore timers/counter
3) C-programs for interrupts
4) Program to demonstrate UART operation

Group - B

5) Program to demonstrate I2C Protocol.
6) Program to demonstrate CAN Protocol.

Group - C

7) Program to interface LCD
8) Program to interface Keyboard and display key pressed on LCD
9) Program to interface stepper motor

Group - D

10) Program to demonstrate RF communication
11) Program to implement AT commands and interface of GSM modem
12) Implementation of USB protocol and transferring data to PC.
13) Implementation of algorithm /program for the microcontroller for low power modes.

uCOSII /Embedded Linux RTOS Examples

Group - E

14) Interfacing 4 x 4 matrix keyboards and 16 x 2 character LCD display to microcontroller / microprocessor and writing a program using RTOS for displaying a pressed key.
15) Writing a scheduler / working with using RTOS for 4 tasks with priority. The tasks may be keyboard, LCD, LED etc. and porting it on microcontroller/ microprocessor.

Group - F

16) Implement a semaphore for any given task switching using RTOS on microcontroller board.
17) Create two tasks, which will print some characters on the serial port, Start the scheduler and observe the behavior.

Group – G

18) RTOS based interrupt handling using Embedded Real Time Linux.
19) Program for exploration of (Process creation, Thread creation) using Embedded Real Time Linux.

Group – H
20) Program for exploring Message Queues using Embedded Real Time Linux.
21) Ethernet Based Socket Programming using Embedded Real Time Linux.

Note: 1) At least one practical should be performed from each group.
2) Two practicals should be performed using the JTAG debugger/on-board Debugger-emulator.

Term work will be based on above list.

NORTH MAHARASHTRA UNIVERSITY, JALGAON
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TERM – I

Elective – I
Image Processing

Teaching Scheme:	**Examination Scheme:**
Lectures: 4 Hrs./ Week	Theory Paper: 100 Marks (03 Hrs.)
Practical: 2 Hrs./ Week	Term Work: 25
	Oral: 25

Unit – I **(10 Hrs. 20 Marks)**
Introduction - What is digital image processing?, Fundamental steps in digital image processing, A simple Image formation model, Image sampling and quantization , Representing Digital Images, Basic relationship between pixels,
Image Enhancement in the spatial domain: Basic Gray level transformations, Histogram Processing(Equalization, Matching), Basics of spatial filtering, Smoothing spatial filters, Sharpening spatial filters.

Unit – II **(10 Hrs. 20 Marks)**
Image Enhancement in the frequency domain: Fourier Transform and Frequency domain, Filtering in the frequency domain, Basics of filtering in the frequency domain, Basic filters and their properties, Smoothing Frequency domain filters, Sharpening Frequency domain filters, Homomorphic Filtering
Properties of 2 D Fourier Transform, The Convolution and Correlation Theorems

Unit – III **(10 Hrs. 20 Marks)**
Image Restoration: Model Of Image Restoration/ Degradation Process, Noise Models, Restoration in the presence of Noise- Spatial Filtering, Periodic Noise Reduction by Frequency Domain Filtering, Filtering Techniques to restore image.
Image Compression- Compression models- Lossy Compression- Lossless Compression.

Unit – IV **(10 Hrs. 20 Marks)**
Color Image Processing : Color Fundamentals, Color Models, Converting Colors from different color models, Gray Level to Color Transformations, Color Transformations, Color Slicing, Color Image Smoothing.
Morphological Image Processing
Basic Concepts, Dilation, Erosion, Thinning, Thickening, Pruning, Gray level Morphology

Unit – V **(10 Hrs. 20 Marks)**
Segmentaion- Edge linking and Boundary detection, Thresholding, Region Based Segmentation, Histogram Analysis,
Application of Image Processing,
Introduction to Content Based Image Retrieval.

Reference Books:

1. R.C. Gonzalez, R.R. Woods, Digital Image Processing Person Education, Pearson Education
2. B. Chanda, D.Datta Mujumdar, “Digital Image Processing And Analysis”, PHI ,
3. William Pratt, “Digital Image Processing”, John Willey & Sons
4. Anil Jain, “Fundamentals Of Digital Image Processing”, PHI

Term work:

1. Develop C/C++ code to create a simple image and save the same as bitmap image in .bmp file.
2. Develop C/C++ code to implement basic gray level transformations(Any One)
3. Develop C/C++ code to perform basic image enhancement operations
4. Develop C/C++ code to implement image histogram processing (Equalization or Matching)
5. Develop C/C++ code to find basic relationship between pixels.(Any One)
6. Develop C/C++ code to implement image compression (any one algorithm)
7. Implement gray scale thresholding to blur an image.
8. Implement C/C++ code to implement an algorithm for edge detection.
9. Implement C/C++ code to implement image morphological operations.(Any One)

The term work will be based on any 5 assignments from above list.

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TERM – I

Enterprise Resource Planning

Teaching Scheme:	**Examination Scheme:**
Lectures: 4 Hrs./ Week	Theory Paper: 100 Marks (03 Hrs.)
	Term Work: 25

Unit – I **(10 Hrs. 20 Marks)**

Introduction to ERP, Evolution of ERP, What is ERP? Reasons for the growth of ERP, Scenario and justification of ERP in India, Evaluation of ERP, Various modules of ERP, Advantages of ERP, An overview of Enterprise, Integrated Management of Information, Business Modeling ERP for Small Business, ERP for Make to Order Companies

Unit – II **(10 Hrs. 20 Marks)**

Business Process Mapping for ERP Module Design, Hardware Environment and its selection for ERP implementation, ERP and Related Technologies, Business Process Reengineering (BPR), Management Information Systems (MIS), Executive Information Systems (EIS), Decision Support System (DSS), Supply Chain Management (SCM)

Unit – III **(10 Hrs. 20 Marks)**

ERP Modules: Introduction, Finance, Plant Maintenance, Quality Management, Materials Management, ERP Market: Introduction, SAP AG, Baan Company, Oracle Corporation, People Soft, JD Edwards, World Solutions Company, System Software Associates, Inc. (SSA), QAD, A comparative assessment and selection of ERP packages and modules

Unit – IV **(10 Hrs. 20 Marks)**

ERP Implementation Lifecycle, Issues in implementing ERP packages, Pre-evaluation Screening, Package Evaluation, Project Planning Phase, Gap Analysis, Reengineering, Configuration, Implementation, Team Training, Testing, Going Live, End-user Training, Post-implementation (Maintenance mode)

Unit – V **(10 Hrs. 20 Marks)**

Vendors, Consultants and Users, In-house Implementation – Pros and Cons, Future directions in ERP, New Markets, New Channels, Faster Implementation Methodologies, Business Models and BAPIs, Convergence on Windows NT, Application platforms, New Business Segments, More features, Web Enabling, Market Snapshots.

Reference Books:

1. S. Sadagopan, “ERP – A Managerial Perspective”, Tata McGraw Hill
2. Alexis Leon, “Enterprise Resource Planning”, Tata McGraw Hill
3. Vinod Kumar Garg, N.K Venkitakrishna, “ERP Concepts and Practice”, PHI
4. Henandez, “The SAP R/3 Handbook”, 2nd ED., Tata McGraw Hill

Term Work:

It should contain at least 6 lab assignments covering the above syllabus.

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TERM – I

Advanced Unix Programming*

Teaching Scheme:	Examination Scheme:
Lectures: 4 Hrs./ Week	Theory Paper: 100 Marks (03 Hrs.)
Practical: 2 Hrs./ Week	Term Work: 25
	Practical: 25

Unit – I **(10 Hrs. 20 Marks)**

UNIX System Overview – Introduction, UNIX Architecture, Logging In, Files and Directories, Input and Output, Programs and Processes, Error Handling, User Identification, Signals, Time Values, System Calls and Library Functions.

File I/O – Introduction, File Descriptors, open Function, creat Function, close Function, lseek Function, read Function, write Function, I/O Efficiency, File Sharing, Atomic Operations, dup and dup2 Functions, sync, fsync, and fdatasync Functions, fcntl Function, ioctl Function, /dev/fd.

Files and Directories – Introduction, stat, fstat, and lstat Functions, File Types, Set-User-ID and Set-Group-ID, File Access Per missions, Ownership of New Files and Directories, access Function, umask Function, chmod and fchmod Functions, Sticky Bit, chown, fchown, and lchown Functions, File Size, File Truncation, File Systems, link, unlink, remove, and rename Functions, Symbolic Links, symlinkand readlink Functions, File Times, utime Function, mkdirand rmdir Functions, Reading Directories, chdir, fchdir, and getcwd Functions, Device Special Files, Summary of File Access Per mission Bits.

Unit – II **(10 Hrs. 20 Marks)**

System Data Files and Information – Introduction, Password File, Shadow Passwords, Group File, Supplementary Group Ids, Implementation Differences, Other Data Files, Login Accounting, System Identification, Time and Date Routines.

Process Environment – Introduction, main Function, Process Termination, Command-Line Arguments, Environment List, Memory Layout of a C Program, Shared Libraries, Memory Allocation, Environment Variables, setjmp and longjmp Functions, getrlimit and setrlimit Functions.

Process Control – Introduction, Process Identifiers, fork Function, vfork Function, exit Functions, wait and waitpid Functions, waitid Function, wait3 and wait4Functions, Race Conditions, exec Functions, Changing User IDs and Group IDs, Interpreter Files, system Function, Process Accounting, User

Identification, Process Times.

Unit – III **(10 Hrs. 20 Marks)**

Signals – Introduction, Signal Concepts, signal Function, Unreliable Signals, Interrupted System Calls, Reentrant Functions, SIGCLD Semantics, Reliable-Signal Terminology and Semantics, kill and raise Functions, alarm and pause Functions, Signal Sets, sigprocmask Function, sigpending Function, sigaction Function, sigsetjmp and siglongjmp Functions, sigsuspend Function, abort Function, system Function, sleep Function, Job-Control Signals, Additional Features.

Advanced I/O – Introduction, Nonblocking I/O, Record Locking, STREAMS, I/O Multiplexing, 2 poll Function, Asynchronous I/O, readv and writev Functions, readn and written Functions, Memory-Mapped I/O.

Unit – IV **(10 Hrs. 20 Marks)**

Threads – Introduction, Thread Concepts, Thread Identification, Thread Creation, Thread Termination, Thread Synchronization.

Thread Control – Introduction, Thread Limits, hread Attributes, Synchronization Attributes, Reentrancy, Thread-Specific Data, Cancel Options, Threads and Signals, Threads and fork, Threads and I/O.

Daemon Processes – Introduction, Daemon Characteristics, Coding Rules, Error Logging, Single-Instance Daemons, Daemon Conventions, Client-Server Model.

Unit – V **(10 Hrs. 20 Marks)**

Interprocess Communication – Introduction, Pipes, popen and pclose Functions, Coprocesses, FIFOs, XSI IPC, Message Queues, Semaphores, Shared Memory, Client-Server Properties.

Network IPC: Sockets – Introduction, Socket Descriptors, Addressing, Connection Establishment, Data Transfer, Socket Options, Out-of-Band Data, Nonblocking and Asynchronous I/O.

Advanced IPC – Introduction, STREAMS-Based Pipes, Unique Connections, Passing File Descriptors, An Open Server, Version 1, An Open Server, Version 2.

Reference Books:

1. W. Richard Stevens and Stephen A. Rago, Advanced Programming in the UNIX Environment, 2/E, Pearson Education

2.W. Richard Stevens, Unix Network Programming - Interprocess Communications, Volume 2, 2/E, Pearson Education

Term Work:

Concerned staff members should suitably frame the term work (at least 6) based on above syllabus and implementation of Unix commands using library functions as well as implementation of shell scripts.

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TERM – I

Object Oriented Modeling and Design

Teaching Scheme:
Lectures: 4 Hrs./ Week
Practicals: 2 Hrs./Week

Examination Scheme:
Theory Paper: 100 Marks (03 Hrs.)
Term Work: 25 Marks
Oral: 25 Marks

Unit – I **(10 Hrs. 20 Marks)**
Review of Object Modeling, New Paradigms, Object Oriented Thinking, UML Concepts: Overview of UML.
UML 2.0 New Features.
Rational Unified Process emphasizing Inception, Elaboration, Construction, Transition Phases. 4+1 View architecture, Architectural approaches: Use case Centric, Architecture driven, Iterative approach, OO Concepts Review.

Unit – II **(10 Hrs. 20 Marks)**
Introduction to UML. UML MetaModel. Extensibility mechanisms like stereotypes, tagged values, constraints and profiles. OCL. Overview of all diagrams in UML 2.0.

Unit – III **(10 Hrs. 20 Marks)**
Object diagrams, CRC method, Review of OO concepts. Class diagrams, Classes and Relationships, Interfaces and ports, Templates, Active Objects, Advanced relationships generalization, association, aggregation, dependencies. Composite structure diagrams including composite structures, collaborations.

Unit – IV **(10 Hrs. 20 Marks)**
Interaction diagrams. Interaction Overview diagrams including interactions, signals, exceptions, regions, partitions, Sequence diagrams, Communication diagrams.
State Machine diagrams, States, encapsulation of states, transitions, submachine, state generalization.
Timing diagrams, Activity diagrams, Activities, sub activities, signals, exceptions, partitions, regions.

Unit – V **(10 Hrs. 20 Marks)**
Support for modeling Architecture in UML. Package diagrams, Component diagrams, Deployment diagrams. Applications of UML in embedded systems, Web applications, commercial applications.

Reference Books:
1. Grady Booch, James Rumbaugh, Ivar Jacobson “Unified Modeling Language User Guide”, Addison-Wesley
2. Joseph Schmuller “SAMS Teach yourself UML in 24 Hours”, Third edition.
3. Martin Fowler, “UML Distilled: A Brief Guide to the Standard Object Modeling Language”, Third Edition (Paperback) ,Addision Wesley
4. Dan Pilone, Neil Pitman “UML 2.0 in a Nutshell”, O'Reilly
5. Rambaugh, “Object Oriented Modeling and Designing”. PHI
6. Bouch. “Object Oriented Analysis and Design with Applications”. Addison Wesley.
7. Schah, “Introduction to OOAD with UML and Unified Process”, TMH

Term Work:
Concerned staff members should suitably frame the term work at least 5 assignments based on above

syllabus. Each assignment must consider definition, analysis, design and modeling of a project.

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TERM – I

E-Commerce

Teaching Scheme:
Lectures: 4 Hrs./ Week

Examination Scheme:
Theory Paper: 100 Marks (03 Hrs.)

Unit – I **(10 Hrs. 20 Marks)**
Overview of electronic commerce- Introduction, Definition of Electronic Commerce, Electronic Business, Potential benefits of electronic commerce, Impact of Electronic Commerce on business model, Overall Business and E-commerce goal congruence, The impact of electronic commerce security, Implications for the Accounting profession.

Unit – II **(10 Hrs. 20 Marks)**
Electronic Commerce and the role of Independent Third parties – Introduction, Consulting practices and Accountants Independence, CPA Vision Project, New assurance services identified by AICPA, The Elliott committee and the Cohen Committee, Impact of electronic commerce on the traditional assurance function, Third party assurance of Web based electronic commerce.

Unit – III **(10 Hrs. 20 Marks)**
EDI, Electronic commerce and the Internet – Introduction, traditional EDI Systems, data transfer and standards, Financial EDI, EDI Systems and the internet, Impact of EDI- Internet applications on the accounting profession. PGP Email, Encryption Software.

Unit – IV **(10 Hrs. 20 Marks)**
Risks of Insecure Systems – Introduction, Internet Associated Risks, Social Engineering, Risk associated with Business transaction data transferred between Trading and Partners. Risk associated with Viruses and malicious code overflows, Implications for the accounting profession. Fire walls security issues, Authentication.

Unit – V **(10 Hrs. 20 Marks)**
Electronic Commerce Payment Mechanism – Introduction, The SET Protocol, Magnetic Strip cards, smart cards, Electronic checks, Electronic cash.

Reference Books:

1. Greenstein, Feinnon, “ Electronic Commerce”, Tata McGraw Hill Edition
2. Ravi Kalakota, et al, “ Electronic Commerce – A Manager’s Guide”, Addison Wesley Longman.

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TERM – I

Seminar

Teaching Scheme:
Practical: 2 Hrs./ Week

Examination Scheme:
Term Work: 25 Marks

1. For seminar every student will individually study a topic assigned to him / her and submit a report and shall deliver a short lecture / Seminar on the topic at the end of term.
2. Selection of topic should be done by students in consultation with concerned guide
    a. Topic should be related to branch but it should be extended part of the branch (latest and advance topic).
    b. The topic should be such that the student can gain latest knowledge. Student should preferably refer at least one research paper
3. Seminar topic should not be repeated in the department and registration of the same should be done on first come first served basis
4. Seminar report should be submitted in paper bound copy prepared with computer typing
    a. Size of report depends on advancement of topic.
    b. Student should preferably refer minimum 5 reference books / magazines.
    c. Format of content
        i. Introduction.
        ii. Literature survey.
        iii. Theory
            1. Implementation
            2. Methodology
            3. Application
            4. Advantages, Disadvantages.
        iv. Future scope.
        v. Conclusion.
5. ASSESSMENT OF SEMINAR for TERM WORK
    Title of seminar : ____
    Name of guide : ____

Sr. No.	Exam Seat No.	Name of Student	Assessment by examiners					Grand Total
			Topic Selection 5	Literature Survey 5	Report Writing 5	Depth of understanding 5	Presentation 5	25

6. Assessment of Literature survey will be based on
    a. collection of material regarding history of the topic,
    b. implementation,
    c. recent applications.

7. Assessment of Depth of understanding will be based on
    a. Questioning by examiners.
    b. Questioning by students.
    c. What the student understands i.e. conclusion regarding seminar.

8. Assessment of presentation will be based on;
   a. Presentation time (10 minutes)
   b. Presentation covered (full or partial)
   c. Way of presentation
   d. Questioning and answering (5 minutes)
9. Examiners should be a panel of two one of them must be guide. Examiner must have experience at least 3 years. Examiners will be appointed by HOD in consultation with Principal.

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TERM – I

Project - I

Teaching Scheme:
Practical: 2 Hrs./ Week

Examination Scheme:
Term Work: 25
Oral: 25

1. Every student individually or in a group (group size is of 3 students. However, if project complexity demands a maximum group size of 4 students, the committee should be convinced about such complexity and scope of the work) shall take a project in the beginning of the (B.E. first Term) seventh term in consultation with the guide and the project must be completed in the (B.E. Second Term) eighth term.

2. The project proposal must be submitted in the institute in the beginning of the (B.E. first Term) seventh term. While submitting project proposal care is to be taken that project will be completed within the available time of two term i.e 2 Hrs per week for (B.E. first Term) seventh term and 4 Hrs per week for (B.E. Second Term) eighth semester (total time become 12*2 + 12*4 = 72 Hrs per project partner). The final title of the project work should be submitted at the beginning of the (B.E. Second Term) eighth semester. .

3. Project title should be precise and clear. Selection and approval of topic:
   Topic should be related to real life or commercial application in the field of Information Technology

   OR

   Investigation of the latest development in a specific field of Information Technology

   OR

   Commercial and Interdisciplinary projects should be encouraged. The examination will be conducted independently in respective departments.

4. The group should maintain a logbook of activities. It should have entries related to the work done, problems faced, solution evolved etc., duly signed by guide.
5. The group is expected to complete details system/problem definition, analysis, design, etc. in (B.E. first Term) seventh term, as a part of term work in the form of a joint report. Project report must be submitted in the prescribed format only. No variation in the format will be accepted.

6. One guide will be assigned at the most three project groups.
7. The guides should regularly monitor the progress of the project work.
8. Assessment of the project for award of term work marks shall be done by the guide and a departmental committee (consisting of minimum two teachers with experience more than three years) as per the guidelines given in the following table.

A) ASSESSMENT OF PROJECT I TERMWORK B.E. FIRST TERM

NAME OF THE PROJECT: ______________________
NAME OF THE GUIDE: ________________________

<table>
<tr><th rowspan="3">Sr No</th><th rowspan="3">Exam Seat No</th><th rowspan="2">Name Of Student</th><th colspan="5">Assessment by guide (70%)</th><th colspan="3">Assessment by Departmental committee (30%)</th><th rowspan="2">Grand Total</th><th rowspan="2">Out of 25 Marks</th></tr>
<tr><th>Literature survey</th><th>Topic Selection</th><th>Docum-entation</th><th>Attendance</th><th>Total</th><th>Evaluation (10%)</th><th>Pres-ntaion (20%)</th><th>Total</th></tr>
<tr><td>Marks</td><td>10</td><td>05</td><td>15</td><td>05</td><td>35</td><td>05</td><td>10</td><td>15</td><td>50</td><td>25</td></tr>
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Sign of Guide Sign. of Committee Members Sign. of H. O. D.

9. The guide should be internal examiner for oral examination (If experience is greater than three years).
10. The external examiner should be from the related area of the concerned project. He should have minimum of five years of experience at degree level / industry.
11. The evaluations at final oral examination should be done jointly by the internal and external examiners.

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TERM – II

Elective – II
Artificial Intelligence and Neural Networks

Teaching Scheme:	**Examination Scheme:**
Lectures: 4 Hrs./ Week	Theory Paper: 100 Marks (03 Hrs.)
Practical: 2 Hrs./ Week	Term Work: 25
	Oral: 25

Unit – I **(10 Hrs. 20 Marks)**

Introduction to Artificial Intelligence:

Definition, AI Problems, AI Technique ,Turing test, Problem as a state space search, production system, water jug problem, Problem characteristics, breadth first search, depth first search, Properties of internal Representation, Heuristic search techniques, Best first search, OR graph, AND-OR graph , A* and AO* Algorithms, Means and ends analysis.

Unit – II **(10 Hrs. 20 Marks)**

Knowledge Representation using Predicate Logic:

Predicate calculus, Predicates and Arguments, ISA hierarchy, Frame notation, Resolution,

Knowledge Representation using Non-monotonic Logic:

TMS (Truth Maintenance System), Knowledge representation, Semantic Net, Frames, Conceptual dependency, Script.

Unit – III **(10 Hrs. 20 Marks)**

Planning:

Types of planning, Block world, strips, Implementation using goal stack, Nonlinear planning with goal stacks, Hierarchical planning, List commitment strategy.

Perception:

Robot architecture, Vision, Representing and recognizing scenes, Constraint determination, Trihedral and Nontrihedral figures labeling, Waltz algorithm.

Unit – IV **(10 Hrs. 20 Marks)**

Introduction to Neural Network:

Biological Neuron, Artificial Neuron, Characteristics of Neural Network, Neural Network Architectures, Learning in Neural Networks, Various learning Methods and Learning Rules, Single layer Perceptron , Applications of Neural Networks for Pattern Recognition, Classification and Clustering.

Unit – V **(10 Hrs. 20 Marks)**

Multilayer and Recurrent Neural Network:

Multilayer Perceptron: - Introduction, different activation functions, Error Back Propagation Algorithm, Introduction and working of counter propagation network .

Introduction to Hopfield/Recurrent Networks, Associative and Bidirectional Associative Memory.

Reference Books:

1. Elaine Rich, K. Knight, “Artificial Intelligence". TMH.
2. Eugene Charniak, Drew McDermott, "Introduction to Artificial Intelligence".
3. J.M.Zurada, “Introduction to Artificial Neural Networks”, Jaico Publishing House.
5. Robert J. Schalkoff, “Artificial Neural Networks”, McGraw-Hill
6. Philip D.Wasserman “Neural Computing:- theory and practice”.
7. Eugene Charniak, Drew McDermott, "Introduction to Artificial Intelligence".

Term Work:

1. Design and Implement Water Jug Problem.
2. Implementation of Unification Algorithm.

3. Implementation of Dynamic database.
4. Implementation of Waltz algorithm.
5. Implementation of single perceptron training algorithm.
6. Application development using Neural Network.
7. Development of Intelligent Perception System.

Any five lab assignments should be framed by concern staff member based on above list.

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BE (Computer Engineering / Information Technology)
(w.e.f. 2008-09)

TERM – II

Elective – II
Mobile Network

Teaching Scheme:
Lectures: 4 Hrs./ Week
Practical: 2 Hrs./ Week

Examination Scheme:
Theory Paper: 100 Marks (03 Hrs.)
Term Work: 25
Oral: 25

Unit – I **(10 Hrs. 20 Marks)**

Introduction – PCS Architecture, Cellular Telephony, Cordless Telephony and Low-tier PCS, Third Generation wireless system

Mobility Management – Handoff, Inter - BS handoff, Intersystem handoff, Roaming management, Roaming management under SS7 and Roaming management for CT2.

Handoff Management – Detection and Assignments, Handoff detection, Strategies for handoff detection, Mobile controlled handoff, Network controlled handoff, Mobile assisted handoff, Handoff failure, Channel assignment, Non- prioritized scheme and Reserved channel scheme, Queuing priority scheme, Sub rating scheme, Implementation issues, Hard handoff – MCHO link transfer, MAHO/NCHO link transfer, Sub rating MCHO link transfer, Soft handoff – adding new BS, dropping a BS.

Unit – II **(10 Hrs. 20 Marks)**

GSM Overview – GSM Architecture, location tracking and call setup, Security, Data Services – HSCSD, GPRS, Unstructured supplementary service data.
GSM Network Signaling – GSM MAP service frame work, MAP protocol machine, MAP dialogue.
GSM Mobility management – GSM location update, Mobility databases, Failure restoration, VLR Identification algorithm, VLR Overflow control.

Unit – III **(10 Hrs. 20 Marks)**

GSM short message service – SMS architecture, SMS protocol hierarchy, Mobile originated messaging, Mobile terminated Messaging.
International Roaming for GSM – International GSM call setup, Reducing the International call delivery cost
GSM Operations, Administration, and Maintenance – Call recording functions, Performance Measurement and Management, Subscriber and Service data Management.
Mobile number portability – Fixed network number portability, Number portability for Mobile networks, Mobile number portability mechanism.

Unit – IV **(10 Hrs. 20 Marks)**

VoIP Service for mobile networks – GSM on the Net, iGSM wireless VoIP solution, iGSM procedures and Message flows.

General Packet Radio Services – Architecture, Network nodes, Interfaces, Procedures, Billing, Evolving from GSM to GPRS.

Unit – V **(10 Hrs. 20 Marks)**

Wireless Application Protocol – WAP Model, WAP Gateway, WAP Protocol – WDP, WTLS, WTP, WSP, WAE, Mobile station Application execution environment.

Third Generation Mobile Services – Paradigm shifts in 3G Systems, W-CDMA, cdma 2000, Improvements on core network, Quality of service in 3G, Wireless Operating System for 3G Handset.

Paging Systems – Paging Network Architecture, User Access Interface – Telocator Alphanumeric Input Protocol (TAP), Telocator Message Entry Protocol (TME), Intersystem Interface.

Wireless Local Loop – WLL Architecture, WLL technologies.

Reference Books:

1. Yi-Bing Lin and Imrich Chlamtac "Wireless and Mobile Network Architecture", Wiley Publication.
2. Kasera Sumit, Narang Nishit, "3G Networks: Architecture, Protocols and Procedures", TMH

Term Work:

1. Setting up wireless network with and without infrastructure support.
2. Configuring Access Point with bridging mode (Point to Point and Point to Multi Point).
3. Configuring Routing between wired and wireless Networks.
4. Configuring Security in wireless network with and without infrastructure support.
5. At least 3 lab assignments based on above syllabus using any network simulator such as NS2, OPNET, OMNET etc.

Concerned staff members should suitably frame the term work (at least 6) based on above syllabus. Oral will be conducted based on the above syllabus and the term work submitted in the form of journal.

NORTH MAHARASHTRA UNIVERSITY, JALGAON

BE (Information Technology)
(w.e.f. 2008-09)

TERM – II

Elective – II
Information Retrieval

Teaching Scheme:	**Examination Scheme:**
Lectures: 4 Hrs./ Week	Theory Paper: 100 Marks (03 Hrs.)
Practical: 2 Hrs./ Week	Term Work: 25
	Oral: 25

Unit – I **(10 Hrs. 20 Marks)**

Background: traditional methods, classification systems, classification of documents, cataloguing, types of catalogues, indexing, types of collections, user requirements

Automatic text analysis: Introduction, Generating document representatives – conflation, Indexing, Index term weighting, Probabilistic indexing, Discrimination and/or representation, Automatic keyword classification, Normalization

Unit – II **(10 Hrs. 20 Marks)**

Automatic classification: Introduction, Measures of association, Classification methods, The cluster hypothesis, The use of clustering in information retrieval, Single-link, The appropriateness of stratified hierarchic cluster methods, Single-link and the minimum spanning tree, Implication of classification methods

Unit – III **(10 Hrs. 20 Marks)**

Search strategies: Introduction, Boolean search, Matching functions, Serial search, Cluster representatives, Cluster-based retrieval, Interactive search formulation, Feedback

Unit – IV **(10 Hrs. 20 Marks)**

Retrieval: user requirements, performance of information systems, manual and automatic methods compared, Retrieval of relevant information in a world-wide web environment, Information retrieval on WWW, advances in searching

Unit – V **(10 Hrs. 20 Marks)**

Retrieval Strategies: Boolean retrieval, Vector space retrieval, Probabilistic retrieval

Reference Books:

1. Korfhage, R.R. “Information Storage and Retrieval”, John Wiley & Sons
2. Kowalski, G. “Information retrieval systems: theory and implementation”, Kluwer
3. Charles T. Meadow “Text Information Retrieval Systems”, Academic Press
4. Salton, G. and McGill, M.J. “Introduction to modern information retrieval”, McGraw-Hill
5. Frakes and Baeza-Yates, “Information Retrieval: Data Structures and Algorithms" Prentice-Hall

Term Work:

It should contain at least 6 lab assignments covering the above syllabus.

NORTH MAHARASHTRA UNIVERSITY, JALGAON

BE (COMPUTER ENGINEERING/IT)
(w.e.f. 2008-09)

TERM – II

Data Warehousing and Mining

Teaching Scheme:	**Examination Scheme:**
Lectures: 4 Hrs./ Week	Theory Paper: 100 Marks (03 Hrs.)
Practical: 2 Hrs./ Week	Term Work: 25
	Oral: 25

Unit – I **(10 Hrs. 20 Marks)**

Evolution of database technology, What is data mining?, Data Mining Applications, Steps in Knowledge Discovery, Architecture of typical data mining System, Data mining- On What kind of data, Data mining Functionalities, Classification of data mining systems, Major Issues in Data Mining.

What is Data Warehouse? Difference between Operational Database systems and Data Warehouse (OLTP and OLAP), Why Separate Data Warehouse?
A Multidimensional Data Model, Schemas for Multidimensional Databases: Stars, Snowflakes, and Fact Constellations. Measures, Concept Hierarchies, OLAP Operations in the Multidimensional Data Model.

Unit – II **(10 Hrs. 20 Marks)**

Data Warehouse Architecture, Process of Data Warehouse design, A Three tier Data Warehouse Architecture., Types Of OLAP servers.
Data Preprocessing: Why Preprocess Data? Data Cleaning Techniques, Data Integration and Transformation, Data Reduction Techniques, Discretization and Concept Hierarchy Generation for numeric and categorical data.
Data mining Primitives, A Data Mining Query Language.

Unit – III **(10 Hrs. 20 Marks)**

Concept Description: What is Concept Description? Data Generalization and Summarization-Based Characterization, Attribute Oriented Induction, Analytical Characterization: Attribute Relevance Analysis, Methods, Mining Descriptive Statistical Measures in Large Databases.
Mining Association Rules: Association Rule Mining, Market Basket Analysis, Association Rule classification, Mining Single-Dimensional Boolean Association Rules from Transactional Databases,

The Apriori Algorithm, Mining Multilevel Association Rules, Constraint-Based Association Mining.

Unit – IV **(10 Hrs. 20 Marks)**

Classification and Prediction: What is Classification and Prediction? Data Classification Process, Issues Regarding Classification and Prediction., Classification by Decision Tree Induction, Bayesian Classification, , Classification by Back propagation, A Multilayer Feed Forward Neural Network, Classification Based on Association Rule Mining, Other Classification Methods

Cluster Analysis: What is Cluster Analysis? Types of Data in Cluster Analysis, A Categorization of Clustering Methods, Partitioning Methods, Hierarchical Methods, Density Based Methods, Grid Based Methods, Model Based Clustering Methods.

Unit – V **(10 Hrs. 20 Marks)**

Cluster Analysis: What is Cluster Analysis? Types of Data in Cluster Analysis, A Categorization of Clustering Methods, Partitioning Methods, Hierarchical Methods, Density Based Methods, Grid Based Methods, Model Based Clustering Methods

Mining Complex Types Of Data: Multidimensional Analysis and Descriptive Mining of Complex Data Objects, Mining Multimedia Databases, Mining Text Databases, Mining the World Wide Web.

Reference Books:

1. Han and Kamber, “Data Mining: Concepts and Techniques”, Morgan Kaufmann Publishers
2. Alex and Berson, “Data warehousing, Data Mining and OLAP”, TATA McGraw Hill

Term Work:

1. Develop a application to construct a multidimensional data model (Star, Snowflake or Fact constellations)
2. Develop a application to perform OLAP operations.
3. Develop a application to implement data preprocessing techniques.
4. Develop a application to implement data integration techniques.
5. Develop a application to implement data generalization and summarization techniques
6. Develop a application to extract association mining rules.
7. Develop a application for classification of data.
8. Develop a application for implementing one of the clustering technique.
9. Study of commercial data mining tools.

Any 6 laboratory assignments should be framed by concern staff member based on above list.

NORTH MAHARASHTRA UNIVERSITY, JALGAON

BE (COMPUTER ENGINEERING / IT)
(w.e.f. 2008-09)

TERM – II

Software Metrics and Quality Assurance

Teaching Scheme:
Lectures: 4 Hrs./ Week
Practical: 2 Hrs./ Week

Examination Scheme:
Theory Paper: 100 Marks (03 Hrs.)
Term Work: 25
Oral: 25

Unit – I **(10 Hrs. 20 Marks)**

Software Measurements: Measurement in Software Engineering, Scope of Software Matrices, The representational theory of measurements, Measurement and Models, Measurements Scales and scale types, Meaningfulness in measurement, Classifying software measures, Applying the framework, Software measurement validation.

Unit – II **(10 Hrs. 20 Marks)**

Measuring internal product attributes: Size- Aspects of software size, Length, Reuse, Functionality, Complexity.

Measuring internal product attributes: Structure- Types of structural measures, Control-flow structure, Modularity and information flow attributes, Data structure, Difficulties with general "complexity" measures.

Measuring internal product attributes: Modeling software quality, Measuring aspects of quality.

Unit – III **(10 Hrs. 20 Marks)**

Software Reliability: Basics of reliability theory, software reliability problem, parametric reliability growth models, predictive accuracy, importance of operational environment.

Good estimates, cost estimation: problems and approaches, models of effort and cost, problem with existing modeling methods, dealing with problems of current estimation methods, implication for process predictions.

Unit – IV **(10 Hrs. 20 Marks)**

Software documentation, Standards, Practices, Conventions and metrics, The software inspection process, The walkthrough process, Audit process, Document verification, The ISO 9000 Quality Standards, Comparison of the ISO 9000 model with SEI's CMM.

Unit – V **(10 Hrs. 20 Marks)**

Cleanroom Software Engineering: The cleanroom approach, Functional Specification, Cleanroom design, Cleanroom testing.

Reengineering: Business process reengineering, Software reengineering, Reverse reengineering, Reconstructing, Forward engineering, The economics of reengineering.

Reference Books:

1. Flanton, Pfleeger, "Software Metrics- A Rigorous and Practical Approach", Thompson Learning
2. Mordechai Ben-menachem/Garry S.Marliss, "Software Quality", Thompson Learning
3. Roger S. Pressman, "Software Engineering- A Practitioner's Approach", TMH
4. Swapna Kishore and Rajesh Naik, "ISO 9001:2000 for Software Organizations", TMH

Term Work:

Concerned staff members should suitably frame the term work at least 5 assignments based on above syllabus.

NORTH MAHARASHTRA UNIVERSITY, JALGAON

BE (Information Technology)
(w.e.f. 2008-09)

TERM – II

Internet Security

Teaching Scheme:	**Examination Scheme:**
Lectures: 4 Hrs./ Week	Theory Paper: 100 Marks (03 Hrs.)
Practical: 2 Hrs./ Week	Term Work: 25

Unit – I **(10 Hrs. 20 Marks)**

Security Basics – Define information security as process. Anti virus Software, Accesses controls, smart cards, biometrics, intrusion detection, policy management Encryption, physical security mechanism. Type of attacks – assess attacks modification attacks, Denial of services attacks repudiation attacks.

Unit – II **(10 Hrs. 20 Marks)**

Hackers techniques – Hackers motivations, historical hacking techniques, advanced techniques. Identification – Malicious code, Method of untargeted hackers, Methods of targeted hacker. Information security services, confidentiality, integrity, availability, accountability, Understanding of laws of India and U.S. Understanding privacy, civil issues.

Unit – III **(10 Hrs. 20 Marks)**

Policy- importance various policies, creating policy, Deploy policy, using effectively policy. Management Risk – risk, identification of risk , measure risk

Information security Process. Conduct an assessment, develop policy, implementation of security conduct training and audit.

Unit – IV **(10 Hrs. 20 Marks)**

Information security, Best practices administrative, technical security university, make use of ISO 17799. Firewalls – types configuration, Rule set. Encryption- private key, public key, digital signature, understand key management, trust in system, Intrusion detection.

Unit – V **(10 Hrs. 20 Marks)**

Unix security issues, setup a system. User management system management, Windows 2000/windows2003 server issues set up system, manage users ,manage the system, use active directory.

Reference Books:

1. Roberta Bragg, Mark Rhodes, Keith Strassberg, “Network Security- The complete Reference”, TMH
2. Eric Maiwald , “Network security a Beginner’s guide”
3. Basics of n/w security, firewalls and VPN , PHI
4. Tanenbaum, “Computer Networks”, PHI

Term Work:

Any five lab assignments should be framed by concern staff member based on above syllabus.

NORTH MAHARASHTRA UNIVERSITY, JALGAON

BE (Information Technology)
(w.e.f. 2008-09)

TERM – II

Industrial Visit / Case Study

Teaching Scheme: -

Examination Scheme:
Term Work: 25

EDUCATION TOUR / TECHNICAL VISITS / CASE STUDY AND ITS EVALUATION

1. During (B.E. First Term / Second Term) seventh and / or eighth terms or during vacation between (B.E. First Term / Second Term) seventh and eighth terms, every student; shall visit minimum two industries, factories arranged by colleges and accompanied by teachers. There shall be at least one teacher for a group of 20 students and at least one non-teaching staff accompanied with the students.

2. The colleges should obtain appropriate certificates of visit from the concerned organizations just after the visits.

3. Students should submit written report about the visits individually at the end of (B.E. Second Term) eighth term.

4. The report should contain information about the following points:

   (a) The organization - activities of organization and administrative setup technical personnel and their main duties.
   (b) The project / industry brief description with sketches and salient technical information.
   (c) The work / processes observed with specification of materials, products, equipments etc. and role of engineers in that organization.
   (d) Suggestions (if any) for improvement in the working of those organizations.

5. The evaluation of the report of technical visits will be made by panel of two teachers appointed by principal based on following points:

   (a) Coverage aspect: All above points should be covered.
   (b) Detailed observations: System / Process / Product explained with data, diagram specifications.
   (c) Quality of presentation: Report should be very objective and should consist of clear and systematic organization of topics and information.
   (d) Viva - voce: A viva -voce shall be conducted on the technical visit report by the teachers to assess the specific knowledge gained by the students for technical applications.

6. The case study should include the study problem in Computer Engineering branch.

NORTH MAHARASHTRA UNIVERSITY, JALGAON

BE (Information Technology)
(w.e.f. 2008-09)

TERM – II

Project - II

Teaching Scheme:
Practical: 6 Hrs./ Week

Examination Scheme:
Term Work: 100
Oral: 50

1. The Project group in (B.E. first Term) seventh term will continue the project work in (B.E. Second Term) eighth term and complete project.
2. The group should maintain a logbook of activities. It should have entries related to the work done, problems faced, solution evolved etc., duly signed by guide.
3. The guides should regularly monitor the progress of the project work.
4. The project work along with project report should be submitted as part of term work in (B.E. Second Term) eighth term on or before the last day of the (B.E. Second Term) eighth term.
5. Project report must be submitted in the prescribed format only. No variation in the format will be accepted.
6. Assessment of the project for award of TW marks shall be done by the guide and a departmental committee (consisting of minimum two teachers with experience more than three years) as per the guidelines given in the following table.

B) ASSESSMENT OF PROJECT II TERMWORK (B.E. SECOND TERM)

NAME OF THE PROJECT: ____

NAME OF THE GUIDE: ____

Sr. No	Exam. Seat No	Name Of Students	Assessment by guide (70%)						Assessment by department (30%)			Grand Total
			Fabrication /software / actual work	Execution of project	Project report	Scope/ Cost / Utility	Attende-nece	Tota l	Evalu ation (10%)	Prese-ntaion (20%)	Tota l	
		Marks	20	10	20	10	10	70	10	20	30	100

Sign of Guide Sign. of Committee Members Sign. of H. O. D.

7. The guide should be internal examiner for oral examination (If experience is greater than three years).
8. The external examiner should be from the related area of the concerned project. He should have minimum of five years of experience at degree level / industry.
9. The evaluation at final oral examination should be done jointly by the internal and external examiners.
10. The Project work should be kept in department for one academic year after University Examination.

NORTH MAHARASHTRA UNIVERSITY, JALGAON

STRUCTURE OF TEACHING AND EVALUATION

S.E.(ELECTRONICS & Communication / electronics & Telecommunication / electronics)

First term

W.E.F. 2006-07

Sr. No.	Subject	Teaching Scheme Hours/week			Examination Scheme				
		Lectures	Tutorial	Practical	Paper Duration Hours	Paper	TW	PR	OR
1	Electronics Materials and Components	4	--	--	3	100	25	--	--
2	Electronics Instrumentation	4	--	2	3	100	25	25	--
3	Digital Circuits and Logic Design	4	--	2	3	100	25	25	--
4	Electrical Circuits and Machines	4	--	2	3	100	25	--	--
5	Semiconductor Devices and Circuits	4	--	4	3	100	25	50	--
6	Electronics Workshop	--	--	2	--	--	25	--	--
	Total	**20**	--	**12**	--	**500**	**150**	**100**	--
	Grand Total	**32**			**750**				

SECOND TERM

Sr. No.	Subject	Teaching Scheme Hours/week			Examination Scheme				
		Lectures	Tutorial	Practical	Paper Duration Hours	Paper	TW	PR	OR
1	Management Science	4	--	--	3	100	--	--	--
2	Electronic Circuits and Applications	4	--	4	3	100	25	50	--
3	Engineering Mathematics-III	4	1	--	3	100	25	--	--
4	Network and Lines	4	1	2	3	100	25	25	--
5	Analog Communication	4	--	2	3	100	25	50	--
6	Software Application-I	--	--	2	--	--	25	--	--
	Total	**20**	**2**	**10**	--	**500**	**125**	**125**	--
	Grand Total	**32**			**750**				

NORTH MAHARASHTRA UNIVERSITY JALGAON
S.E. (ELECTRONICS, ELECTRONICS & COMMUNICATION, ELECTRONICS & TELECOMMUNICATION)
W.E.F 2006 -2007
TERM - I
ELECTRONICS MATERIALS AND COMPONENTS

Teaching scheme:	Examination scheme:
Lectures : 4 hrs/week	Theory Paper : 100 Marks (3 Hours).
	Term Work : 25 Marks

UNIT – I

Electrical conducting materials, Copper, Aluminum, Tungsten, Carbon and Graphite, Nickel, Lead, Tin-Alloys, properties and applications; Insulating materials, Mica, porcelain, Marble and Slate, Polythene, Bakelite, Polyvinyl chloride, Asbestos, Rubber, Cotton and Silk, Glass, Paper and Boards, Wood, Enamel covering, Semiconductor materials-Classification of semiconductors;-Elemental semiconductors-Antimony, Arsenic .Selenium. Gallium Silicon and Germanium, Compound Semiconductors -GaAs. Amorphous semiconductor:-Ge, Si, Se, Te, properties and applications; Magnetic materials:-Soft magnetic materials, Electrical steels, Hard magnetic materials, Magnetic recording, magnetic memories. Metallic glasses. Dielectric materials:-Capacitor structure, Multi layer capacitor dielectric . Lead Zirconate Titanate (LZT), PLZT system.

Lectures-10, Marks -20

UNIT – II

Passive components: Resistors: - Fixed type, carbon composition, carbon film, metal film: construction and characteristics; Variable resistors, carbon potentiometer, and wire-bound potentiometer: construction and characteristics. Tolerance of various resistors. Capacitors: - fixed type, electrolytic, aluminium type, tantalum type, ceramic capacitors, polystyrene, polyester capacitors, mica capacitor and paper capacitor, variable capacitor: construction and properties of each type. Inductors: - fixed type, air-core, ferrite-core inductors and variable inductors: construction and characteristics. Transformers:-Construction, Operation and types- power transformer, IF, AF and RF. Losses in transformers-Core losses, Eddy current Losses, Residual Losses Applications.

Lectures-10, Marks -20

UNIT - III

Discrete devices: Fabrication of discrete and monolithic devices, Semiconductor processing:-Zone refining Mono crystallization, Floating Zone method, vaferization. Diodes:- alloy junction, Crystals, Grown junctions, Solid diffusion, and Gaseous diffusion. Epitaxial diodes. Point contact diode, Schottky barrier diode, Zener diodes, power diodes, Tunnel diodes. Light emitting diodes. BJT Fabrication:-Alloy junction, Point contact, Diffusion, Power transistors,. junction, Diffused junction and Epitaxial techniques, JFET; Fabrication:-MOSFET Fabrication, Depletion MOSFET- Enhancement – MOSFET, C-MOS. V-MOS. Alloy junction, Diffused junction and Epitaxial techniques .UJT Fabrication, Pellet type SCR, Annular SCR, DIAC Fabrication,

Lectures-10, Marks -20

UNIT –IV

Fabrication of Optoelectronic Devices: LDR Phototransistor, LASCR, SUS, LCD, Seven segment displays.

Integrated circuits: Monolithic integrated circuits, chip and component size, photolithographic masking, fabrication: IC resistors, capacitors, diodes and transistors; fabrication of epitaxial- diffused integrated circuits. Thermo-compressic bonding of lead and packaging of ICs.

Lectures-10, Marks -20

UNIT –V

Printed Circuit Boards: Base and conducting materials, artwork, copper clad laminates: properties and types, Design rules for analog circuit PCBs, Design rules for PCBs in power electronics application, Design rules for PCBs in microwave application, photographic etching techniques, mass-soldering techniques, mounting of components, final protection, multilayered flexible PCB.

Lectures-10, Marks -20

REFERENCES:

1. C.S. Indulkar, S.Thiruvengadam: An Introduction to Electrical Engineering Materials, S Chand & Company. 3/e
2. Salivahanan, Suresh Kumar, Vallavaraj : Electronic Devices and Circuits, TMH publication.
3. Allison: Electronic Engineering Materials and Devices, TMH publication.
4. W. Bosshart : Printed Circuit Boards: Design and Fabrication, TMH publication.
5. S.M. Dhir: Electronic components & materials

Note: The term work should include minimum FIVE assignments based on above syllabus, ONE from each unit.

NORTH MAHARASHTRA UNIVERSITY JALGAON
S.E. (ELECTRONICS, ELECTRONICS & COMMUNICATION, ELECTRONICS & TELECOMMUNICATION)
W.E.F 2006 -2007
TERM - I
ELECTRONICS INSTRUMENTATION

Teaching scheme:	Examination scheme:
Lectures : 4 hrs/week	Theory Paper : 100 Marks (3 Hours)
Practicals : 2 hrs/week	Term Work : 25 Marks
	Practical : 25 Marks

UNIT – I

Measurement and error : Definitions, instruments, accuracy, precision, sensitivity , resolution error, accuracy and precision , significant figures, types of error , gross error, systematic error, random error, statistical analysis, arithmetic mean, average deviation, standard deviation, probable error and limiting errors.

Units of measurement: Fundamental and derived units, systems of unit - CGS, MKS and SI. Standards of measurement: Classification of standards, international standards, primary standard, secondary standard, working standard, IEEE standards.

Calibration – Primary calibration , Secondary Calibration, Indirect Calibration, Routine Calibration, Fundamentals elements of Measurement System.

Lectures-10, Marks -20

UNIT – II

Electromechanical Indicating Instruments : Permanent magnet moving coil mechanism (PMMC) , D'Arsonal movement , multirange DC ammeter , multirange DC volt meter sensitivity , loading effect , voltmeter - ammeter methods of measuring resistance , series type ohm meter, shunt type ohm meter, multimeter, calibration of DC instruments , AC indicating instruments , electrodynamometer , rectifier type instruments , typical multimeter circuits, electrodynamometer in power measurements, single phase watt meter , watt –hour-meter, power factor meter. Lectures-10, Marks -20

UNIT – III

Bridges and their applications : Wheatstone bridge, measurement errors, sensitivity, Kelvin bridge, guarded wheatstone bridge, Mega ohm bridge, AC bridge, conditions for bridge balance, inductance comparison bridge, capacitance comparison bridge, maxwell bridge, Hay bridge, Schering bridge, Wein bridge, Wagner ground connections. Lectures-10, Marks -20

UNIT – IV

Electronic instruments: Electronic dc and ac voltmeter, electronics multimeter, digital voltmeter - ramp type, Integration continuous balance and successive approximation type.

Recorders : Galvanometric, servo potentiometer, magnetic and digital data recording, printers.

Lectures-10, Marks -20

UNIT – V

Transducers and application: characteristic and applications of Strain gauges, capacitive transducer, Inductive transducer, linear variable differential transformer (LVDT), potentiometric transducer, thermister, thermocouple, thermostat ,Acoustical transducers - microphone, speakers., Instrumentation amplifier, RTD, pressure transducer, flow transducer, pyrometer, luxmeter. Lectures-10, Marks -20

REFERENCES:

1) Cooper & Helfric : Electronics Instrumentation & measurement technique, Pearson LPE
2) H.S. Kalsi : Electronics Instrumentation, TMH 2/e
3) A.K.Sawhney: Electrical and Electronics measurement and Instrumentation, Dhanpat Rai and compony.

LIST OF EXPERIMENTS:-

Group A

1) (a) Study of single phase wattmeter.
   (b) Study of single phase watt hour meter.
2) Study of Wheat stone bridge
3) Study of Kelvin bridge
4) Study of Maxwell bridge
5) Study of Hay bridge
6) Study of Schering bridge

Group B

7) Study of Wein bridge
8) Study of digital voltmeter
9) Study of Recorder
10) Study of Instrumentation amplifier
11) Study of Linear variable differential transformer
12) Application of thermistor for temperature control

The term work should include a minimum EIGHT experiments. FOUR from group A and FOUR from group B .

NORTH MAHARASHTRA UNIVERSITY JALGAON
S.E. (ELECTRONICS, ELECTRONICS & COMMUNICATION, ELECTRONICS & TELECOMMUNICATION)
W.E.F 2006 -2007
TERM - I
DIGITAL CIRCUITS AND LOGIC DESIGN

Teaching scheme:		Examination scheme:	
Lectures	: 4 hrs/week	Theory Paper	: 100 Marks (3 Hours)
Practicals	: 2 hrs/week	Term Work	: 25 Marks
		Practical	: 25 Marks

UNIT – I
Characteristics of digital IC's , TTL, Schottkey TTL , ECL, Interfacing ECL and TTL, MOS Logic, CMOS Logic, Interfacing of CMOS and TTL.
Loading rules for logic families, switching times, digital signals, positive and negative logic
Lectures-10, Marks -20

UNIT – II
Binary arithmetic, Signed binary numbers, Binary codes : Exess-3, Gray, BCD, ASCII , parity bit, hamming code .Boolean algebra, Demorgan's theorems , Minimization of logic functions using K-map, Canonical forms, min terms, max terms, don't care conditions, variable entered mapping (VEM) , code converters
Lectures-10, Marks -20

UNIT – III
Combinational Logic Circuits Design: Arithmetic circuits, half and full adder, half and full subtractor, binary parallel adder, 7483, BCD adder, BCD subtractor, Excess-3 adder, digital comparator, Multiplexers, Demultiplexers, decoders, Arithmetic logic unit (ALU – 74181), Carry look ahead generator.
Lectures-10, Marks -20

UNIT – IV
Sequential logic circuits : Flip flops (SR, JK, MSJK, D, T), excitation table, design of ripple counter using flip flop and IC's, 4- bit Up / Down ripple counter, shift register, universal register and application
Lectures-10, Marks -20

UNIT – V
Synchronous Sequential Machine: Synchronous counters, Mod- N counter, synchronous counters using 74191, design of Sequential generator. Moore Mealy machines, state diagram, state table, application to sequential generator, Introduction to array
Lectures-10, Marks -20

REFERENCES:

1. R.P. Jain : Modern digital electronics , TMH 3/e
2. Morris Mano : Digital logic and computer design, Pearson LPE
3 Macrovitz : Introduction to logic design . TMH 2/e
4 Taub and Schilling : Digital integrated electronics, Mc Graw Hill
5 Gothman : Digital electronics : An Introduction to Theory & Practice, PHI 2/e
6. William Fletcher : Engineering approach to Digital design, PHI
7. Givone : Digital principles and Design , TMH
8. Malvino , Leach : Digital principle and Applications

LIST OF EXPERIMENTS

GROUP - A

1. Design and implement circuit using NAND or NOR gate to perform the Boolean expression
2. Design and implement BCD to Exess-3 code converter
3. Design and implement 4- bit binary to Gray code converter
4. Implement 4-bit binary adder using IC 7482 and IC 7483
5. Implement BCD to 7- segment decoder using IC 7447/7448
6. Implement BCD adder using 7483
7. Implement 4 – bit comparator using IC 7485
8. Implement arithmetic logic unit using IC 74181

GROUP – B

1. Verify the truth table of multiplexer and demultiplexer ICs
2. Implement the logical expression using multiplexer IC and gates
3. Implement the logical expression using demultiplexer IC and gates
4. Implement and verify S-R, J-K,D, and T flip flop using ICs
5. Implement 4- bit ripple counter using IC 7493
6. Design and Implement Mod -6 synchronous counter
7. Implement decade up- down counter using ICs
8. Implement shift register using 7495.

The term work should include a minimum EIGHT experiments. FOUR from group A and FOUR from group B.

NORTH MAHARASHTRA UNIVERSITY JALGAON
S.E. (ELECTRONICS, ELECTRONICS & COMMUNICATION, ELECTRONICS & TELECOMMUNICATION)
W.E.F 2006 -2007
TERM - I
ELECTRICAL CIRCUITS AND MACHINES

Teaching scheme:	Examination scheme:
Lectures : 4 hrs/week	Theory Paper : 100 Marks (3 Hours)
Practicals : 2 hrs/week	Term Work : 25 Marks

UNIT – I

DC circuits: circuit definitions, sources of energy, source conversion, mesh analysis, nodal analysis, Thevinin`s theorems, Norton`s theorem, superposition theorem, maximum power transfer theorem,

Three phase circuits : Three phase supply, phase sequence , star and delta connection of three phase winding, line and phase voltages and currents in star and delta connections, power in three phase circuit with balance load for star and delta connections, measurement of three phase power by three watt meter method, two Watt meter method , single watt meter method, calculation of active and reactive power. Lectures-10, Marks -20

UNIT – II

DC Machines : construction ,types ,generator action, emf equation motor action , significance of back emf , torque and speed equations , characteristics of shunt , series , compound motors, speed controll methods , starters , theoretical treatment of losses and power flow diagram of dc machines, applications of dc machines. Lectures-10, Marks -20

UNIT – III

Transformers : Single phase transformer construction , emf equation , transformer on no load , transformer on load , phasor diagram, equivalent circuit, efficiency and regulation, open circuit and short circuit tests,

Three – phase transformers : star / star, delta / delta, star / delta, delta / star connections, V-V and scott connections, Autotransformer, C.T. and P.T. Lectures-10, Marks -20

UNIT – IV

Synchronous Machines : Alternators – principle of operation , constructional features, emf equation, winding factors, voltage regulation by synchronous impedance method.

Synchronous Motors: principle of operation, rotating magnetic field, on no load ,on load , phasor diagrams, 'V' curves, hunting, method of starting . Lectures-10, Marks -20

UNIT –V

Induction Motors: Three phase motors - principle of operation, construction, slip, torque equation , torque slip characteristics, relation between slip and rotor copper loss and rotor input, equivalent circuit, different types of starters, applications induction motors.

Single phase Induction motors - principle of operation, types, and applications.

Special purpose machines: Principle, working and application of stepper motor, servo motor, universal motors. Lectures-10, Marks -20

REFERENCES:

1. Edward Hughes : Electrical technology, ELBS.6/e
2. V. N. Mittal : Basic electrical engineering, TMH. 2/e
3. Nagarath and Kothari : Electrical machine, TMH.2/e
4. S.K. Bhattacharya : Electrical machine, TMH. 2/e
5. V. Del Toro : Electrical machines and power systems, Pearson.

LIST OF EXPERIMENTS:-

1. Two Wattmeter method of power measurement in three phase balanced load.
2. Speed control of D.C. shunt motor by armature voltage and flux control method,.
3. Load test on D.C. shunt motor
4. Load test on D.C. series motor.
5. O.C. and S.C. test of single phase transformer to determine regulation and efficiency.
6. Scott connection to convert three phase supply to two phase supply.
7. Regulation of alternator by synchronous impedance method.
8. Regulation of alternator by direct loading method.
9. To plot 'V' curve and P.F. curve for synchronous motor.
10. Load test on three phase induction motor.
11. Study of various single phase motors.
12. Study of three point starter.

The term work should include minimum EIGHT experiments , from the list..

NORTH MAHARASHTRA UNIVERSITY JALGAON
S.E. (ELECTRONICS, ELECTRONICS & COMMUNICATION, ELECTRONICS & TELECOMMUNICATION)
W.E.F 2006 -2007
TERM - I
SEMICONDUCTOR DEVICES AND CIRCUITS

Teaching scheme:	Examination scheme:
Lectures : 4 hrs/week	Theory Paper : 100 Marks (3 Hours)
Practicals : 4 hrs/week	Term Work : 25 Marks
	Practical : 50 Marks

UNIT - I

Semiconductor physics and semiconductor diodes: Conduction mechanism in extrinsic semiconductors, carrier concentrations, mobility, drift and diffusion current densities, mass action law, Einstein's relation and charge density relation. Piecewise linear diode model, V - I characteristics equation, static and dynamic resistances of diode, small signal and large signal model of diode.

Diode applications and special types of diodes: FWR, capacitor filter, power, shottkey and PIN diode, diode switching times and junction capacitance. Lectures-10, Marks -20

UNIT - II

BJT biasing and small signal models: Need for biasing BJT circuit, voltage divider biasing , stability factors, thermal runaway and compensation circuits. Low frequency h - parameter analysis , derivations for CE configuration for A_i, R_i, R_o, A_{vs}, A_{is} (exact / approx. analysis) in terms of h - parameters, Miller theorem and its dual, CE – CC and CE – CB parameter conversion, comparison of performance parameters with CB and CC configurations in tabular form. Need for multistage amplifiers. Cascade analysis of CE – CE, CE – CC and CE – CB. Darlington configuration, boot strapping.

. Lectures-10, Marks -20

UNIT - III

Field effect transistors : An overview of different types of FET's viz JFET , MOSFET, MESFET, JFET : JFET construction, symbol, basic operation , V - I characteristics, transfer characteristics, cut-off and pinch off voltages, trans conductance , Input resistance and capacitance, Drain to source resistance, Universal JFET bias curve. Biasing arrangements for JFET , biasing against device variation , biasing for zero current drift, d.c.analysis using graphical approach. JFET as voltage controlled source JFET amplifiers :CS, CD, CG amplifiers, their analysis using small signal JFET model.

Lectures-10, Marks -20

UNIT - IV

MOSFET's: An overview of following MOSFET's types – DMOSFET, EMOSFET, Power MOSFET nMOSFET, pMOSFET and CMOS devices .handling precautions for CMOS devices, D and E MOSFET characteristics and parameters, non ideal voltage current characteristics finite output resistance , body effect subthreshold conductions , break down effects and temperature effects , MOSFET biasing ,introduction to MOSFET as VLSI device.

MOSFET in VLSI: V - I characteristic equation in W / L ratio , MOSFET capacitances , CMOS inverter static characteristic , noise margin, threshold voltage

Lectures-10, Marks -20

UNIT - V

Frequency responses for BJT and FET: Concept of frequency response , human ear response to audio frequencies ,significance of octaves and decades .The decibel unit ,square wave testing of amplifiers. Effect of coupling, by pass, junction and stray capacitances on frequency response for BJT and FET amplifiers. Concept of dominant pole, N stage cascade amplifier, band pass of cascaded stages, concept of gain band width product.

Lectures-10, Marks -20

REFERENCES:

1) Thomas L Floyd : Electonics devices , Pearson 6/e
2) Millman Halkias: Integrated electronics ,TMH publications
3) Boylested Nashelsky: Electronics devices and circuits, ,Pearson LPE 8/e
4) Donald A, Neamen : Semiconductor physics and Devices – Basic Principles, TMH. 3/e
5) Cathey and Singh : Electronics Devices and circuits , TMH 3/e
6) D.R.Cheraku , B.T.Krshina : Electronics Devices and circuits, Pearson
7) R.S.Sedha : Applied Electronics , S Chand Publication.

LIST OF EXPERIMENTS:-

1) For a half wave rectifier with capacitor filter find line and load regulation and ripple factor.
2) For a bridge rectifier with capacitor filter find line and load regulation and ripple factor.
3) For full wave rectifier with capacitor filter find line and load regulation and ripple factor.
4) Determine h-parameters for CE configuration.
5) Determine I/P and O/P impedances and voltage gain of a CE stage followed by CC.
6) Measurement of I/P and O/P impedances and voltage gain of Darlington circuit without and with bootstrapping.
7) Plot characteristics of CSFET. Determine amplification factor, transconductance and dynamic resistance.
8) Determine I/P and O/P impedances and voltage gain and current gain for CSFET.
9) Plot characteristics of CSDMOSFET.
10) Plot characteristics of CSEMOSFET.
11) Square wave testing of an amplifier used to find lower and higher cut off frequency.
12) For two cascaded CE-CE stages, find voltage gain and bandwidth.
13) For cascode amplifier determine voltage gain and bandwidth.
14) Study frequency response of CSFET.
15) Study the effect of bypass capacitor on frequency response of single stage CE amplifier

The term work should include a minimum TWELVE experiments from the list.

NORTH MAHARASHTRA UNIVERSITY JALGAON
S.E.(ELECTRONICS, ELECTRONICS & COMMUNICATION, ELECTRONICS & TELECOMMUNICATION)
W.E.F 2006 –2007
TERM - I
ELECTRONICS WORKSHOP

Teaching scheme:
Practical : 2 hrs/week

Examination scheme:
Term Work : 25 Marks
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I.] Multimeters and Power supply
(a) Study of Analog and Digital Multimeter (DMM)
1) To study AC / DC voltage and current ranges, different ranges for resistance and other functions.
2) Comparison of DMM and True RMS meters.
3) Difference in V_{rms}, V_{dc} and $V_{average}$ voltages.
4) Importance of $3_{1/2}$ digit and $4_{1/2}$ digit multimeters.
5) Study of different types of fuses used for multimeter.
6) Different types of batteries used in multimeters, voltage and current ratings.

(b) Study of Power Supply
1) Single Power Supply
2) Dual Power Supply
3) Dual Tracking Power Supply
4) Variable AC Power Supply

Measurement of voltage and current levels at different ranges

II.] Study of Cathode Ray Oscilloscope (C.R.O.)
a) Function of front panel knobs, different types of screens used for C.R.O.and probes.
b) Measurement of various parameters e.g. AC,DC voltages , currents, time , frequency measurement lissageous pattern and by phase shift method
c) Study of different types of C.R.O.

III.] Study of signal generator.
a) Study of front panel of signal generator.
b) Adjusting different signals (sine, square, triangular) along with voltages and frequencies
c) Significance of source resistance, offset voltage

IV.] Study of passive components
a) Resistors
1) Different types:- MFR, MFR precision, CFR, Wire-wound, Variable resistors, potentiometers, trimpots of different wattages e.g. 1/8, ¼, ½ ,1 watt.
2) 3, 4, 5 band resistors and colour codes of resistors.
3) Fixed resistors
4) Importance of zero ohm resistance
5) E-series alpha numeric resistance like E6, E12, E24 resistors.

b) Capacitors
Different types of capacitors (Fixed and Variables)
1) Fixed : - ceramic, tantalum, aluminium, polysterene, mica, metalised poly paper, electrolytic etc.
2) Variables: - air-dielectric, trimmer, ganged capacitors. Voltage and capacitance ratings
3) Calculation of capacitance like 101, 102, 103,104 etc on ceramic capacitors.

4) Identification polarities of electrolytic capacitors.
5) Testing of polarized capacitors using analog meters [$\geq 1\mu f$].
6) Checking of capacitors on meters and identification of open / short of capacitance.
7) Colour coding of capacitors.

c) Inductors: -

Different types : ferrite core, iron core, RF coil, power transformer (step-down) , pulse transformer.

Study of quality factor.

V.] Study of hardware components

a) Wires and cables: different types like single strand, multi strand, ribbon cable, co-axial cable (75 ohm), TV antenna cable (300 ohm).
b) Switches: SPDT, DPDT, Toggle, Rotary, Micro, Membranes, Sliding.
c) Relays: general purpose, reed, pcb mounting, body mounting.
d) Wire connectors: relimate, power connector, D - type, FRC

VI.] Study of Active components

Diodes, Transistors, FET / MOSFET

a) Study of different types of diodes: rectifier, switching, power diode, number identification using datasheets.
   Frequency operation of switching diodes, zener diodes, LED, LCD.
   Testing of diodes (by multimeters).
b) Transistors: (BJT / FET)
   Study of different types of transistors e.g. Audio, semi-power, power with their numbers, company names, Xerox of data sheet.
   Identification of the types of transistors (NPN, PNP)
   Different packages of transistors.
   Testing of BJT (Using DMM).
   Testing of FET (Using DMM).

VII.] a) Build and test any basic electronic circuit on bread board .

b) Preparation of artwork and layout of above circuit . Preparation of its PCB and testing the circuit.

REFERENCES:

1. James and M. Krickpatrick : Electronic Drafting and PCB Design , Thomson publications.
2. W. C. Bosshart : Printed Circuit Boards Design And Technology, TMH
3. Motorola power data book

Note: The term work is based on above syllabus with minimum EIGHT experiments and experiment from part VII is compulsory

TERM - II

MANAGEMENT SCIENCE

Teaching scheme:
Lectures : 4 hrs/week

Examination scheme:
Theory Paper : 100 Marks (3 Hours)

UNIT - I

History of management, Scientific management and its principles, Administration management, Neo-Classical theory

Therbligs, Modern Management theories, Relation between Administration, Management and Organization, Levels of Management

Functions of Management

Lectures-10, Marks -20

UNIT - II

Organizational structures- Line, Functional, Line and staff, Forms of Business Ownership-Proprietorship, Partnership, Joint Stock company-Private limited. company, Public limited. company , Co-operative organizations, Public sector, Joint Ventures their meanings ,formation, advantages, limitations and applications.

Lectures-10, Marks -20

UNIT - III

Engineering Economics, Wants,Utility,Demand,Supply, Elasticity of demand and supply, Capital-Fixed capital, Working Capital

Sources of finance-Shares, Debentures, Ploughing Back of Capital, Loans from Banks, Trade Credit, Public Deposits, Financial- Institutions, Foreign Capital

Cost Estimating, Cost Accounting, Fixed Costs, Variable Costs, Selling Price (No Numerical)

Lectures-10, Marks -20

UNIT - IV

Manpower Planning, Factors affecting Manpower Planning, Sources of Recruitment, Need, Objectives and Benefits of Training Methods of training Workers, Supervisors and Executives Job Evaluation and Merit Rating (concept only)

Selling and Marketing Concept, Sales Promotion, Advertising

Lectures-10, Marks -20

UNIT - V

Industrial Acts:

Factories Act, Industrial Accidents, Industrial Safety, Quality Concepts, Total Quality Management, ISO 9001-2000, Intellectual Property Rights - Patents, Trademarks, Copy Rights

Lectures-10, Marks -20

REFERENCES:

1. M.Mahajan : Industrial Organization and Production Management, Dhanpat Rai and compony
2. O.P Khanna : Industrial Engineering and Management, Dhanpat Rai and compony
3. Koontz :Essentials of Management, TMH 6/e.

S.E. (ELECTRONICS, ELECTRONICS & COMMUNICATION, ELECTRONICS & TELECOMMUNICATION)
W.E.F 2006 -2007
TERM - II

ELECTRONICS CIRCUITS AND APPLICATIONS

Teaching scheme:	Examination scheme:
Lectures : 4 hrs/week	Theory Paper : 100 Marks (3 Hours)
Practicals : 4 hrs/week	Term Work : 25 Marks
	Practical : 50 Marks

UNIT - I

Diode Application:Voltage Multiplier Circuits: Working and comparison of voltage doubler, tripler and voltage quardrupler configuration. Limitations of voltage multiplier circuits. **Clipping and Clamping circuits:** Series and parallel form of clipping circuits, biased clipper, their operation and transfer characteristics, clamping circuits.

Differential Amplifiers: Emitter coupled differential amplifier, FET differential amplifier.D.C. Analysis of BJT and FET differential amplifier, Common Mode Rejection Ratio methods used to improve CMRR. Schmitt Trigger circuit.

Lectures-10, Marks -20

UNIT - II

High Frequency, small signal BJT amplifiers: Behaviour of transistor at higher frequency, high frequency hybrid "π" CE amplifier model. CE short circuits current gain for π models. Definitions and derivations for f_α, f_β and f_γ.Technique to improve bandwidth; cascode amplifiers.

Single tuned, doubled tuned and staggered tuned amplifiers, calculation of unloaded and loaded Q, effect of staggering on bandwidth [No derivations], neutralization

Lectures-10, Marks -20

UNIT - III

Large Signal AF BJT Amplifiers: Classes of power amplifiers: Class A, Class B, Class AB. An overview and applications of Class C and Class D amplifiers. Class A with resistive load, transformer coupled Class A amplifier, Class B push-pull, Class AB, complimentary symmetry, and quasi complimentary configuration.

Efficiency analysis for Class A transformed coupled and Class B push pull amplifiers. Comparison of efficiency of other configuration, distortion in amplifiers, concept of total harmonic distortion.

Lectures-10, Marks -20

UNIT IV

Feedback Amplifiers and Oscillators: Concept of feedback, negative and positive feedback, classification of feedback amplifiers based on feedback topology [voltage, current, transconductance and transresistance amplifiers]. Advantages and Disadvantages of negative feedback. Effect of feedback on input and output impedances and bandwidth of an amplifiers. Analysis of circuit for each feedback topology.

Oscillators: Barkhausen Criterion, study of following oscillators circuits (using BJT / FET) .LC Oscillators : General form of LC Oscillators, Hartley Oscillator, Colpitts Oscillators, Clapp Oscillators, Crystal Oscillators.

Lectures-10, Marks -20

UNIT - V

Linear Voltage Regulators and Voltage References:

Block diagram of regulated power supply, series regulator, line and load regulation, output resistance Analysis of emitter follower regulator and controlled feedback type regulator. I.C. voltage regulator [IC 723]. Method for boosting output current using external series pass transistor.Protection circuits for regulator, over current protection, simple and fold back current limiting. Three terminals floating, dual and adjustable regulators. Current Boosting (LM 340, LM 320, 78XX, 74XX series) SMPS, UPS [Block Diagram and working only].

Lectures-10, Marks -20

REFERENCES:

1) Salivahanan, Kumar and Vallavraj : Electronics Device & circuits , TMH
2) Millman and Halkias: Integrated Electronics ,TMH
3) Allen Mottershead : Electronics Devices and Circuits Introduction , PHI
4) Boylestad Nashelsky : Electronics Devices and circuits, Pearson 9/e
5) Malvino : Electronics Principles , TMH

LIST OF EXPERIMENTS:

1. Emitter Coupled Differential Amplifiers Calculation of CMRR using emitter resistance.
2. In experiment 1 , emitter resistance is replace by (Constant current source) find CMRR
3. Plot frequency response of single tuned amplifiers.
4. Measure the response of Schmitt trigger circuit for a sine wave input observe Hysteresis characteristics, calculation of UTP, LTP.
5. Line and Load regulation of a series regulator.
6. Plot frequency response of voltage series feedback amplifiers calculation of bandwidth.
7. Class A transformer coupled efficiency calculation.
8. Class B push pull amplifiers efficiency calculation.
9. Oscillators circuits L C Oscillators, Hartley, Clapp/Colpitts.
10. Determination of frequency and output voltage of crystal oscillator..
11. Effect of feedback on Ri, Ro and Av for voltage series feedback amplifier.
12. Plot frequency response of stagger tuned amplifiers.
13. Complementary symmetry power amplifier, calculation of efficiency.
14. To observe & elimination of crossover distortion in complimentary symmetry class B amplifier.
15. IC LM317 for fixed out put, adjustable output ¤t regulation.
16. Low and High voltage measurement and regulation characteristics using LM723.
17. Regulation characteristics of voltage doubler circuit
18. Q point, Ad, Ac &CMRR measurement for BJT differential amplifier

The term work should include a minimum TWELVE experiments from the list.

NORTH MAHARASHTRA UNIVERSITY JALGAON

S.E. (ELECTRONICS, ELECTRONICS & COMMUNICATION, ELECTRONICS & TELECOMMUNICATION)

W.E.F 2006 -2007

TERM - II

ENGINEERING MATHEMATICS – III

Teaching Scheme:		Examination Scheme:
Lectures : 4 Hrs/Week	Theory Paper	: 100 Marks (3 Hours)
Tutorials : 1 Hr/Week	Term Work	: 25 Marks

Unit – I : Linear Differential Equations

Linear Differential equation of order n, Solution of LDE with constant coefficient, method of variation of parameters, equations reducible to linear form with constant co-efficients, Cauchy's linear equation, Legendre's linear equation. Solution of Simultaneous and Symmetric Simultaneous Differential equation Applications to electrical circuts. Lectures-10, Marks -20

Unit – II : Complex Variables

Functions of complex variables, Analytic functions, C-R equations, Conformal mapping, Billinear transformation, Residue theorem, Cauchy's Integral theorem and Cauchy's Integral formula (without proof). . Lectures-10, Marks -20

Unit – III : Fourier and Z – Transforms

Fourier Transform (FT): Fourier Intergral theorem. Sine and Cosine Integrals. Fourier ,Transform, Fourier Cosine Transform, Fourier Sine Transform and their inverses.,Problems on Wave equation.

Z Transform (ZT): Definition, standard properties (without proof), ZT of standard sequences and Inverse. Solution of simple difference equations, Applications of Z Transform to discrete system analysis.

. Lectures-10, Marks -20

Unit –IV: Laplace Transform (LT)

Definition of LT, Inverse LT. Properties and theorems. LT of standard functions. LT of some special functions viz, error, 1st order Bessel's Periodic, Unit Step, Unit Impulse and Ramp. Problems on finding LT and Inverse LT. Initial and final value theorems.Applications of LT for Network Analysis.

Lectures-10, Marks -20

Unit – V Vector Integration.

a) Applications of partial differential equations to :

1. Vibration of strings or wave equations:

$$\frac{\partial^2 y}{\partial t^2} = a^2 \frac{\partial^2 y}{\partial x^2}$$

2. One dimensional heat flow equation.

$$\frac{\partial u}{\partial t} = a^2 \frac{\partial^2 u}{\partial x^2}$$

3. Laplace equation Two dimensional heat flow equation.

$$\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$$

by separating variables only.

b) Line Integral, Surface and Volume integrals, Gauss's, Stoke's and Green's Theorems (without proof). Applications to problems in Electromagnetic Fields. Lectures-10, Marks -20

REFERENCES:

1. Erwin Kreyszig :Advanced Engineering Mathematics , John Wiley and sons
2. H.K. Dass : Advanced Engineering Mathematics , S. Chand
3. Wylie C.R. and Barrett : Advanced Engineering Mathematics , Mc Graw Hill
4. B.S. Grewal : Higher Engineering Mathematics , Khanna Publication, Delhi.
5. B.V. Raman : Engineering Mathematics , Tata Mc- Graw – Hill.
6. P.N. Wartikar and J.N. Wartikar : Applied Mathematics (Volume I & II), Pune Vidhyarthi Griha Prakashan, Pune
7. Thomas L. Harman James Dabney and Norman Richer : Advance Engineering Mathematics with MATLAB, Books/Cole, Thomson Learning 2/e
8. Dr. Gokhale, Dr. Chaudhari and Dr. Singh :Engineering Mathematics – III

S.E. (ELECTRONICS, ELECTRONICS & COMMUNICATION, ELECTRONICS & TELECOMMUNICATION)
W.E.F 2006 -2007
TERM - II
NETWORKS AND LINES

Teaching scheme:		Examination scheme:	
Lectures	: 4 hrs/week	Theory Paper :	100 Marks (3 Hours)
Tutorial	: 1 hrs/week	Term Work	: 25 Marks
Practical	: 2 hrs/week	Practical	: 25 Marks

UNIT – I

A.C. circuits and theorems – Mesh and nodal analysis, Thevenins , Nortons, Millmans, Reciprocity, and Maximum power transfer theorem.(A.C. analysis)

Graph theory and network equations – Introduction, graph, tree, co-tree and loops. Incidence matrix, cutset matrix, tieset matrix and loop currents, number of possible trees of a graph, analysis of networks, network equilibrium equations. duality general network transformation.

Lectures-10, Marks -20

UNIT – II

Resonance – Introduction , Q- factor, series resonance, selectivity and bandwidth, selectivity with variable capacitance and variable inductance, Parallel resonance, selectivity and bandwidth, Maximum impedance condition with C, L and f variable, current in antiresonance, General case resonance.

Transfer and mutual inductance, Coupling coefficient, properties of ideal transformer, impedance matching with transformer, “L” and “T” circuit impedance matching.

Lectures-10, Marks -20

UNIT – III

Four Terminal Network and Transmission Line- Two port network classification, characteristic impedance and propagation constant for symmetrical network , image and iterative impedance for asymmetrical network, Terminal impedances, reduction of complicated network into its equivalent T and π networks.

Transmission line as two port network, cascaded sections, characteristic impedance and propagation constant. Transmission line general solution, infinite line, wavelength and velocity of propagation. Line without distortion, reflection on transmission line reflection coefficient and SWR.

Lectures-10, Marks -20

UNIT – IV

Filters and attenuators – Filter fundamentals, constant k type low pass and high pass filter, m derived filter , low pass and high pass m - derived filters, Band pass and band stop filters, half section , terminating half section, composite filter.

Attenuators - symmetrical T and π attenuators, ladder type attenuators, asymmetrical T and π attenuators.

Lectures-10, Marks -20

UNIT – V

Transient response – Standard input signals, first order transients, zero input response, step response, pulse response, switched dc transients, switched ac transients, second order natural response, second order circuit equations, over damped, under damped and critically damped response, second order transients, initial conditions.

Lectures-10, Marks -20

REFERENCES:-

1) D Roy Choudhary : Networks and Systems, New Age International
2) Carlson : Circuits, Thomson publications,
3) John D. Ryder : Network Lines and Fields, Prentice Hall of India, 2/e
4) M. E. Van-Valkenburg : Network Analysis, Prentice Hall of India.

LIST OF EXPERIMENTS:-

1) Verification of Thevenins and Nortons theorem for a two port reactive network.
2) Maximum Power Transfer theorem.
3) Series and parallel resonance- BW and Q factor
4) Frequency response of constant k filters and find out cut of frequency.
5) Frequency response of m derived filters and find out cut of frequency.
6) Frequency response of band pass filter
7) Design build and test symmetrical T or Π attenuator(plot attenuation Vs RL)
8) Measurement of Zo and γ for a transmission line.
9) To study the transient response of second order circuit
10) Measurement of VSWR and effect of terminating impedance on VSWR for a transmission line and evaluation of reflection coefficient.

The term work should include a minimum EIGHT experiments from the list including at least one experiment from each unit.

NORTH MAHARASHTRA UNIVERSITY JALGAON
S.E. (ELECTRONICS, ELECTRONICS & COMMUNICATION, ELECTRONICS & TELECOMMUNICATION)
W.E.F 2006 –2007
TERM - II

ANALOG COMMUNICATION

Teaching scheme:		Examination scheme:	
Lectures	: 4 hrs/week	Theory Paper	: 100 Marks (3 Hours)
Practicals	: 2 hrs/week	Term Work	: 25 Marks
		Practical	: 50 Marks

UNIT – I

Introduction and importance of communication system: Modulation, Need for modulation, types of modulation, Noise : Internal sources of noise , external sources of noise, signal to noise ratio, noise figure , noise factor due to amplifiers in cascade , measurement of noise temperature and noise factor , Noise in reactive circuit, transit time noise, addition of noise due to several sources .

Lectures-10, Marks -20.

UNIT – II

Amplitude modulation concept : Introduction, modulation index, frequency spectrum of AM wave, power and current calculation in AM, AM generation circuits low level and high level modulation, block diagram of AM transmitter , single side band techniques, balance modulation circuits. SSB generation methods. (Filter method, phase shift, third method,) extension of SSB pilot carrier system, ISB system, VSB system.

Lectures-10, Marks -20

UNIT – III

Angle modulation concept: Introduction, modulation index, frequency spectrum of FM wave, phase modulation, comparison between PM and FM, FM modulator circuits, (direct method, basic reactance modulator, stabilizes reactance modulator, varactor diode modulator, indirect method.) pre-emphasis, de-emphasis, narrow band and wide band FM.

Lectures-10, Marks -20

UNIT – IV

AM / FM receiver : TRF receiver, super heterodyne receiver block diagram of AM and FM receiver, characteristics of receiver , (sensitivity , selectivity , fidelity, image rejection ratio, tracking), mixer stage , mixer circuits, AM detectors, AGC types , Muting circuits, Pilot carrier receiver, suppressed carrier receiver, ISB receiver, FM demodulator, Amplitude limiter , slope detector, balance slope detector, phase discriminator , ratio detector .

Lectures-10, Marks -20

UNIT – V

Types of communication channels: transmission lines, parallel wire, coaxial cable, submarine cable, wave guide, optical fiber cable.

Multiplexing: TDM, FDM, concept of radiation, electromagnetic spectrum, mechanism of propagation, ground wave, sky wave, space wave, duct, tropospheric, concept of fading and diversity reception
Introduction to TV system and introduction to telephone system.(Primary treatment only)

Lectures-10, Marks -20

REFERENCES:

1. George Kannedy and Bemard Davis : Electronics Communication System, Tata McGraw Hill.4/e
2. Robert Schoenbeck : Electronics Communication , PHI, 2/e
3. Dennis Roddy and John Coolen : Electronics Communication, Prentic-Hall of India. 3/e
4. Wayne Tomasi : Electronic Communication system, Pearson LPE 5/e
5. Taub and Schilling : Principle of communication, Tata McGraw Hill.
6. T.G.Thomas, S.Chandrashekhar : Communication theory, TMH.

LIST OF EXPERIMENTS:

1) Study of AM transmitter and calculate of modulation index of AM wave by envelope method.
2) Study of Diode detector circuit.
3) Study of FM transmitter.
4) Study of Amplitude limiter circuit.
5) Calculate gain for RF / IF stage with AGC and without AGC.
6) To plot frequency response curve for IF Amplifier.
7) Study of Phase discriminator.
8) Study of AM super heterodyne receiver.
9) Study of FM receiver.
10) Study of AM Mixer circuit. / balanced Modulator circuit.
11) Study of TV system.
12) Study of Telephone system.

The term work should include a minimum EIGHT experiments from the list.

NORTH MAHARASHTRA UNIVERSITY JALGAON
S.E. (ELECTRONICS, ELECTRONICS & COMMUNICATION, ELECTRONICS & TELECOMMUNICATION)
W.E.F 2006 -2007
TERM - II
SOFTWARE APPLICATION – I

Teaching scheme: Examination scheme:
Practical : 2 hrs/week **Term Work : 25 Marks**

Objectives:
To make the students aware of:
1. Programming practice in C for numerical methods .
2. Use of application specific software tools in the design development simulation and testing of electronic circuits .
3. Use of mathematical software packages for understanding and modeling electrical signals and linear systems .

Section- A : Numerical computational techniques:
Instruction of following techniques assited by C programme/ function implimentation of at least THREE of them is expected .
Solution of transcendental &polynomial equation, bisection method,Newton Raphson ,secant, successive methods, solution of linear equations using Gauss elimination .Gauss-Jordan methods Newton's forward and backward difference equations, interpolation, numerical integration and differentiation: trapezoidal rule Simpson's 1/3 and 3/8 rule, Euler's Method.

List of suggested assignments:
1: Program to solve numerical methods : bisection method, Newton Raphson method using users defined functions. Functions should incorporate parameter passing techniques.
2. Program using Functions to solve differential equations by Euler's modified method.
3. Program using Function to find integration by Simpson's 1/3 and 3/8 method.

Section B: Simulation of typical circuits using circuit simulation tools
(a) Transistorized circuits.
 (1) Two stage amplifiers.
 (2) Series regulatator.
 (3) Audio Driver / Audio power Amplifiers.
(b) IC Based circuits
 (1) Sequential Digital circuits.
 (2) Combinational Logic
 (3) Timer Circuit

Section C : Simulation software based Experiments / Assignments:
Assignments related to Electronics Instrumentation, Digital circuits and logics design, Analog communication, Network and lines.

REFERENCES:
W H Hayt / J E Kemmerly / S M Durbin : Engineering circuit Analysis, TMH 6/e

Note: Term work should be based on minimum SIX assignments, THREE from section A and ONE each from section B (a), B (b) and C.

Faculty of Engineering & Technology

NORTH MAHARASHTRA UNIVERSITY,

JALGAON (M.S.)

THIRD ENGINEERING (T.E.)

ELECTRONICS AND COMMUNICATION,
ELECTRONICS AND TELECOMMUNICATION
TERM – I & II

W.E.F 2007 - 2008

NORTH MAHARASHTRA UNIVERSITY, JALGAON
STRUCTURE OF TEACHING AND EVALUATION
T.E.(Electronics & Communication / Electronics & Telecommunication)

FIRST TERM

W.E.F. 2007-08

Sr. No.	Subject	Teaching Scheme Hours/week			Examination Scheme				
		Lectures	Tutorial	Practical	Paper Duration Hours	Paper	TW	PR	OR
1	*Feedback Control System	4	--	2	3	100	25	--	--
2	#Electromagnetic Engineering	4	1	--	3	100	25	--	--
3	Digital Communication	4	--	2	3	100	25	25	--
4	*Microprocessor and Micro controller System	4	--	2	3	100	25	50	--
5	*Network Analysis and Synthesis	4	1	2	3	100	25	25	--
6	*Software Application-II	--	--	2	--	--	25	--	--
	Total	**20**	**2**	**10**	--	**500**	**150**	**100**	--
	Grand Total	**32**			**750**				

SECOND TERM

Sr. No.	Subject	Teaching Scheme Hours/week			Examination Scheme				
		Lectures	Tutorial	Practical	Paper Duration Hours	Paper	TW	PR	OR
1	*Electronics Measurements	4	--	2	3	100	25	--	--
2	Power Electronics	4	--	2	3	100	25	25	--
3	*Electronics Circuit Design	4	1	2	3	100	25	50	--
4	Information Theory and Coding Techniques	4	1	--	3	100	25	--	--
5	*Analog Integrated Circuits and Applications	4	--	2	3	100	25	25	--
6	#Practical Training / Mini Project / Special Study	--	--	2	--	--	25	--	--
	Total	**20**	**2**	**10**		**500**	**150**	**100**	--
	Grand Total	**32**			**750**				

* Common with TE (Electronics)
\# Common with TE (Electronics) and T.E.(Electrical)

NORTH MAHARASHTRA UNIVERSITY JALGAON
T.E. (ELECTRONICS, ELECTRONICS & COMMUNICATION, ELECTRONICS & TELECOMMUNICATION)
W.E.F : 2007- 08
TERM - I

FEEDBACK CONTROL SYSTEM

Teaching scheme:	Examination scheme:
Lectures: 4 hrs / week	Theory Paper : 100 Marks (3 Hours)
Practicals: 2 hrs / week	Term Work : 25 Marks

Unit I

Introduction to the control system, Servomechanisms, History and Development of Automatic Control, Digital Computer Control. Mathematical Models of Physical Systems, Differential Equations of Physical Systems, Transfer Functions, Block Diagram Algebra, Signal Flow Graph. Feedback and Non-feedback Systems, Reduction of Parameter Variations by Use of Feedback, Control Over System Dynamics by use of Feedback, Control of the Effects of Disturbance Signals by use of Feedback, Linearizing effect of Feedback, Regenerative Feedback.

Lectures 10, Marks 20

Unit II

Control system components: stepper motors, servomotors, synchros, and tachometer.

Standard Test Signals, Time Response of First and Second-order Systems, Steady-state Errors and Error Constants, Effect of Adding a Zero to a System, Design Specifications of Second-order Systems, Design Considerations for Higher-order Systems. The Concept of Stability, Necessary Conditions for Stability, Hurwitz Stability Criterion, Routh Stability Criterion, Relative Stability Analysis.

Lectures 10, Marks 20

Unit III

The Root Locus Concepts, Construction Root Loci, Root Contours, Systems with Transportation Lag, Sensitivity of the Roots of the Characteristic Equation, design of lead – lag compensator using Root locus. Effect of addition of poles and zeros on root locus

Lectures 10, Marks 20

Unit IV

Correlation between Time and Frequency Response, Polar Plots, Bode Plots, All-pass and Minimum-phase Systems, Log-magnitude versus Phase Plots. Nyquist Stability Criterion, Assessment of Relative Stability Using Nyquist Criterion. Design of Basic lead / lag compensators using Bode plot. Constant M and constant N circles

Lectures 10, Marks 20

Unit V

Concepts of State, State Variables and State Model, State Models for Linear Continuous-Time / Invariant Systems, State Variables and Linear Discrete-Time Systems, Diagonalization, Solution of State Equations, Concepts of Controllability and Observability, Pole Placement by State Feedback. Linear Approximation of Nonlinear Systems,

Introduction to Fuzzy Logic Control, Neural Networks, Robotic Control System. PI, PD, PID Controller. (Primary treatment only)

Lectures 10, Marks 20

References: -

1. I.J.Nagrath and M. Gopal - Control System Engineering - New Age International Publisher. 4th Ed.
2. Katsuhiko Ogata - Morden Control Engineering - Pearson Education Publication, Fourth Edition.
3. Ashok Kumar - Control System - Tata McGraw-Hill Publishing Company.

4. R. Ananda and P. Ramesh Babu - Control System Engineering - SciTech Publications (India)

List of Practicals:

1) Determine Magnitude and phase plot of lead electrical network.
2) Determine Magnitude and phase plot of lag electrical network.
3) Determine transient response of RLC Electrical network.
4) Study AC position control of Servomotor.
5) Study DC position control of Servomotor.
6) Study of flow control using PID controller (Simulation)
7) Study of synchros to observe angular displacement.
8) Study of stepper motor
9) Study of tachometer

Note: Minimum EIGHT practicals are to be performed

NORTH MAHARASHTRA UNIVERSITY JALGAON

T.E. (ELECTRONICS, ELECTRONICS & COMMUNICATION, ELECTRONICS & TELECOMMUNICATION, ELECTRICAL)

W.E.F : 2007- 08

TERM – I

ELECTROMAGNETIC ENGINEERING

Teaching scheme:	Examination scheme:
Lectures : 4 hrs / week	Theory Paper : 100 Marks (3 Hrs)
Tutorial : 1 hrs / week	Term Work : 25 Marks

UNIT I

Electrostatics:- Coulomb's law, Electric field due to line charge, Sheet charge and volume charge densities, Electric flux density, Gauss's law and Divergence theorem. Energy, Potential and Work-done, Potential gradient.Dipole and its electric field, Dipole movement. Energy density in electrostatic field.

Lectures 10, Marks 20

UNIT II

Conductor, Dielectrics and Capacitance:- Current and current density. Current continuity equation, Properties of conductors, Boundary conditions. Energy stored in capacitors, Poisson's and Laplace's equation's, Capacitance between parallel plates and co-axial cable using Laplace's equation.

Lectures 10, Marks 20

UNIT III

Magnetostatics:- Biot-Sarverts law and its vectorial form, Magnetic field due to infinitely long current carrying conductor ,Ampere's Circuital law. Application to co-axial cable. Curl operator, Magnetic flux density, Stoke's theorem. Scalar and Vector magnetic potential. Lorentz's Force equation. Energy stored in magnetic field.

Lectures 10, Marks 20

UNIT IV

Time Varying Fields:- Faradays law , Maxwell's equations (Differential , Integral and Phasor forms). Uniform plane waves. Representation of wave motion in free space, perfect dielectrics and Lossy dielectrics (Wave equations). Poyinting Theorem and Power density. Propagation in good conductor and Skin effect. Reflection of Uniform plane waves. VSWR.

Transmission Line: - Impedance matching ,Single stub and Double stub transmission line. Introduction to Smith Chart.

Lectures 10, Marks 20

UNIT V

Radiation and antennas: - Radiation resistance. Radiation pattern. Calculation of Radiation resistance for short dipole, Short monopole, Half-wave dipole and Quarter-wave monopole antennas. Directivity, Reciprocity between Transmitting and Receiving antennas, Hertzian dipole, Vector retarded potential.

Types of Antennas: - Folded dipole, Yagi-uda, Horn antenna, Parabolic and Cassegrain feed antenna. Broadside, End fire, Binomial, Tchebysheff antenna arrays. Principle pattern multiplication, General pattern of two isotropic radiators.

Lectures 10, Marks 20

References:

1) W. Hayt - Engineering Electromagnetics , TMH. (5th or 7th edition).
2) K. D. Prasad - Antenna and Wave Propagation, Satya Prakashan.
3) Guru and Hizirogli - Electromagnetic field theory fundamental, Thomson Publication
4) Narayan Rao - Basic Electromagnetics with application, PHI
5) J D Kraus - Electromagnetics, MGH ,4th edition.

Termwork:- Assignment will be based on the problems on EACH unit . (min.FIVE Assignments).

NORTH MAHARASHTRA UNIVERSITY JALGAON
T.E. (ELECTRONICS & COMMUNICATION, ELECTRONICS & TELECOMMUNICATION)
W.E.F : 2007- 08
TERM - I
DIGITAL COMMUNICATION

Teaching scheme:	Examination scheme:
Lectures : 4 hrs / week	Theory Paper : 100 Marks (3 Hours)
Practicals : 2 hrs / week	Term Work : 25 Marks
	Practicals : 25 Marks

UNIT I

Spectral Analysis and Sampling :- Fourier series and fundamentals, The Fourier transform, signal spectra, Energy density spectrum, Power density spectrum, Auto and cross correlation functions, properties of Fourier transform, Parseval's theorem, Rayleigh Energy theorem, LTI system response and distortion less transmission, Band limited and time limited signals, sampling theorem in frequency domain and time domain, Nyquist criteria, Reconstruction using inter polation filters, Ideal, natural, flat top sampling, Aperture effect,

Lectures 10, Marks 20

UNIT II

Random Variables and Processes :- Probability theory fundamentals, Bays theorem, Random variables, discrete and continuous random variables, probability density function, cumulative distribution function properties, standard models like Poisson, Binomial, Rayleigh, Gaussian,UDF. Central limit theorem, Mean moment, variance.

Random Processes: Mathematical definition, stationary process, Mean, correlation, co-variance function, Ergodic process, transmission of random process through LTI filter, Gaussian process, power spectral density, Noise , Narrow band noise.

Lectures 10, Marks 20

Unit III

Waveform Coding and Synchronization : Pulse code modulation; PCM generation and reconstruction, Quantization, Quantization error , Non – uniform Quantization and companding – PCM with noise Error threshold. Delta modulation, Delta- sigma modulation , Adaptive delta modulation, Differential PCM – LPC speech synthesis. Data encoding formats, Digital Multiplexers. ISI, Eye diagram , Bit synchronizer, Early late synchronizer , scrambling and un scrambling , carrier recovery.

Lectures 10, Marks 20

UNIT IV

Digital Continuous Wave Modulation Technique : Introduction BPSK, Differential PSK, DEPSK, Quadrature PSK, M- ary PSK, Quadrature Amplitude shift keying, Binary frequency shift keying , minimum shift keying, GMSK, $\pi / 4$ QPSK.

NON-coherent detection of FSK, DPSK, QPSK, calculation of error probability of BPSK and BFSK.

Lectures 10, Marks 20

UNIT V

Performance Analysis of Digital Signals and Spread Spectrum. : Baseband signal receiver, probability of error, optimum filter, White noise - matched filter. Properties, probability of error of match filter. Spread spectrum: PN sequence DSSS with coherent BPSK, signal space representation and processing Gain, Probability of error, Frequency hopped spread spectrum. Introduction to multiple

Access Techniques: TDMA, FDMA and CDMA.

Lectures 10, Marks 20

References :

1) A B Carlson – Communication Systems (MGH 4th Edition)
2) Simon – Digital Communication Techniques , PHI
3) Amitabh Bhattacharya – Digital Communication (TMH)
4) Taub and Schilling – Principle of Communication Systems (TMH) 2nd ed
5) Das Mullick, Chatterjee – Principle of Digital Communication (New Age)
6) Proakis – Digital Communication (MGH 4 th Edition)
7) S.K.Venkataram - Digital Communication , S. Chand

List of Practicals

1) Verification of sampling theorem. PAM techniques. (Flat top and natural sampling) Effect of variable sampling rate, filter cut off , reconstruction of original signal using filter , aliasing effect
2) Study of DM , ADM , Techniques ,observation of effect of slope over load , granular noise and SNR measurement
3) Companded PCM (using A- Law) Plot quantization curve. SNR measurement ,
4) Generation and reception of QPSK in presence of noise
5) Generation and detection of FSK
6) Generation and detection of Quadrature Amplitude shift keyng
7) Study of line codes (NRZ, RZ, polar RZ, bi polar (AMI), Manchester) and spectral analysis
8) Generation and detection of DSSS coherent BPSK and spectral analysis.
9) Noise analysis using any software tool (use of any discrete distribution). Find response by changing parameters
10) Noise analysis using any software tool (use of any continuous distribution). Find response by changing parameters

Note: Minimum EIGHT practicals are to be performed, out of which minimum TWO practical using software tools are compulsory

NORTH MAHARASHTRA UNIVERSITY JALGAON

T.E. (ELECTRONICS, ELECTRONICS & COMMUNICATION, ELECTRONICS & TELECOMMUNICATION)

W.E.F : 2007- 08

TERM - I

MICROPROCESSOR AND MICROCONTROLLER SYSTEM

Teaching scheme:	Examination scheme:
Lectures : 4 hrs / week	Theory Paper : 100 Marks (3 Hours)
Practicals : 2 hrs / week	Term Work : 25 Marks
	Practical : 50 Marks

UNIT I

Introduction to microprocessor and microcomputer system, functional pin diagram and detailed architecture of 8085 microprocessor, Demultiplexing of address / data bus, Generation of control signals, Instruction Set, Addressing modes. Programming for arithmetic and logical operation. Subroutine concepts.

Lectures 10, Marks 20

UNIT II

Functional pin diagram and architecture of 8031 / 51 microcontroller, Port structure, Instruction Set and assembly language programming.

Lectures 10, Marks 20

UNIT III

Timer / counter, modes of operation, Programming timer / counter.

Interrupt structure and Interrupts programming.

Serial communication programming in 8051 (only Standard 8-Bit UART Mode).

Memory interfacing (RAM, ROM, EPROM) - Basic concept in memory interfacing and address decoding.

Lectures 10, Marks 20

UNIT IV

Programmable Peripheral Interface (8255) – Block diagram, control words and modes and Interfacing.

Interfacing to external RAM and ROM, LED, Switch, 7-Segment display, Multiplexed 7-Segment display, Matrix Key-Board, Liquid Crystal Display, DAC, ADC, Stepper Motor with programs.

Lectures 10, Marks 20

UNIT V

Buses and Protocols – RS 232, RS 485, I^2C, MODBUS, IEEE 488.

Interfacing to EEPROM 93C46 / 56 / 66, 24C16 / 32 / 64, RTC DS1307.

Conceptual study of various derivatives of 8051 microcontroller from different manufacturers like Atmel, Phillips etc. Introduction to PIC microcontroller.

Lectures 10, Marks 20

References:

1. Gaonkar - Microprocessor Architecture , PHI.
2. Kenneth J. Ayala - 8051 Microcontroller, PHI.
3. Mazidi and Mazidi - The 8051 Microcontroller and Embedded Systems, Pearson.2nd ed
4. Mike Predko - Programming and Customizing 8051 micro controller, TMH.

List of Practicals:

1. Study of 8051 / 8085 assembler and Simulator.
    a) This is to be studied by writing program for addition / subtraction, multiplication / division.
    b) Executing external memory related instructions using MOVC / MOVX instruction (8051 only) *OR* Executing input / output or memory mapped input output related instructions (8085 only)
2. Writing a program which involves following any TWO (one using 8051and one using 8085):
    a) Celsius to Fahrenheit or Fahrenheit to Celsius conversion.
    b) Calculation of factorial.
    c) Multiple digit BCD arithmetic.
3. Write and Execute program to flash LED.
4. Write and Execute program to display 0 to 9 continuously on 7-Segment display,
5. Write and Execute program to demonstrate interfacing of 4 X 4 matrix Key-Board.
6. Write and Execute program to demonstrate interfacing of multiplexed 7-Segment display.
7. Write and Execute program to demonstrate interfacing of Liquid Crystal display.
8. Write and Execute program to demonstrate interfacing of DAC.
9. Write and Execute program to demonstrate interfacing of ADC.
10. Write and Execute program to demonstrate interfacing of Stepper Motor.
11. Write and Execute program to demonstrate Serial data Transmission.
12. Write and Execute program to demonstrate Serial data Reception.
13. Write and Execute program to demonstrate interfacing of Serial EEPROM 93C14 / 56 / 66 or 24C16 / 32 / 64.
14. Write and Execute program to demonstrate interfacing of RTC DS1307.

Note:

1. Experiments 3 to 14 should be performed with 8051 / 89c51 / 89c51RD2 kits using Assembler and downloading program.
2. Minimum EIGHT practicals are to be performed

NORTH MAHARASHTRA UNIVERSITY JALGAON
T.E. (ELECTRONICS, ELECTRONICS & COMMUNICATION, ELECTRONICS & TELECOMMUNICATION)
W.E.F : 2007- 08
TERM - I
NETWORK ANALYSIS AND SYNTHESIS

Teaching scheme:		Examination scheme:	
Lectures	: 4 hrs / week	Theory Paper	: 100 Marks (3 Hours).
Practical	: 2 hrs / week	Term Work	: 25 Marks
Tutorial	: 1 hr / week	Practical	: 25 Marks

UNIT I

Concept of complex frequency, Characteristics of signals, standard signals, Laplace transform: Definition, Advantages in Network Analysis , Laplace Transform of waveforms , Network Analysis using Laplace Transform, Mesh Analysis. Node analysis , Thevenin Theorem and Nortons Theorem, Initial and final value theorem System Function, Impulse and state response of networks. , illustrative examples.

Lectures 10, Marks 20

UNIT II

System and Network Functions : Driving point admittance and impedance- Transfer impedance and admittance, voltages and current transfer Ratio, illustrative examples.

Natural frequencies, Poles and zeros in Network functions, significance of poles and zeros. Necessary conditions of driving point function and transfer function. Network with OP-Amps, Time domain behavior from poles and zeros plot in S domain.

Lectures 10, Marks 20

UNIT III

Two Port Networks Parameters: Z Parameter, Y parameter, h – parameter, ABCD parameter, Equivalent circuit using these parameters. Condition for reciprocity and symmetry of two port network in different parameters. Interconnection of two port networks. Cascade connection of two port networks parallel connection of two port networks. Series and series parallel connections. Inter conversion of parameters.

Lectures 10, Marks 20

UNIT IV

Synthesis of One and Two Port Networks : Hurwitz polynomials, positive Real functions. Synthesis of one port networks. Properties of LC immittance function, synthesis of LC driving point immittance, properties of RC driving point impedance or RL admittance, properties of RL impedances and RC admittances. Synthesis of RL , RC , LC , RLC functions. Synthesis in all Cauer / Foster form

Elements of Transfer function synthesis. Transfer function synthesis of two port networks.

Properties of transfer functions, zeros of transmission . synthesis of Y_{21} and Z_{21} and synthesis of constant resistance network.

Lectures 10, Marks 20

UNIT V

Filter Design: Frequency domain approximation of ideal low pass filter, Butterworth approximation, Tchebyshev approximation, synthesis of low pass filter, magnitude and frequency normalization, frequency transformation to generate high pass, band pass filter and band elimination filter from normalized LPF.

Lectures 10, Marks 20

References:

1) Van- Vakenberg - Introduction to Modern Network Synthesis , PHI / Pearson 3rd ed
2) Franklin Kuo - Network Analysis and Synthesis
3) J Michael Jacob - Application of Design with Analog Integrated circuit , PHI 2nd ed
4) Gobind Daryanani - Principles of Active Network Synthesis and Design , Wiley
5) C P Kuriakose - Circuit Theory ; Elements of Network System , PHI
6) D Roy Chaudhary - Network and System , New Age
7) V K Atre - Network Theory and Filter Design, New age

List of practicals

1) Verify the Thevenin's theorem for given two port reactive circuit.
2) Determine transfer / driving point Impedance of given Two port reactive N/w.
3) Determine voltage and current transfer function of a given two port reactive N/w.
4) Determine pole - zero plot of given one port reactive N/w.
5) Determine Z parameter of networks connected in series.
6) Determine Y parameter of networks connected in parallel
7) Determine transmission parameter of networks connected in cascaded form.
8) Design and test low pass Butterworth filter
9) Design and test high pass Butterworth filter
10) Design and test low pass Tchebyshev filter

Note :- Minimum EIGHT practicals are to be performed..

NORTH MAHARASHTRA UNIVERSITY JALGAON
T.E. (ELECTRONICS , ELECTRONICS & COMMUNICATION, ELECTRONICS & TELECOMMUNICATION)
W.E.F : 2007- 08
TERM – I

SOFTWARE APPLICATION -II

Teaching scheme:	Examination scheme:
Practical : 2 hrs / week	Term Work : 25 Marks

Objectives:
Introduction to the various software tools in the design, simulation and testing of electronics circuits.

Section A:
Simulation of analog circuits using any software tool:
1) To find voltage and current of the given network using simulation tool.
2) To find transfer / Driving point impedance of two port network.
3) To design and test active filter.
4) Frequency domain analysis of given filter.

Section B:
Simulation of control system using any software tool:
1) To find the pole zero plot of the given network.
2) To find the polar / Nyquist plot of the given network.
3) To design and check any control system.
4) To obtain transient response and characteristics of any given network.

Section C:
Simulation of Radiation Patterns using any software tool:
To find the radiation pattern any four types of antennas and study the effects of varying parameters.

Note: Minimum SIX assignments, TWO from EACH section.

References :

i. RASHID - PSPICE
ii. Stephen Chapman - Matlab programming for Engineer, Thomson.
iii. Manuals / Books of concern software tools.

NORTH MAHARASHTRA UNIVERSITY JALGAON
T.E. (ELECTRONICS, ELECTRONICS & COMMUNICATION, ELECTRONICS & TELECOMMUNICATION)
W.E.F : 2007- 08
TERM – I I
ELECTRONICS MEASUREMENTS

Teaching scheme:
Lectures : 4 hrs / week
Practical : 2 hrs / week

Examination scheme:
Theory Paper : 100 Marks (3 Hours).
Term Work : 25 Marks

UNIT I

Analog instruments:

LCR-Q meter, True RMS meter, vector voltmeter, RF power and voltage measurement, Electronic multimeter, Amplified DC meter, AC voltmeter using rectifiers, Vector impedance meter, Output power meter, Field strength meter, Automatic bridge transmitter, Analog Ph meter, Bolometer method for power measurement.

Lectures 08, Marks 20

UNIT II

Digital Instruments

Microprocessor controlled bridges, Digital Readout Bridges, Digital counters and timers, Basic counter circuitry, main gate, Time base control circuit, Frequency measurement, measurement errors, Ratio of frequency measurement, Automation in digital instruments (Auto zeroing, auto polarity etc), Digital tachometer, Digital Ph meter, Phase meter, capacitance meter

Lectures 08, Marks 20

UNIT III

Signal Generators and Analyzers:-

Sine wave generator, Fixed Frequency AF Oscillator, Frequency synthesized signal generator, Random noise generator, sweep generator, Sweep marker generator, Colour bar generator, Vectroscope, Function generator.

Basic wave analyzer, Frequency selective wave analyzer, heterodyne wave analyzer, harmonic distortion analyzer, spectrum analyzer, Digital Fourier analyzer, logic analyzer, signature analyzer, OTDR meter, Wobbuloscope.

Lectures 10, Marks 20

UNIT IV

Oscilloscope:-

Introduction, principle, feature, block diagram, vertical amplifier, sweep types , delay line types , CRT diagram, CRT basics, PDA Tubes, dual beam CRO, dual trace CRO, VHF oscilloscope , VLF signal scope (analog storage and digital storage scopes), digital read out scopes, probes for CRO, attenuators, applications of CRO, fiber optic CRT, recording oscilloscope, hall effect probe , power scope.

Lectures 14, Marks 20

UNIT V

Data Aquisition, Conversion and Transmission:

Instrumentation system, interfacing transducer to electronic control, objectives of DAS , single channel multi channel DAS, ATS, computer based testing of audio amplifier ,radio receiver, data loggers, digital transducers. Data transmission systems, advantages and disadvantages of digital over analog transmitter, TDM, etc.

Lectures 10, Marks 20

References:

1) Helfrick and Cooper – Modern Electronics Instrumentation and Measurement Techniques , Pearson
2) Deoblin – Measurements systems: Applications and Design , TMH 5th ed
3) Nakra , Choudhari -- Instrumentation Measurements and analysis , 2/E TMH
4) H. S. Kalsi – Electronics Instrumentation, TMH 2nd ed

List of Practicals :

1) Measurement of reactive and resistive components with LCR Q meter.
2) Study of true RMS meter / DMM for measurement of EMS value of any AC signal.
3) Measurement of frequency Time with the help of frequency counter.
4) Study of Digital Tacho meter for measurement of motor speed .
5) Measurement of distortion and nature of distortion by harmonic distortion analyzer.
6) Study of spectrum analyzer for its application.
7) Measurement techniques using CRO (frequency, amplitude, phase, time and component tester).
8) Study of DSO to measure and store frequency and amplitude.
9) Study of DATA loggers for various parameter measurement.
10) Study of computerized analysis of radio receiver and measurement of power with it.
11) Study of ATS

Note :- Minimum EIGHT practicals are to be performed.

NORTH MAHARASHTRA UNIVERSITY JALGAON
T.E. (ELECTRONICS & COMMUNICATION, ELECTRONICS & TELECOMMUNICATION ENGINEERING)
W.E.F 2007 –2008
TERM – II
POWER ELECTRONICS

Teaching scheme:
Lectures: 4 hrs / week
Practical: 2 hrs / week

Examination scheme:
Theory Paper: 100 Marks (3 Hours)
Term Work: 25 Marks
Practical: 25 Marks

UNIT I

Power Devices : S.C.R. Structure, characteristics, transistor Analogy , ratings, R , RC, UJT Triggering, dv / dt and di / dt protection. Structure and characteristics of IGBT, GTO, FCT, MCT, Electrically isolated drive circuit for IGBT and MOSFET.

Lectures 10, Marks 20

UNIT II

Line Frequency Controlled Rectifiers : Natural and Line commutation, single phase, Half and full controlled bridge rectifier with R load, Circuit diagram, waveforms, average load voltage, efficiency, Ripple factor, Form factor. Single phase Half and fully controlled bridge rectifiers with inductive load, circuit waveforms, average output voltage, RMS load voltage, average load power, active power, reactive power, current distortion factor, displacement factor, input power factor, Effect of source inductance. 3 - ф Half and fully controlled bridge rectifier with highly inductive load, circuit, operation and waveform, derivation of average and rms load voltage.

Lectures 10, Marks 20

UNIT III

DC – DC Converter Control of dc - dc- converter, step – down and step - up dc-dc converter, circuit diagram, waveform, output voltage calculations. Continuous conduction mode, boundary between continuous and discontinuous conduction.

Full bridge dc-dc converter– PWM Bipolar voltage switching. Switch mode power supply – Block diagram , control of SMPS – voltage feed forward control, current mode control, power supply protection. Electrical isolation in feedback loops.

Lectures 10, Marks 20

UNIT IV

DC – AC Inverters: Parallel inverters, principle of operation, 1 – ф Half bridge and full bridge inverters with R and R-L load, square wave and sinusoidal PWM switching, selection of frequency modulation ratio and amplitude modulation ratio. Harmonic analysis of square and quasi – square waveform, Harmonic load current, Harmonic reduction.

3 - ф Bridge inverter with balanced star resistive load, 120 degree and 180 degree conduction sinusoidal PWM switching scheme and Harmonic spectrum.

Lectures 10, Marks 20

UNIT V

AC Controllers and Application Principle of integral cycle and phase angle control. 1 ф Half wave and full wave AC control with R and R -L load, derivation of output Voltage. 3 - ф Half and full wave AC control, circuit diagram, waveforms and operation.UPS- configurations, Battery- Ah, back up time and battery charger rating calculations. Study of speed control of DC motor, speed control of AC motor.

Lectures 10, Marks 20

References:

1. M.H. Rashid - Power Electronics circuits, devices and applications, PHI, 3/e . Or Pearson
2. Ned Mohan, T.M. Undeland and W.P. Robbins- Power Electronics, converters , Application, and Design , John willey and sons , 3/e
3. M.S. Jamil Asgar, - Power Electronics , PHI, 2004, New Delhi.
4. S.K. Bhattacharya - Industrial Electronics and control , Tata Mc-graw-Hill (TMH)
5. M Ramamurthy - An Introduction to Thyristor and their application, Second Edition,
6. M.D. Singh , K.B. Khanchandi - Power Electronics, TMH
7. Deodatta Shingare , Industrial and Power Electronics, Electrotech Pub.

LIST OF Practicals :

Group A

1) Study of R , RC and UJT triggering circuits of SCR to plot waveforms for various values of firing angle..
2) Implement optically isolated driver circuit for IGBT and MOSFET.
3) Study of 1 - ϕ Half controlled Bridge rectifier with R and RL Load , plot input and output voltage waveforms ,average load voltage v/s firing angle.
4) Study of 1- ϕ full controlled bridge converter with R and R-L load , plot input and output voltage waveforms ,average load voltage v/s firing angle.
5) Study of circuit and waveforms of step-down dc –dc converter and plot output voltage v/s duty ratio and switching frequency.
6) Study of circuit and waveforms of step-up dc –dc converter and plot output voltage v/s duty ratio and switching frequency.
7) Plot characteristics of IGBT, GTO .

Group B

8) Find Line and load regulation of SMPS.
9) Study of Parallel Inverter and find efficiency.
10) Study of I- ϕ full bridge inverter and find efficiency.
11) Study of 3- ϕ Bridge inverter and find efficiency.
12) Study of UPS
13) Study of 1- ϕ AC controller with R load and measure load voltage and plot waveforms for different firing angles
14) Study of 3- ϕ AC controller with R load and measure load voltage and plot waveforms for different firing angles

.

Note :- Minimum EIGHT practicals are to be performed.(Minimum FOUR practicals from EACH group)

NORTH MAHARASHTRA UNIVERSITY JALGAON
T.E. (ELECTRONICS, ELECTRONICS & COMMUNICATION, ELECTRONICS & TELECOMMUNICATION)
W.E.F : 2007- 08
TERM – I I
ELECTRONICS CIRCUIT DESIGN

Teaching scheme:		Examination scheme:	
Lectures	: 4 hrs / week	Theory Paper	: 100 Marks (3 Hours)
Practicals	: 2 hrs / week	Term Work	: 25 Marks
Tutorial	: 1 hr / week	Practical	: 50 Marks

UNIT I

Design of Power Supplies : Design of Unregulated power supply , selection of transformer, diodes, capacitors , calculation of surge resistance (using bridge rectifier) Design of Discrete series regulated power supply with protection circuit , design of regulated power supply using IC LM- 340 series, design of Dual power supply using LM-317 and LM 337 IC's., Design of switching regulators , Buck regulator , Boost regulator, and Buck – Boost using switching regulator IC – LM 1577 / 2577 . Heat sink calculations for power supplies.

Lectures 10, Marks 20

UNIT II

Design of Small Signal (Voltage) Amplifier BJT / FET : Design of Bias circuits (BJT / FET) Design of single stage amplifiers (CE / CS , CG / CB / CC / CD) Use of negative feedback : feedback amplifier design. Designing of negative feedback amplifiers : voltage series , voltage shunt, current series, current shunt

Lectures 10, Marks 20

UNIT III

Design of Large Signal (power) Amplifiers: Class - A, class - B, Class - AB , Push-pull amplifier, complementary symmetry amplifiers , Monolithic power amplifier design using IC LM-379.

Lectures 10, Marks 20

UNIT IV

Design of High Frequency Amplifier : Design of Tuned amplifier BJT / FET single tuned , double tuned. Use of auto transformer (Tapped - inductor) High frequency, cascode amplifier. Design of oscillator circuits : Clapp, Colpitt , Hartley oscillaotor, Design of switching circuits: Astable multivibrator, Monostable multivibrator, Bistable multivibrator.

Lectures 10, Marks 20

UNIT V

Design using Analog Integrated Circuits. : Single supply amplifiers (AC inverting, AC Non inverting amplifiers) , instrumentation amplifier AD – 620 , V - I converter, I - V converter, V - F, F - V, converters.

Current amplifiers. Design of Non-linear circuits: Voltage comparators , peak detectors. , True RMS converter. Sallen-key active filter design: Second order Sallen-key low pass, high pass, band pass, band reject, unity gain and equal component circuit design for Butterworth, Chebyshev response. Higher order filter design.

Lectures 10, Marks 20

References:

1) M.M. Shah - Design of Electronics Circuits and Computer Aided Design , Wiley Eastem
2) Goyal , Khetan - Monograph on Electronics Design Principles , Khanna Pub.
3) Michael Jacob - Application and Design with Analog Integrated Circuits , PHI 2/e
4) Sergio Franco – Design with OP-AMP and Analog Integrated Circuits, TMH , 3/e.
5) Bell - Electronics Devices and Circuits, PHI or Pearson 4/e

6) Martin S Roden , Gordon – Electronics Design ,Shroff Pub. - 4/e.
7) Bell – Solid State Pulse Circuits , PHI 4/e
8) K.V.Ramanan - Functional Electronics, TMH

LIST OF Practicals :

UNIT – I

1) Design of Regulated power supply.
   a) Transformer selection.
   b) Rectifier (Bridge)
   c) Filter Designing (Capacitor)
   d) Transistor series Regulator (Feedback type) with current protection circuit (or) Design of Regulated power supply using IC LM 340 series.
2) Design of switching regulator circuit using switching Regulator IC LM1577 / 2577

UNIT – II

3) Design of single stage amplifier circuits using BJT / FET
   a) Inverting / non inverting amplifier.
   b) Self bias for BJT and potential divider for FET.
   c) Calculation of Performance parameters like A_v, R_i and R_o
4) Design Test and verify the negative feedback amplifier circuits using BJT / FET
   a) Design biasing network
   b) Feedback network
   c) Calculation of performance parameters like A_{vf}, R_{if} and R_{of}

UNIT – III

5) Design and Testing of monolithic power amplifier using IC LM 379
   a) Designing of External Components required.
   b) Measurement of output power.
6) Design of Transformer less class B push pull amplifier using BJT. For
   a) With cross over Distortion.
   b) Elimination of Cross over distortion.

UNIT – IV

7) Design the single stage tuned amplifier using BJT / FET for given center frequency.
   a) Design of biasing circuit
   b) Designing of tuned circuit
   c) Calculations and verification of f_o and Bandwidth.
8) Design of Astable multivibrator using BJT
   a) Selection of Transistor
   b) Design of all external components.
   c) Calculation and verification of desired output frequency and amplitude of output voltage.

UNIT – V

9) Design of Inverting / Non inverting single supply amplifier using LM 324
   a) Designing of Biasing circuits
   b) Verification of the given gain and input impedance.
10) Designing of Instrumentation Amplifier using AD 620
   a) Designing of External components for given value of gain.

   OR

   Design of voltage to frequency converters using IC AD 537 for given requirements and verification of the same.
11) Design and test a sallen – key second order low pass / high pass filter for given specifications.
12) Design and test a sallen – key second order band pass filter for given specifications.

NOTE : 1) Minimum FIVE practicals are to be performed ,at least ONE from EACH unit.
2) EACH experiments should be carried out in TWO turns. In FIRST turn designing

calculations are expected and in SECOND turn a complete circuit or major part of it be implemented.

3) Design using BJT must be carried out using h- parameters only.

NORTH MAHARASHTRA UNIVERSITY JALGAON

T.E. (ELECTRONICS & COMMUNICATION, ELECTRONICS & TELECOMMUNICATION)

W.E.F : 2007- 08

TERM – I I

INFORMATION THEORY AND CODING TECHNIQUES

Teaching scheme:	Examination scheme:
Lectures : 4 hrs / week	Theory Paper : 100 Marks (3 Hours)
Tutorial : 1 hrs / week	Term Work : 25 Marks

UNIT I

Information Theory and Channel Capacity : Introduction , Uncertainty, Information and Entropy, source coding theorem, Shannan fano algorithm data compaction, Discrete memory less channels, Mutual Information, channel capacity, channel coding theorem, differential entropy and mutual information for continuous ensembles . Information capacity theorem, Implication of the information capacity theorem, information capacity of colored noise channels, rate distortion theory, data compression.

Lectures 10, Marks 20

UNIT II

Error Control Coding : Introductions to error correcting codes, basic definitions, matrix description of linear block codes, equivalent codes . Parity check matrix, decoding of linear block codes, syndrome decoding , error probability after coding , perfect codes, hamming codes , optimal linear codes , maximum distance separable codes. Introduction to cyclic codes polynomials. The division algorithm for generating cyclic codes, matrix description of cyclic codes, Burst error correction, fire codes, golay codes, Cyclic Redundancy check codes, circuit implementation of cyclic codes . FEC and ARQ systems.

Lectures 10, Marks 20

UNIT III

Convolutional Codes and Coding Methods : Introduction to convolutional codes, Tree codes and trellis codes, polynomial description of convolutional codes, distance notions for convolutional codes, Generating functions, Matrix Description of convolutional codes, viterbi Decoding of convolutional codes, distance bounds for convolutional codes, Turbo codes, Turbo decoding, Introduction to TCM , concept of coded modulation. Mapping by set partitioning, ungerboecks TCM design rules, TCM decoder Performance evaluation for AWGN channel. Burst error correcting Codes,

Lectures 10, Marks 20

UNIT IV

Application of Information Theory : Introduction to BCH codes, primitive elements, Minimal polynomials, Generate polynomials in terms of Minimal polynomials, same examples of BCH codes, Reed solemen codes, implementation of Reed Solomon encoders and decoders. Data compression. Introduction to data compression, The JPEG standards for loss less compression. Introduction to crypto graphy. Overview of encryption Techniques. RS algorithm, application of information theory. An optimum modulation system. Comparison of Amplitude modulation system with optimum system. Feedback communication system.

Lectures 10, Marks 20

UNIT V

Communication Link Design : Introduction to multi-user radio communications . Multiple Access Techniques. Introduction to satellite communication , Radio link analysis, wireless communication , statistical characteristics of multipath channels. Binary signaling, Over a Rayleigh fading channel . TDMA and CDMA wireless communication systems, wireless standards IS 95.

Lectures 10, Marks 20

References:

1. Ranjan Bose - Information Theory Coding and Cryptography, TMH
2) Taub and Schilling - Principle of Communication Systems, (TMH) 2nd edition.
3) J. Das , K Mulik, P.K. Chatterjee - Principle of Digital Communication , (New Age Int.)
4) Theodore S. Rappaport - Wireless Communication – Principles and practice ,(Pearson Ed) 2nd Ed..
5) J.G. Proakis - Digital Communications, (MGH), 4th Ed.

Note: - Assignment will be based on the problems on EACH unit . (min.FIVE Assignment)

NORTH MAHARASHTRA UNIVERSITY JALGAON
T.E. (ELECTRONICS, ELECTRONICS & COMMUNICATION, ELECTRONICS & TELECOMMUNICATION)
W.E.F : 2007- 08
TERM – I I

ANALOG INTEGRATED CIRCUITS AND APPLICATIONS

Teaching scheme:	Examination scheme:
Lectures : 4 hrs / week	Theory Paper : 100 Marks (3 Hours)
Practicals : 2 hrs / week	Term Work : 25 Marks
	Practicals : 25 Marks

UNIT I
Op-amp Basics

Block diagram of op-amp, differential amplifier, various configurations, dc and ac analysis, constant current bias circuits, current mirror, active load, dc level shifter, output stage, op-amp symbol, packages, 741 op-amp pin diagram, overview of general purpose and special purpose op-amp, their peculiarities and application areas, FET op-amp, MOSFET op-amp.

DC parameters: definitions and typical values, input bias current, input offset current, input offset voltage, offset voltage and bias current compensation, thermal drift, A.C. parameters: frequency response, stability of op-amp, frequency compensation, internally compensated op-amp, slew rate, its effect on op-amp output, gain bandwidth product, rise time, full power bandwidth, CMRR, SVRR, open loop and close loop operation of op-amp, ideal op-amp, practical op-amp, inverting and non inverting amplifier, and analysis using ideal and practical op-amp, concept of virtual ground.

Lectures 10, Marks 20

UNIT II

Op-amp Applications

Voltage follower, difference amplifier, summing amplifier, substractor, adder-substractor, peaking amplifier, instrumentation amplifier using 3 op-amp and its applications, linearization, isolation techniques, monolithic instrumentation op-amp IC AD 5219 (pin and functional diagram), ac amplifier, dc amplifier, V to I (floating and grounded load) and I to V converter, its applications, integrator and differentiator, their practical considerations.

Half wave and full wave Precision rectifiers, clipper, positive and negative clamper, peak detector, sample and hold circuit, IC LF398 (pin and functional diagram), log and antilog amplifier, Analog multiplier and divider.

Lectures 10, Marks 20

UNIT III

Comparators and Signal Generators

Inverting and non inverting comparator, zero crossing detector, window detector, Schmitt trigger, its advantages, limitation of op-amp as comparator, comparator IC study LM311, introduction to OTA.

Square wave generator, monostable multivibrator, triangular wave and sawtooth wave generator, sine wave generator, phase shift oscillator, Wien bridge oscillator.

Timer IC 555: Functional diagram, monostable operation, astable operation, applications. Function generator IC 8038.

Lectures 10, Marks 20

UNIT IV

PLL and Audio Power Amplifiers

V to F converter, IC AD537. F to V converter, IC LM 2917. PLL: basic principles, block schematic, phase detector, low pass filter, VCO IC 566, transfer characteristics, free running frequency, lock range, capture range, pull in time, PLL IC 565, block diagram, circuit connection, PLL application: frequency synthesis, FM demodulator, AM demodulator, FSK demodulator.

Audio power amplifier: LM380 specifications, features, applications, features of other amplifier such as LM384, LM 377, LM810.RF and IF amplifier IC.

Lectures 10, Marks 20

UNIT V

Active Filters, D to A and A to D Converter

Active filter: Butter worth low pass, high pass, band pass and band reject filter, first order and second order filter design, frequency scaling.

DAC Specifications: resolution, offset error, gains error. Weighted resistor DAC, its disadvantages, R-2R ladder DAC, inverted R-2R ladder, AD 558.

ADC specification: resolution, quantization error, offset error, gain error, linearity error, conversion time. Flash ADC, counter type ADC, successive approximation type, integrating type ADC, dual slope ADC, AD670. Frequency response of ADC, sample and hold circuit.

Lectures 10, Marks 20

References:

1) D.Roy Chaudhary ,Shalil Jain- Linear Integrated Circuit, New Age International, 2/e.
2) Coughling,Driscoll - Op amps and Linear Integrated Circuits, Pearson education, 6/e
3) Ramakant Gaikward - Op amp and Integrated circuit, PHI
5) Sergio Franco - Design with Operational Amplifier and Analog Integrated Circuits , TMH- 3 / e
6) Botkar - Integrated circuits, Khanna Pub.

List of Practicals

Study of op-amp data sheets: LM 741, OP-07

1. Op-amp parameter measurement: input bias current, input offset current, input offset voltage, slew rate of op-amp 741.
2. Design and test active integrator and differentiator circuits for given frequency.
3. Study the operation of half wave and full wave precision rectifier.
4. Design and test positive and negative clamper.
5. Design and test Schmitt trigger circuit using LM 311 for given hysteresis.
6. Design and test of square wave and triangular and saw tooth wave generator using op-amp for given frequency.
7. Design and test timer using IC 555 in monostable and astable mode.
8. Design and test function generator using IC 8038.
9. Design and test PLL using IC 565 PLL for given lock and capture range.
10. Design and test audio amplifier using IC LM380 with and without positive feedback.
11. Setup DAC circuit Using IC AD 558 and study its performance
12. Setup ADC circuit Using IC AD 670 and study its performance
13. Design and test second order Butterworth LP / HP filter.
14. Design and test BP Butterworth filter.
15. Design and test BR Butterworth filter.

Note: Minimum EIGHT practicals are to be performed, at least ONE from each unit. All practical should be performed on bread board.

NORTH MAHARASHTRA UNIVERSITY JALGAON
T.E. (ELECTRONICS, ELECTRONICS & COMMUNICATION, ELECTRONICS & TELECOMMUNICATION, ELECTRICAL)
W.E.F : 2007- 08
TERM – I I

PRACTICAL TRAINING / MINI PROJECT / SPECIAL STUDY

Teaching scheme:	Examination scheme:
Practical : 2 hrs / week	Term Work : 25 Marks

- Every student has to undergo industrial / practical training for a minimum period of two weeks either during summer vacation between (S.E Second Term) fourth term and (T.E. First Term) fifth term or during winter vacation between fifth term and sixth term (T.E. First Term and Second Term).

- The industry in which practical training is taken should be a medium or large scale industry

- The paper bound report on training must be submitted by every student in the beginning of (T.E. Second Term) sixth term along with a certificate from the company where the student took training.

- The report on training should be a detailed one.

- Maximum number of students allowed to take training in a company should be five. Every student should write the report separately.

- In case if a student is not able to undergo practical training, then such students should be asked to

  prepare special study report on a recent topic from reported literature .

  or

  prepare a mini project related to the Electronics / Electronic and Communication / Electronic and Telecommunication branch of engineering.

1. The circuit for mini project must be designed by a student.

2. The circuit should be simulated using any of the standard simulation software available.

3. Result verification for paper design and simulation should be carried out and discrepancies should be discussed.

4. Verified circuit should be assembled and tested on general purpose PCB/ Protoboard for actual working and practical results.

5. Layout of circuit using standard Layout tool (Orcad / Protel / CADstar / Pads / Ultiboard) should be designed and PCB making process should be carried out.

6. Assemble and test the circuit on PCB. Prepare bill of materials.

7. Project report should be detail of work, carried out by student, including layouts, circuits, bill of materials and relevant details

- The practical training / special study / mini project shall carry a term work of 25 marks. Every student shall be required to present a seminar in the respective class in the presence of two teachers. These teachers (appointed by the head of department in consultation with the Principal) shall award marks based on the following:

(a) Report	10 marks.
(b) Seminar presentation	10 marks.
(c) Viva -voca at the time of Seminar presentation	05 marks.
Total	25 marks.

T.E. (ELECTRONICS AND COMMUNICATION, ELECTRONICS AND TELECOMMUNICATION)

SR. NO.	OLD SUBJECTS	NEW SUBJECTS
1	NETWORK ANALISYS AND SYNTHESIS Term I	NETWORK ANALISYS AND SYNTHESIS Term I
2	MICROPROCESSOR TECHNIQUES Term I	
3	FEEDBACK CONTROL SYSTEM Term I	FEEDBACK CONTROL SYSTEM Term I
4	ELECTRONICS DESIGN - I Term I	
5	SIGNAL CONDITIONING AND DATA CONVERSION Term I	ANOLOG INTEGRATED CIRCUITS AND APPLICATIONS Term II
6	MICROPROCESSOR INTERFACING AND PERIPHERALS Term II	
7	POWER ELECTRONICS Term II	POWER ELECTRONICS Term II
8	COMMUNICATION SYSTEM - I Term II	
9	INDUSTRIAL MANAGEMENT Term II	MANAGEMENT SCIENCE at S.E. (E &C, E & T/c) Term II
10	ELECTRONICS DESIGN - II Term II	
11	Practical Training / Mini Project / Special Study Term II	Practical Training / Mini Project / Special Study Term II
12		ELECTRONICS CIRCUIT DESIGN Term II
13		MICROPROCESSOR & MICROCOLTROLLER SYSTEMS Term I
14		SOFTWARE APPLICATION - II Term I
15		DIGITAL COMMUNICATION Term I
16	ELECTRONIC MEASUREMENT at B. E. (E &C, E & T/c) Term II	ELECTRONIC MEASUREMENT Term II
17		INFORMATION THEORY AND CODING TECHNIQUES Term II
18	ELECTROMAGNETIC ENGINEERING at S. E.(E &C, E & T/c) Term I	ELECTROMAGNETIC ENGINEERING Term I

NORTH MAHARASHTRA UNIVERSITY,

JALGAON (M.S.)

BACHELOR OF ENGINEERING (B.E.)

(FINAL YEAR)

ELECTRONICS AND COMMUNICATION,

ELECTRONICS AND TELECOMMUNICATION

TERM – I and II

W.E.F 2008 - 2009

NORTH MAHARASHTRA UNIVERSITY, JALGAON
STRUCTURE OF TEACHING AND EVALUATION
B.E. (ELECTRONICS and COMMUNICATION / ELECTRONICS and TELECOMMUNICATION)

FIRST TERM

W.E.F. 2008-09

SR.No.	Subject	Teaching Scheme Hours / Week			Examination Scheme				
		Lectures	Tutorial	Practical	Paper Duration Hours	Paper	TW	PR	OR
1	Radiation and Microwave Technology	4	-	2	3	100	25	25	-
2	* Fiber Optic Communication	4	-	2	3	100	25	-	-
3	* Digital Signal Processing and Processors	4	-	2	3	100	-	25	-
4	* Computer Communication Networks	4	-	-	3	100	25	-	-
5	Elective - I	4	-	2	3	100	25	25	-
6	* Project - I	-	-	2	-	-	25	-	25
7	* Seminar	-	-	2	-	-	25	-	-
	Total	**20**		**12**		**500**	**150**	**75**	**25**
	Grand Total	**32**			**750**				

SECOND TERM

SR. No.	Subject	Teaching Scheme Hours / week			Examination Scheme				
		Lectures	Tutorial	Practical	Paper Duration Hours	Paper	TW	PR	OR
1	Telematics	4	-	2	3	100	25	-	25
2	Television and Consumer Electronics	4	-	4	3	100	25	25	-
3	Satellite communication	4	-	2	3	100	25	-	-
4	Elective -II	4	-	2	3	100	25	25	-
5	* Industrial Visit / Case Study	-	-	-	-	-	25	-	-
6	* Project - II	-	-	4	-	-	100	-	50
	Total	**16**	**-**	**14**		**400**	**225**	**75**	**50**
	Grand Total	**30**			**750**				

*** Common with B.E. (Electronics Engineering)**

ELECTIVE I	
	i) Data Communication and Design
	ii) * Biomedical Instrumentation
	iii) System Programming
	iv) * VLSI Design
	v) Broad band Communication

ELECTIVE II	
	i) * Embedded System
	ii) * Digital Image Processing
	iii) * Neural Network and Fuzzy systems
	iv) Telecomm. Network Management
	v)Nanotechnology

NORTH MAHARASHTRA UNIVERSITY JALGAON
B.E. (ELECTRONICS AND COMMUNICATION, ELECTRONICS AND TELECOMMUNICATION)

W.E.F : 2008- 09

TERM - I
RADITATION AND MICROWAVE TECHNIQUES

Teaching scheme:	**Examination scheme:**
Lectures: 4 hrs / week	**Theory Paper : 100 Marks (3 Hours)**
Practicals: 2 hrs / week	**Practical : 25 Marks**
	Term Work : 25 Marks

UNIT I
Guided waves and Transmission lines : Transmission line parameter, Transmission line equation, Transmission coefficient, reflection coefficient, Impedance matching, quarter wave transmission line, single stub, double stub matching (Analytically and using Smith chart), Solution of quarter wave transformer and single stub by using smith chart only
Electromagnetic Theory: Maxwell's Equation, Uniform waves, free space impedance **Lectures 10, Marks 20**

UNIT II
Wave guide Theory: Comparison between Transmission line and Waveguide, waveguide types rectangular and circular. Wave propagation through rectangular waveguide, Solution of wave equation in rectangular waveguide, Rectangular wave guide modes, Waveguide characteristics for TE and TM modes (for rectangular waveguide), equation for cut off wavelength, guided wavelength, guided velocity, group velocity
Passive Microwave components : Terminator, attenuator, ,traveling detector, Microwave filter, parametric amplifier, resonator, E-plane, H-plane, Magic Tee, Hybrid circuits, Ferrite Components, Microwave bridge Isolator, Circulator, Directional coupler, E-plane Tee, H-plane Tee, magic tees, Directional couplers, Ferrite components, Microwave bridge, Circulator, Isolator, slotted line, Tuners, coupling probes **Lectures 10, Marks 20**

UNIT III
Microwave Tubes: Limitations of conventional Tubes, Klystron tubes, Two cavity Klystron, Multi cavity Klystron, Modes of Reflex klystron, Efficiency of Reflex Klystron, **Slow wave structure: (TWT) :** O type, M type, Magnetron Efficiency, Advantages and disadvantages
Solid state Devices: GUNN diode, PIN diode, IMPATT, BARITT, TRAPATT, Monolithic Microwave strip line devices, Microwave Integrated circuits, Applications of Microwave Integrated Circuits **Lectures 10, Marks 20**

UNIT IV
PMicrowave Antenna
RF antenna and Microwave antenna, Horn antenna, Parabolic reflector with all types of feeding methods, slotted antenna, Lens antenna, Microwave strip line antennas, Equation for antenna gain, Directivity and Beam width of all above antenna types.
Microwave measurements: Frequency, Power, attenuation, VSWR, Impedance measurement. **Lectures 10, Marks 20**

UNIT V
Microwave Applications:
Wireless Microwave communication system: Radio Receiver Architecture, Noise Characterization
Radiometer System: Theory and application, total Power Radiometer, Dicke Radiometer
Microwave heating
Power Transfer
Bio-medical application
RADAR: Principle of Radar System, Pulse radar, Radar range equation, Doppler Effect, Blind Speed, CW Doppler MTI Radar
Lectures 10, Marks 20

References:

1. R. E. Collins - Foundation of microwave engineering, Tata McGraw Hill
2. Pozar - Microwave Engineering , John Wiley
3. Annapurana Das, S. K das - Microwave Engineering, Tata McGraw Hill
4. Samuel Liao – Microwave Devices and circuits, PHI
5. K. C. Gupta – Microwave, New Age
6. Peter A. Rizivi - Microwave Engineering,

List of Practical:

1. Reflex Klystron Characteristics
2. GUNN Diode Characteristics
3. Microwave Junction: Power splitting Characteristics
4. Directional coupler: Isolator, Coupling factor
5. Circulator, Isolator (Y type) Circulator and Isolation Calculation
6. VSWR Measurement (Using V_{max} / V_{min} Method)
7. Antenna Horn (Radiation Pattern and beam width)
8. Antenna parabolic (Radiation Pattern and beam width)
9. Measurement of attenuation (Fixed and variable)

Note: Minimum **EIGHT** practicals are to be performed.

NORTH MAHARASHTRA UNIVERSITY JALGAON
B.E. (ELECTRONICS, ELECTRONICS AND COMMUNICATION, ELECTRONICS AND TELECOMMUNICATION)

W.E.F : 2008- 09

TERM - I
FIBER OPTIC COMMUNICATON

Teaching scheme:	**Examination scheme:**
Lectures: 4 hrs / week	**Theory Paper: 100 Marks (3 Hours)**
Practical: 2 hrs / week	**Term Work : 25 Marks**

UNIT I
Introduction to Optical Fiber Communication System:
Block diagram of OFCS, Advantage and Disadvantage of OFCS over other communication systems. Ray theory of transmission and concept of acceptance angle and Numerical Aperture (Numericals based on this), Meridonial and skew propagate wave theory of optical propagation : cut – off wavelength. Group velocity and Group delay, Types of fibers (According to materials, Refractive index profile, Mode of propagation) Fiber Optic Splices, connectors, couplers, Directional Coupler.

Lectures 10, Marks 20

UNIT II
Light Sources and Detectors:
Sources : Factors or Characteristics for their selection in OFCS, **Types :** Light Emitting diodes, Laser diodes, Surface emitter LEDS, Edge emitter LEDS, Super luminescent LEDS, LED operating Characteristics, **Modulation Bandwidth:** 3-dB electrical bandwidth, 3-dB optical Bandwidth, Radiation patterns of surface and Edge emitters, **Laser diode:** Laser principles, semiconductor laser diode , Hetero junction Laser , strip- gromentry lasers, Distributed feedback lasers, laser diode operating Characteristics, Radiation patterns.
Detectors: Characteristics or factors for their Selection, P-N photo diode, P-I-N Photo diode, Avalanche photodiode, detector parameters: Quantum efficiency, Responsivity, speed of Response (Numericals based on this) **Lectures 10, Marks 20**

UNIT III
Modulation: Noncoherent / Coherent
Intensity Modulation: LED Modulation and Circuits (Analog and digital) Analog modulation formats; AM / IM Sub carrier Modulation, FM / IM Sub carrier Modulation. Digital Modulation formats; PCM: RZ, NEZ, Manchester, Bipolar codes, Other digital formats: PPM, PDM, OOK, FSK and PSK.
Detection: (Coherent detection / Heterodyne / Homodyne detection):- Optical heterodyne receivers, Optic Frequency Division Multiplexing. **Lectures 10, Marks 20**

UNIT IV
Losses in fibers: Absorption, scattering and bending losses. Signal distortion in optical fiber: Material dispersion, waveguide dispersion, intermodal dispersion. Noise in optical fiber: Thermal Noise, shot noise, S / N Ratio, Noise equivalent power (Numericals based on this)
Fiber Optics System Design: Optical power budgeting, Rise-time budget.
Optical Fiber Measurements: Measurement of Attenuation, dispersion, refractive index. Field Measurements: Optical time domain reflectometry. (OTDR) **Lectures 10, Marks 20**

UNIT V
Advanced Systems and Techniques: -
Wavelength Division Multiplexing, DWDM, optical amplifiers, Optical filters, Integrated optics, Optical Networks: SONET / SDH, Photonic switching, Local Area Networks, Optical Sensors. **Lectures 10, Marks 20**

References:

1. Jonn M. Senior - Optical fiber communication (Principles and Practice), Pearson
2. G. Keiser - Optical fiber communication, MH
3. Joseph Palais - Fiber optic communications, Pearson
4. Wilson Hawkes - Opto electronics, PHI
5. Selvrajan, Srinivas - Optical fiber communication, TMH
6. B.P.Pal - Optical fiber systems and sensors
7. Govind P. Agrawal - Fiber optic communications systems, wiley 3rd Ed.

List of Practical:

1. Electrical characteristics of (Different type LED)
2. Photometric characteristics of LED / LD (Polar Plot, Intensity Measurement)
3. NA Measurement for Single / Multi de, Gi / S1, fiber
4. Attenuation Measurement of optical fiber
5. Spectral characteristics of LED / LD
6. Fiber optic Analog / Digital transmitter / receiver parameter measurement
7. Study of fiber optical connectors
8. Spectral response of optical fiber
9. Parameter measurement of opto isolator
10. Study of OTDR.

Note: Minimum **EIGHT** practicals are to be performed

NORTH MAHARASHTRA UNIVERSITY JALGAON
B.E. (ELECTRONICS, ELECTRONICS AND COMMUNICATION, ELECTRONICS AND TELECOMMUNICATION)

W.E.F : 2008- 09

TERM - I
DIGITAL SIGNAL PROCESSING AND PROCESSORS

Teaching scheme:	Examination scheme:
Lectures: 4 hrs / week	Theory Paper: 100 Marks (3 Hours)
Practical: 2 hrs / week	Practical : 25 Marks

UNIT I

Discrete Time Signals and Systems:

Introduction: Basic elements of Digital Signal Processing Systems, Advantage and Limitation of Digital over Analog Signal Processing, Application of Digital Signal Processing: Spectral Analysis, Echo Cancellation, Image Processing, Biomedical Signal Processing, Classification of Signals. Discrete Time Signals: Representation, Standard Discrete Time Signals, Classification of Discrete Time Signals, Simple Manipulations of Discrete Time Signals, Sampling of Analog signals, Aliasing, Sampling Theorem. Discrete Time System: Block diagram representation of Discrete Time Systems, Classification of Discrete Time System, Convolution Sum, Properties of Convolution, Causality and Stability condition in terms of the Impulse Responses. Meaning of IIR, FIR, Recursive, Nonrecursive Systems, and Impulse Response of LTI Recursive System. Cross Correlation and Auto Correlation of two sequences. **Lectures 10, Marks 20**

UNIT II

Z Transform and its application to the analysis of LTI system:

Definition of Z transform, Meaning of ROC, Properties of ROC, Properties of Z transform, Inverse Z transform, Pole Zero plot of the function, Pole location and time domain behavior for causal sequences. Analysis of LTI Systems in Z domain: The System Function of LTI system, Response of LTI system with zero initial condition, Transient and Steady state responses, Causality and Stability of System. Pole zero cancellation. The one sided Z transform, Response of the system with nonzero initial conditions. Solution of difference Equations using Z transform. **Lectures 10, Marks 20**

UNIT III

Frequency Analysis of Discrete Time Signals and Systems:

The Fourier Transform of Discrete time Aperiodic Signals and Energy Density Spectrum, Frequency response of Discrete Time Systems, Magnitude and Phase response. Frequency Domain Sampling: The Discrete Fourier Transform, IDFT, The DFT as Linear Transformation, Twiddle factor, Properties of the DFT, Use of DFT in linear filtering, Frequency analysis of signals using DFT. Magnitude spectrum of signals. FFT Algorithms: Radix2 DIT and DIF algorithms to computer DFT and IDFT. **Lectures 10, Marks 20**

UNIT IV

Design and Realization of Digital Filters:

Basic Network Elements, FIR Filter Structure and Design: Direct form, cascade form, frequency sampling and linear phase structure. Fourier series, Windowing method. Gibbs phenomenon, Frequency sampling method of design. IIR Filter structure and Design: Direct form, Cascade form, Parallel form and Transposed structures. Impulse invariance, Bilinear Transformation method of design. **Lectures 10, Marks 20**

UNIT V

DSP Architecture:

Architectural features of DSP processors: Multiplier and Multiplier Accumulator (MAC), Modified Bus Structures and Memory Access schemes in DSP, Multiple access memory, Multiport Memory, Pipelining, Special addressing modes, Onchip Peripherals. Different generation of DSP Processors, Fixed point and floating point numeric representation and Arithmetic, Introducing the TI 6000 platform, Features of TMS320C62X Processors, EDMA, Host Port Interface, Expansion Bus, External Memory Interface (EMIF), Boot Loader, McBSP, Interrupts, Timers, Basic Interfacing Techniques. **Lectures 10, Marks 20**

References:

1. Proakis and Monolakis - Digital Signal Processing-Principles, Algorithms and Applications, Pearson Publication / PHI
2. Mitra S.K. - Digital Signal Processing, TMH Publication
3. B.Venkataramani, M.Bhaskar - Digital Signal Processor, Architecture, Programming and Applications,TMH.
4. Texas Instruments - Technical Reference Manual
5. Teaching Material for TI6000 platform from Texas Instruments
6. Thomas Cavicchi - Digital Signal Processing, Wiley
7. Ingle & Prokis – Digital Signal Processing Using MATLAB, 2nd Ed, Thomson Learning.

List of Practical:

1. Basic operations on sequences of equal and unequal lengths.
2. Sampling of continuous time signal and aliasing effect.
3. Convolution of two sequence\ Impulse response.
4. Spectrum of signals using DFT.
5. Frequency response of LTI Discrete time system.
6. Designing of FIR Filter.
7. Designing of IIR Filter.
8. Sampling audio signal at different sampling rate using DSP kit.
9. Interfacing with DSP Kit.
10. Implementation of digital filter using DSP Kit.
11. Using ADC and DAC for signal acquisition and play back after processing.

Note: Minimum **EIGHT** practicals are to be performed. At least **TWO** on any DSP platform.

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TERM - I
COMPUTER COMMUNICATION NETWORK

Teaching scheme:	**Examination scheme:**
Lectures: 4 hrs / week	**Theory Paper: 100 Marks (3 Hours)**
	Term Work : 25 Marks

UNIT I

Introduction to Computer Network: OSI model, TCP / IP and other network models, Different Networks: Novell Netware, Arpanet, NSFNET, Internet. Network Topologies: LAN, WAN, MAN

Physical Layer: Basic for data communication: Fourier analysis, Bandwidth Limited Signal. Transmission media: Twisted pair, Baseband coaxial cable, Broadband coaxial cable, Fiber optics. Wireless Transmission: Radio transmission, Microwave transmission, Infrared and light wave Transmission. Switching. ISDN: Narrowband ISDN: ISDN services, System architecture, Interface. Broadband ISDN: Virtual switching, Circuit switching, ATM Network, Transmission in ATM networks, ATM switches. Cable TV and internet over cable **Lectures 10, Marks 20**

UNIT II

Data link layer: Design issues: Framing, Error detection and correction code, Flow control Data Link Protocols: Unrestricted Simplex Protocol, stop and wait protocol, Simplex Protocol for a Noisy Channel. Sliding Window Protocols: One bit sliding window, Using Go-Back n, Protocol using Selective Repeat. Practical Example of Data Link Protocols: The Data Link layer in HDLC, internet, ATM.

Medium access sub layer: Channel allocation Problem: Static Channel and dynamic Channel allocation in LANs and MANs. Multiple Access Protocols: ALOHA, Carrier Sense Multiple Access, Collusion Free Protocols, Wireless LAN Protocols. IEEE Standards For LANS and MANS:IEEE Standard 802.3 and Ethernet, (IEEE Standard 802.4) token Bus, (IEEE Standard 802.5) Token Ring, (IEEE Standard 802.6) distributed Queue Dual Bus. (IEEE Standard 802.2) Logical Link Control.

Lectures 10, Marks 20

UNIT III

Network layer : Design Issue: Internal Organization ,Virtual circuit and Datagram subnets, Routing algorithm: Shortest Path Routing, Flooding, Hierarchical Routing, Broad Cast Routing, Routing for mobile host, Multicast routing, Congestion Control Algorithms: Congestion Prevention Policies, Control in virtual Circuits Subnets, choke Packets, Load Shedding.

Lectures 10, Marks 20

UNIT IV

Internetworking: The network layer in the internet: IP Protocol, IP Address, Subnet, Internet control Protocols, Internet multicasting, IPv4: Datagram, Fragmentation, Checksum, Options ,IPv6: Advantages, Packets Formats Extension Headers. Address Resolution Protocol (ARP), RARP, DHCP. The Network Layer in the ATM Networks: Routing and Switching, Traffic Shaping, Congestion Control, ATM LANs.

Lectures 10, Marks 20

UNIT V

Transport layer: The Internet Transport Protocols: TCP: Services, Features, Segments, Connections, Flow control, Error Control, congestion Control, UDP. QOS (Quality of Services) ATM AAL layer protocol.

Application layer: Network security, Domain Name system, SNMP, Electronic Mail; the World Wide Web, Multi media.

Lectures 10, Marks 20

References:

1. Andrew S Tanebaum - Computer Networks, 4th Ed. PHI/ Pearson education.
2. Behrouz A Forouzan - Data Communication and Networks, 3rd Ed. TMH.
3. S. Keshav - An Engineering approact to Computer Networks, 5th Ed. Pearson.
4. W.A. Shay - Understanding communication and Networks, Thomson.
5. Irvine Olifer - Computer Networks: Principles, Technology and Protocols, Wiley India.
6. William Stalling – Data and Computer communications, 7th Ed. PHI

Term Work: It is 50% based on theory and 50% based on minimum FIVE assignments on above syllabus (one assignment for each unit)

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TERM - I
DATA COMMUNICATION AND DESIGN (ELECTIVE I)

Teaching scheme:	**Examination scheme:**
Lectures: 4 hrs / week	**Theory Paper: 100 Marks (3 Hours)**
Practical: 2 hrs / week	**Practical : 25 Marks**
	Term work : 25 Marks

UNIT I
Digital Transmission Fundamentals
Digital signals, Limits of achievable data rate in digital communication, Data communication – components, data representation , Transmission impairment throughput, propagation speed, propagation time, wavelength, Attenuation distortion, delay distortion, Thermal noise , Inter modulation noise , Impulse Noise, Cross talk, channel capacity, source coding, data Rate, and channel capacity. **Lectures 10, Marks 20**

UNIT II
Digital Modulation
Modems, Digital continuous wave modulation techniques for Modem , Baud rate, QAM modern constellation patterns, Telephone modems- Modern stard,, traditional modems, 56M modems, Interface control for typical modem, EIA 232 / V.24 interface, interfacing with computer , Broad b modems. Cable modems. **Lectures 10, Marks 20**

UNIT III
Switching techniques High Speed Digital Access
Different switching techniques, circuit switching telephone , Signaling systems 1H Architecture overview , Packet switching N/w. T1 carrier system / E1 / , T3 / E3 carriers, SONET/ SDB, SDL Technical , ADSL technology, cellular Telephone systems,
Lectures 10, Marks 20

UNIT IV
Data communication Media
Transmission media guided transmission media (Physical description , application , transmission char.) Twisted pair (unshielded , shielded , twisted pair) , category 3 , 5 , 5E , 6 . UTP, coaxial cable. Wireless transmission unguided media; (Terrestrial microwave satellite microwave) fiber optic communication, satellite communication. , wireless fidelity
Lectures 10, Marks 20

UNIT V
Ethernet
Traditional Ethernet, fast Ethernet, gigabit Ethernet. Multiple access, rom access, MA, CSMA/ CD , CSMA/CA, control access, FDMA, TDMA, CDMA, . IEEE 802.3, 802.4, 802.5, X.21, X.25, SDLC/HDLC protocol stards. Introduction to N/w connecting devices, bridge , router, gateway, hub, etc. **Lectures 10, Marks 20**

Reference Book:

1) Behrouz A, Forouzan -Data communication, TMH
2) Stallings W. - Data Computer communication , PHI 6th Ed.
3) Shay W - Understanding Data communication and Networks, 3rd Ed., Thomson
4) Godbole A - Data communications, TMH

List of Practical:

1. Implementation of LAN using star topology and connectivity between two computers using crossover UTP5 cable.
2. To establish internet connectivity using dial up modem on windows system.
3. Study of network components such as Preparation of various cables, information attenuator, hubs, switches, bridges, routers, gateways, color codes of AT and T (2 Practicals)
4. Study of MODEM Trainer kit
5. Study of RAM for MODEM
6. Study of CDMA Trainer
7. study of GSM Trainer

Note: Minimum **EIGHT** practicals are to be performed

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TERM - I
BIOMEDICAL INSTRUMENTATION (ELECTIVE I)

Teaching scheme:	**Examination scheme:**
Lectures: 4 hrs / week	**Theory Paper: 100 Marks (3 Hours)**
Practical: 2 hrs / week	**Practical : 25 Marks**
	Term work : 25 Marks

UNIT I
Modern Imaging System:
Principles of NMR Imaging systems, Image reconstruction technique, Basic NMR components, biological effects of NMR imaging, Advantages, diagnostic ultrasound, physics of ultrasound waves, Medical ultrasound, Basic Pulse Echo Apparatus, A-scan, M- mode, B-scan, Real time Ultrasonic imaging system, Biological effects of ultrasound, Medical thermography, Physics of thermography, Infrared Detector, pyro-electric vidicon camera etc. **Lectures 10, Marks 20**

UNIT II
Cardiac Pacemakers and Defibrillators:
Need for pacemakers, external pacemakers, and Implantable pacemakers, recent developments, pacing system analyzer, need for defibrillators, DC defibrillators, Implantable defibrillators, and Defibrillators analyzers. Blood gas analyzers Acid base balance, Blood pH measurement, measurement of blood PCO_2, Blood PO_2 measurement, intra arterial blood gas monitoring, and complete gas analyzers, types of blood cells, coulter counters, and Auto recognition and differential counting of cells.
Lectures 10, Marks 20

UNIT III
Instruments for Surgery:
Principle of surgical diathermy, surgical diathermy machine, safety aspects, surgical diathermy analyzers, LASER, pulsed RUBY laser, Nd - YAG laser, He-Ne laser, Argon laser, CO_2 laser, laser safety, microwave diathermy, ultrasonic therapy unit,, pain relief through electrical simulation. **Lectures 10, Marks 20**

UNIT IV
Heamo-dialysis Machines and ventilators:
Function of kidneys, Artificial kidney , Dialysers, Membranes for Heamo-dialysis Heamo-dialysis Machine, Portable kidney machine, Mechanics of respiration Artificial ventilation , ventilators Types, ventilator terms, classification of ventilators Modern ventilators, HF ventilators, Humidifiers, Nebulisers and Aspirators. **Lectures 10, Marks 20**

UNIT V
Biomedical Telemetry and telemedicine:
Introduction, physiological parameters adaptable, wireless telemetry, single channel, Multi-channel, multi–patient telemetry, components of Bio-telemetry system, Implantable telemetry, Transmission of Analog and physiological signals over telephone , Telemedicine. Spectro-photometry, colorimeters, Automated Biochemical analysis. Infusion Pumps, Implantable Infusion systems. **Lectures 10, Marks 20**

References:

1. Cromwell - Biomedical Instrumentation, Pearson / PHI
2. Khandpur - Handbook of Biomedical Instrumentation
3. Webster - Biomedical Instrumentation, Wiley

List of Practical:

1. Measurement of echo with ultrasound system.
2. Study of Internal Pacemaker.
3. Study of Pacemaker simulator.
4. Measurement of pacing pubes with the pacemaker system.
5. Study of ON - DEMAND pacemaker system
6. Measurement of blood cell count.
7. Study of Surgical diathermy machine.
8. Study of Heamo dialysis Machine
9. Study of Nebulisers.
10. Measurement of Heart beats by wireless telemetry system.
11. Study of Ultrasonic therapy machine.
12. Study of Spectrophotometer.

Note: Minimum **EIGHT** practicals are to be performed

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TERM - I
SYSTEM PROGRAMMING (ELECTIVE I)

Teaching scheme:	**Examination scheme:**
Lectures: 4 hrs / week	**Theory Paper: 100 Marks (3 Hours)**
Practical: 2 hrs / week	**Practical : 25 Marks**
	Term work : 25 Marks

UNIT I

Introduction to system software: Types of Software and Application Software Spectrum of system Software, Need of system Software, Assembler, Loader, Compiler. Symbolic Debuggers, Interpreter, Macro, Operating system and its types. Assembler- Structure of Assembler, Basic Functions, Assembler directives, Types of Assembler, General design specification of an Assembler, Purposes of Passes, Databases for Passes, Literals, Design of Pass I and Pass II Assembler.

Lectures 10, Marks 20

UNIT II

Data Structure -Stack Array, Queue, Link list, Data Structure, Sorting Technique, Linear and binary search. Macro and Macroprocessor- Macro definition and call, Features of macro, Macro expansion, Nested Macros, Design of Macroprocessor single pass and two pass macroprocessor. **Lectures 10, Marks 20**

UNIT III

Loader and Linkage editor- Basic functions of Loader, Relocation and Linking concepts, and different Loader schemes, other Loader schemes, binders, Linking Loaders, overlay Dynamic Binders, Design issue of Direct Linking Loaders. Compiler- Concept, Phases of compiler, Types of complier, Parser, Parsing technique, Top-down and Bottom-up parsing, Shift reduce and recursive descent parser, Operator precedence parser, Predictive parser, L-R parser. **Lectures 10, Marks 20**

UNIT IV

Operating System Concepts- Need of OS, Types of OS, like Batch, Time sharing, Multiprogramming, Multitasking real time and personal OS.

Process Concepts and Management: - Process concepts, process state, process state Transition, PCB, operation on process, OS Services for Process Management.

Deadlocks - Principals, Detections, Preventions Recovery and Avoidance Algorithm. Scheduling - Process scheduling long term, middle term and short term scheduling CPU burst, scheduling algorithm and performance evolution.

Lectures 10, Marks 20

UNIT V

Memory Management -Concept of Memory management, Contiguous Memory allocation, paging and segmentation concepts, , virtual memory concept. File Management- File concepts, Access Methods, Directory Structure, single, two, three level structure, Protection, file sharing allocation methods. Dynamic Linking In Windows- (Introduction and concepts only) clipboard, OLE terminology and Technology, Dynamic Data Exchange Dynamic Linking Libraries (DLL) **Lectures 10, Marks 20**

References:

1. Jhon J. Donovan - System Programming, TMH.
2. Dhamdhere - System Programming and Operating System, TMH, 2nd Ed.
3. L Beck - System Software, Pearson, 3rd Ed.
4. Aho Ulman - Complier Construction, Pearson LPE.
5. Silberschatz, Galvin, Gagne.- Operating System Principles , John Wiley and Sons, 7th Ed.
6. Tanenbaum - Modern Operating System, Pearson, 2nd Ed.
7. J.P. Bennett - Compiling Technique, TMH

List of Practical:

1. Language Programming for 8085 / 8051.
2. Implementation of sorting method (Any two) in C / C++.
3. Implementation of searching methods (Linear and Binary Search) in C / C++.
4. Implementation of stack/queue using linked list data structure in C / C++.
5. Develop an application to simulate first pass of two pass assembler for 8085 Microprocesser.
6. Design of simple Loader.
7. Design of Parser for a subset of C by using C / C++.
8. Design of Line and Screen Editor in C / C++.
9. Design of Microprocessor (Nested Macro Calls within definition) in C / C++.
10. Implementation of CPU Scheduling algorithm,
11. Implementation of memory management algorithm.
12. Implementation of interprocess Communication.

Note: Minimum **EIGHT** practicals are to be performed

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TERM - I
VLSI DESIGN (ELECTIVE I)

Teaching scheme:	**Examination scheme:**
Lectures: 4 hrs / week	**Theory Paper: 100 Marks (3 Hours)**
Practical: 2 hrs / week	**Practical : 25 Marks**
	Term work : 25 Marks

UNIT I
Introduction:
History of HDL: Brief history of VHDL, brief history of Verilog. Structure of VHDL and Verilog module: Structure of Entity / Module, Port. Operators in VHDL and Verilog: Logical, Relational, Arithmetic Shift and Rotate Operators. Data types of VHDL and Verilog. Types of Architecture use in VHDL and Verilog: Behavioral Description, Structural Description, Switch level Description, Data-flow Description, Mixed-type Description. Simulation and Synthesis and comparison between them.

Lectures 10, Marks 20

UNIT II
Data-flow Description (VHDL / Verilog): Structure of Data-flow Description: Signal declaration and Signal assignment statements, Concurrent Signal assignment statements, Constant declaration and assignment statements, Assigning a delay to the signal assignment statements, VHDL / Verilog Programming using Data-flow description and Common errors occurs during programming.
Behavioral Description (VHDL / Verilog): Structure of Behavioral Description for both VHDL/Verilog. VHDL variable assignment statement. Sequential statements for VHDL / Verilog: IF statement, Signal and variable (only for VHDL) assignment, Case statement, Loop statement. VHDL/ Verilog Programming using Behavioral description and Common errors occur during programming. **Lectures 10, Marks 20**

UNIT III
i) Structural Description (VHDL / Verilog): Organization of structural design, Binding, State machines, Generic (VHDL), Parameter (Verilog), VHDL / Verilog Programming using Structural description and Common errors occurs during programming.
ii) Switch Level Description (VHDL / Verilog): Single NMOS and PMOS switches: NMOS and PMOS switch description for VHDL / Verilog, Serial and parallel combinations of switches. Switch level description of: Primitive gates, Combinational logics, Sequential circuits. CMOS switch. Bidirectional switches.
iii) Procedures (VHDL), Task (Verilog) and Functions (VHDL / Verilog) **Lectures 10, Marks 20**

UNIT IV
Mixed type Description (VHDL / Verilog): User defined data types in VHDL, VHDL Packages, Implementation of Arrays, and Mixed-type Description Programming.
Advanced HDL Description (VHDL / Verilog): File processing in VHDL / Verilog. VHDL record types. Programming of File processing for VHDL / Verilog.
Architecture of Xilinx 9500 series CPLD. **Lectures 10, Marks 20**

UNIT V
Xilinx Spartan 4000 series FPGA.
Testing of Logic Circuits:
Fault model, path sensitizing, random test. Design of testability, BIST (Built in self test), Boundary scan test.
Introduction to various Debugging Tools .Introduction to Simulation Tools.
Introduction to Digital Pattern Generator and Logic Analyser. Advantage of Logic Analyzer with built in Digital Pattern Generator over Simulator. **Lectures 10, Marks 20**

References:

1. John F. Wakerly - Digital Design, Principles and Practices, Pentice Hall Publication.
2. Nazeib M. Botros - HDL programming Fundamentals VHDL and Verilog , Thomson.
3. Stephen Brown and Zvonko Vranesic - Fundamentals of Digital Logic with VHDL design, McGraw Hill
4. Douglas Perry - VHDL , Tata MC-Graw Hill
5. Xilinx data manual - The Programmable Logic data Book
6. Sudhakar Yalamanchil - An Introduction to VHDL from Synthesis to Simulation
7. Bhaskar – A VHDL Primer, Pearson
8. Zwolinski – Digital System Design with VHDL, Pearson

List of Practical:

Minimum **EIGHT** Practical on VHDL / Verilog coding, simulation and synthesis with implementation on CPLD / FPGA devices. and test performance using 32 channel pattern generator integrated with logic analyzer apart from verification by simulation with tools . Use the pattern generator to generate input signal and truth tables. (PC Based instruments may also be used)

Simulation, Synthesis, and Implementation and observe Real-time validation using pattern generator and Integrated logic Analyzer:

Group A. Combinational Logic: (At least THREE of the following must be covered)

1. Write VHDL code to realize all the logic gates

2. Write a VHDL program for the following combinational designs
   a. 2 to 4 decoder
   b. 8 to 3 (encoder without priority & with priority)
   c. 8 to 1 multiplexer
   d. 4 bit binary to gray converter
   e. Multiplexer, demultiplexer, comparator

3. Write a VHDL code to describe the functions of a Full Adder Using following modeling styles.
4. Write VHDL code to display messages on the given seven segment display and LCD and accepting Hex key pad input data

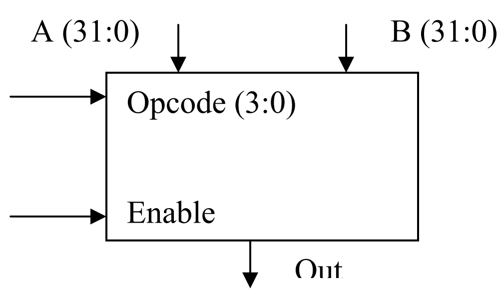
Group B. Sequential logic: (At least THREE of the following must be covered)

1. Develop the VHDL codes for the following flip-flops,
   SR, D, JK, T.

2. Design 4 bit binary, BCD counters (Synchronous reset and Asynchronous reset) and “any sequence” counters.
3. Implementation of 8 – Bit Left / Right Shift Register.

Group C. Implement 32 bit ALU for any (Arithmetic / Logical) Function.
(At least ONE of the following must be covered)

Write a model for 32 bit ALU using the schematic diagram shown below.(example only)



- ALU should use combinational logic to calculate an output based on the four bit op-code input
- ALU should pass the result to the out bus when enable line in high, and tri-state the out bus when the enable line is low.
- ALU should decode the 4 bit op-code according to the given in example below

OPCODE	ALU OPERATION
1.	A + B
2.	A - B
3.	A Complement
4.	A * B
5.	A AND B
6.	A OR B
7.	A NAND B
8.	A XOR B

Group D. INTERFACING (At least Two of the following must be covered)

1. Write VHDL code to control speed, direction of DC and Stepper motor
2. Write VHDL code to accept 8 channel Analog signals, Temperature sensors and display the data on LCD panel or seven segment displays.
3. Write VHDL code to generate different waveforms (Sine, Square, Triangle, Ramp etc.,) using DAC change the frequency and amplitude.
4. Write VHDL code to simulate Elevator operations
5. Write VHDL code to control external lights using relays.

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TERM - I
BROADBAND COMMUNICATION (ELECTIVE I)

Teaching scheme:
Lectures: 4 hrs / week
Practical: 2 hrs / week

Examination scheme:
Theory Paper: 100 Marks (3 Hours)
Practical : 25 Marks
Term work : 25 Marks

UNIT I
Switching Techniques:
Introduction, circuit switching, Routing for circuit switching networks, control signaling. Common channel signaling, Packet switching, Packet size, X.25 protocol, packet level, sequence of events. Comparison of circuit and packet switching.
Lectures 10, Marks 20

UNIT II
Frame Relay:
Introduction, Frame relay protocols, architecture, comparison with X.25 protocol, frame mode call control, call control protocol. Frame relay congestion control, Congestion, Approaches, traffic rate management, explicit congestion avoidance, implicit congestion control. **Lectures 10, Marks 20**

UNIT III
ISDN:
Introduction to ISDN, IDN, Principles of ISDN, Evolution of ISDN, ISDN Standards, Architecture, Transmission structure, User network interface configuration, ISDN protocol architecture, ISDN Connection, Addressing. Inter Networking ISDN – ISDN, ISDN – PSTN, ISDN – CSPDN. **Lectures 10, Marks 20**

UNIT IV
ATM:
Overview, Virtual channels, Virtual paths, VP and VC switching, ATM cells, Header format, Generic flow control, Header error control, Transmission of ATM cells, Adaptation layer, AAL services and protocols. ATM switching building blocks, ATM cell processing in a switch, Matrix type switch, Input, Output buffering, central buffering, Performance aspects of buffering switching networks. **Lectures 10, Marks 20**

UNIT V
Broadband standards:
Broadband ISDN Standards, Broadband Services, Broadband Architecture, User network interface. Broad band ISDN protocol, architecture, physical layers, SONET / SDH. **Lectures 10, Marks 20**

References:

1) Williams stallings - ISDN and Broadband ISDN with frame Relay and ATM , PHI , 4TH Ed
1) Mischa Schwartz - Broadband Internet Network, PHI
2) Bernand Forozen. - Data Communication. and Networking, TMH
3) Balaji kumar - Broadband Communication, MGH

List of Practical:
- Simulation of any one of the PSTN switch Configuration (T / S / T Switch)
- Implementation of congestion control algorithm
- Implementation of routing algorithm (Shortest path)
- Case Study – ISDN – ISDN and ISDN - PSTN

Note: Minimum **EIGHT** practicals are to be performed, based on the syllabus.

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TERM - I
PROJECT I

Teaching scheme:
Practicals: 2 hrs / week

Examination scheme:
Oral : 25 Marks
Term Work : 25 Marks

1. Every student individually or in a group (group size is of 3 students. However, if project complexity demands a maximum group size of 4 students, the committee should be convinced about such complexity and scope of the work.) shall take a project in the beginning of the (B.E. first Term) seventh term in consultation with the guide and the project must be completed in the (B.E. Second Term) eighth term.

2. The project proposal must be submitted in the institute in the beginning of the (B.E. first Term) seventh term. While submitting project proposal care is to be taken that project will be completed within the available time of two term i.e 2 Hrs per week for (B.E. first Term) seventh term and 4 Hrs per week for (B.E. Second Term) eighth semester (total time become 12*2 + 12*4 = 72 Hrs per project partner). The final title of the project work should be submitted at the beginning of the (B.E. Second Term) eighth semester. .

3. Project title should be precise and clear. Selection and approval of topic:

   Topic should be related to real life application in the field of Electronics and Telecommunication

   OR

   Investigation of the latest development in a specific field of Electronics or Communication or Signal Processing

   OR

   The investigation of practical problem in manufacture and / or testing of electronics or communication equipments

   OR

   The Microprocessor / Microcontroller based applications project is preferable.

   OR

   Software development project related to VHDL, Communication, Instrumentation, Signal Processing and Agriculture Engineering with the justification for techniques used / implemented is accepted.

   OR

   Interdisciplinary projects should be encouraged. The examination will be conducted independently in respective departments.

4. The group should maintain a logbook of activities. It should have entries related to the work done, problems faced, solution evolved etc., duly signed by guide.

5. The group is expected to complete details system design, layout etc. in (B.E. first Term) seventh term, as a part of term work in the form of a joint report. Project report must be submitted in the prescribed format only. No variation in the format will be accepted.

6. One guide will be assigned at the most three project groups.

7. The guides should regularly monitor the progress of the project work.

8. Assessment of the project for award of TW marks shall be done by the guide and a departmental committee (consisting of minimum two teachers with experience more than three years) as per the guidelines given in the following table.

A) ASSESSMENT OF PROJECT I TERMWORK B.E. FIRST TERM

NAME OF THE PROJECT ____

NAME OF THE GUIDE: ____

Sr No	Exam Seat No	Name Of Student	Assessment by guide (70%)					Assessment by Departmental committee (30%)			Grand Total	Out of 25 Marks
			Liter-ature survey	Topic Se le-tion	Docum-entation	Atte-nden-ce	To-tal	Eval-uation (10%)	Pres-ntaion (20%)	Total		
		Marks	10	05	15	05	35	05	10	15	50	25

Sign of Guide   Sign. of Committee Members   Sign. of H. O. D.

9. The guide should be internal examiner for oral examination (If experience is greater than three years).

10. The external examiner should be from the related area of the concerned project. He should have minimum of five years of experience at degree level / industry.

11 .The evaluations at final oral examination should be done jointly by the internal and external examiners.

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TERM - I
SEMINAR

Teaching scheme: | **Examination scheme:**
Practical: 2 hrs / week | **Term Work : 25 Marks**

1. For seminar every student will individually study a topic assigned to him / her and submit a report and shall deliver a short lecture / Seminar on the topic at the end of term.
2. Selection of topic should be done by students in consultation with concerned guide
   a. Topic should be related to branch but it should be extended part of the branch (latest and advance topic).
   b. The topic should be such that the student can gain latest knowledge. Student should preferably refer at least one research paper
3. Seminar topic should not be repeated in the department and registration of the same should be done on first come first served basis
4. Seminar report should be submitted in paper bound copy prepared with computer typing
   a. Size of report depends on advancement of topic.
   b. Student should preferably refer minimum 5 reference books / magazines.
   c. Format of content
      i. Introduction.
      ii. Literature survey.
      iii. Theory 1) Implementation 2) Methodology
      3) Application 4) Advantages, Disadvantages.
      iv. Future scope.
      v. Conclusion.

5 ASSESSMENT OF SEMINAR for TERM WORK
Title of seminar: ____
Name of guide : ____

Sr. No.	Exam Seat No.	Name of Student	Assessment by examiners					Grand Total
			Topic Selection 5	Literature Survey 5	Report Writing 5	Depth of understanding 5	Presentation 5	25

6 . Assessment of Literature survey will be based on
   a. Collection of material regarding history of the topic.
   b. Implementation.
   c. Recent applications.

7. Assessment of Depth of understanding will be based on
   a. Questioning by examiners.
   b. Questioning by students.
   c. What the student understands i.e. conclusion regarding seminar.

8. Assessment of presentation will be based on;
    a. Presentation time (10 minutes)
    b. Presentation covered (full or partial)
    c. Way of presentation
    d. Questioning and answering (5 minutes)

9. Examiners should be a panel of two one of them must be guide. Examiner must have experience at least 3 years. Examiners will be appointed by HOD in consultation with Principal.

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TERM - II
TELEMATICS

Teaching scheme:
Lectures: 4 hrs / week
Practical: 2 hrs / week

Examination scheme:
Theory Paper: 100 Marks (3 Hours)
Oral : 25 Marks
Term work : 25 Marks

UNIT I

Telephone switching and Traffic Engineering:

Evolution of telecommunication, simple telephone communication, basics of switching systems Dialing mechanism, electronics switching, digital switching system, SPC configuration , Architecture features, centralized and distributed SPC, enhanced services.

Traffic Engineering, Introduction, Traffic usages, traffic measurement unit, traffic distribution, Grade of service Blocking probability, Numericals on above topics. **Lectures 10, Marks 20**

UNIT II

Switching networks

Single stage and multistage switching N/W, blocking probability, Lee's model to evaluate blocking probability of three stage network , concept of time division time switching, time multiplexed time and space switching, combination switch ST, TS, STS, TST stages, Brief description of combination switching. **Lectures 10, Marks 20**

UNIT III

Mobile cellular Telephony:

Limitations of conventional mobile Telephone system, Frequency band allocation, Basic cellular system components, operations of a cellular. Calculation of maximum number of calls per hour per cell, frequency channels per cell, concept of frequency reuse, cell splitting: Hand off mechanism, Delayed hand off, Forced hand off. Mobile assisted hand off. Cell site hand off, Inter system hand off, co-channel Interference reduction factor, fading. Multi-user communication . TDMA, FDMA and CDMA. **Lectures 10, Marks 20**

UNIT IV

Digital cellular systems:

GSM, radio aspects, features of GSM. Architecture details channel structure, security aspects, Authentication and ciphering key. Different call flow sequences in GSM, North American CDMA cellular standard , radio aspect, forward link and Reverse link structure, key features of standard. **Lectures 10, Marks 20**

UNIT V

IP telephony

Introduction to VOIP, low level protocols, - RTP / RTCP / UDP, voice activity detection and discontinuous transmissions. IP telephony protocols: - H.323 standard, session Initiation protocol (SIP), Gateway location protocol, QOS requirements, RSVP Architecture, message format , reservation merging. **Lectures 10, Marks 20**

References :

1. Vishwanathan - Telecommunication switching systems , PHI
2. William C.Y. LEE - Wireless and cellular Telecommunications, MGH , 3rd Ed.
3. Raj Pandya - Mobile and personal communication systems , PHI
4. Rappaport - Wireless communication , PHI
5. Alberto Leon Garcia - Communication network, TMH
6. Andreas F. Molisch - Wireless communication, Wiley

List of Practical:

1. Study of Electronic Telephone exchange (C-Dot OR E-10B)
2. Traffic Measurement calculations
3. Mobile Transmitter and Receiver (Trainer Kit)
4. To study GSM architecture
5. To Study cordless Telephone system
6. To study CDMA
7. To study VOIP
8. To study RSVP Architecture.
9. Study of DTMF signaling including DTMF decoder
10. Study of GSM AT commands.

Note: Minimum **EIGHT** practicals are to be performed

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TERM - II
TELEVISION AND CONSUMER ELECTRONICS

Teaching scheme:	**Examination scheme:**
Lectures: 4 hrs / week	**Theory Paper: 100 Marks (3 Hours)**
Practical: 2 hrs / week	**Practical : 25 Marks**
	Term work : 25 Marks

UNIT I
Basic concept of Television: TV broadcasting, Scanning methods, Synchronization, Aspect ratio, Kell factor, Horizontal and Vertical resolution, video bandwidth, positive and negative modulation. Composite video signal. **Camera Tubes:** Image Orthicon, Vidicon, Plumbicon, Saticon, Silicon diode array, **Television transmission:** VSB transmission, TV channels, TV standards, TV Channels bands, block diagram of monochrome TV receiver. **Lectures 10, Marks 20**

UNIT II
Colour Television receivers: Colour fundamentals, compatibility, frequency interleaving, colour mixing. Colour camera tube, picture tubes – static and dynamic convergence, colour purity. PAL, SECAM, NTSC system concept, encoder and decoder and their comparison. Colour TV transmitter and receiver block diagram. **Lectures 10, Marks 20**

UNIT III
Advanced TV system and techniques: Introduction to digital compression technique : GPEG, MPEG.,Block diagram of digital TV:- transmitter and receiver, HDTV- transmitter and receiver, DTH system, Video on demand. Introduction of Plasma and LCD TV. Cable TV. Introduction of 3D DTV system. CCTV, digital terrestrial TV (DTT). **Lectures 10, Marks 20**

UNIT IV
Methods of sound, video recording and reproduction: Disc recording, magnetic recording, optical recording- CD and DVD. Monophony, stereophony, Hi-Fi system. **PA system:** Block diagram, requirement, characteristics, its planning for various uses. Introduction to satellite radio reception (word space) **Lectures 10, Marks 20**

UNIT V
Modern Home Appliances : Block Diagram and working of FAX Machine, Washing Machine, Microwave Oven, Video Games, CD and DVD players, Digital diary. **Internet Applications:** E-mail, FTP, WWW. Solar Cells and Panels. Introduction to Palm Top, Pen Drive. **Lectures 10, Marks 20**

References:

1. A. M. Dhake - TV and Video Engineering , TMH
2. R. G. Gupta - TV Engineering and Video system , TMH
3. Kelth Jack - Video Demisified , Penram International
4. S. P. Bali - Colour TV Theory and Practice , TMH
5. Bernard Grobb, Charles E - Basic TV and Video system , TMH (6^{Th} Ed.)
6. R. R. Gulati - Monochrome and colour TV , New Age
7. Philips Handbooks on Audio, Video and Consumer Electronics application notes
8. Olson - High Quality Sound recording and reproduction

List of Practical:

1. Study of colour TV Receiver
2. Voltage and Waveform analysis for colour TV.
3. Alignment and fault finding of colour TV using wobbuloscope and pattern generator (02 Expts.)
4. Study of DTH and Set Top Box.
5. Study of CD / DVD player.
6. Practical Visit to TV transmitter / Studio.
7. Study of PA system with cordless microphone.
8. Study of Audio System, MP3 player, Satellite radio.
9. Study of HDTV.
10. Study of Digital TV.
11. Web page designing.
12. Study of Tape recorder

Note: Minimum **EIGHT** practicals are to be performed

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TERM - II
SATELLITE COMMUNICATIONS

Teaching scheme:	**Examination scheme:**
Lectures: 4 hrs / week	**Theory Paper: 100 Marks (3 Hours)**
Practical: 2 hrs / week	**Term work : 25 Marks**

UNIT I
Introduction: General background, frequency allocations for satellite services, basic satellite system, system design considerations, applications. **Satellite Orbits:** Introduction, laws governing satellite motion, orbital parameters, orbital perturbations, Doppler effects, geostationary orbit, antenna look angles, antenna mount, limits of visibility, Earth eclipse of satellite, sun transit outage, inclined orbits, sun-synchronous orbit, launching of geostationary satellites.

Lectures 10, Marks 20

UNIT II
Wave Propagation and Polarization: Introduction, atmospheric losses, ionospheric effects, rain attenuation, other impairments, antenna polarization, polarization of satellite signals, cross polarization discrimination, ionospheric depolarization, rain depolarization, ice depolarization. **Satellite Antenna:** Antenna basics, aperture antennas, parabolic reflectors, offset feed, double reflector antenna shaped reflector systems. **Lectures 10, Marks 20**

UNIT III
Link Design: Introduction, transmission losses, link power budget equation, system noise, carrier to noise ratio for uplink and downlink, combined uplink and downlink carrier to noise ratio, intermodulation noise. **Multiple Access Techniques:** Introduction, FDMA, TDMA, FDMA / DMA, operation in a multiple beam environment, CDMA, multiple access examples .

Lectures 10, Marks 20

UNITT IV
Satellite Transponder: Transponder Model, Satellite front end, RF filtering of digital carrier, Satellite signal processing Transponder limiting. **Communication Satellites:** Introduction, design considerations, lifetime and reliability, spacecraft sub systems, spacecraft mass and power estimations, space segment cost estimates. **Earth Stations:** Introduction, design considerations, general configuration and characteristics. **Lectures 10, Marks 20**

UNIT V
Non Geostationary Orbit Satellite Systems: Introduction, reasons, design considerations, case study, example of systems. **Satellite Applications**: INTELSAT Series, INSAT, VSAT, DBS Television and Radio, Remote sensing, Mobile satellite services: GSM and GPS, Satellite navigation system, DTH, Internet Connectivity, Video Conferencing.

Lectures 10, Marks 20

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References:

1. M. Richharia - Satellite Communications systems, Mc Millan publication ,2nd Ed.
2. Dennis Roddy - Satellite Communications, Mc-Graw Hill publication , 3rd Ed.
3. Timothy Pratt, Charles Bostian, Jeremy Allnut - Satellite communications , John Wiley & Sons , 2nd Ed.
4. J. Martin - Communication Satellite Systems, PHI Publication.
5. Robert M. Gagliardi - Satellite Communication , CBS Publishers and Distributors , 2nd Ed.

Term Work: It is 50% based on theory and 50% based on minimum FIVE assignments on above syllabus (one assignment for each unit)

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TERM - II
EMBEDDED SYSTEM (ELECTIVE II)

Teaching scheme:	**Examination scheme:**
Lectures: 4 hrs / week	**Theory Paper: 100 Marks (3 Hours)**
Practical: 2 hrs / week	**Practical : 25 Marks**
	Term work : 25 Marks

UNIT I
Embedded system Introduction:
Introduction to Embedded System, History, Design challenges, optimizing design metrics, time to market, applications of embedded systems and recent trends in embedded systems, embedded design concepts and definitions, memory management, hardware and software design and testing, communication protocols like SPI, SCI, I2C, CAN etc

Lectures 10, Marks 20

UNIT II
System Architecture:
Introduction to ARM core architecture, ARM extension family, instruction set, thumb Instruction set, Pipeline, memory management, Bus architecture, study of on-chip peripherals like I / O ports, timers, counters, interrupts, on-chip ADC, DAC, RTC modules, WDT, PLL, PWM, USB etc. **Lectures 10, Marks 20**

UNIT III
Interfacing and Programming:
Basic embedded C programs for on-chip peripherals studied in system architecture. Need of interfacing, interfacing techniques, interfacing of different displays including Graphic LCD (320X240), interfacing of input devices including touch screen etc, interfacing of output devices like thermal printer etc., embedded communication using CAN and Ethernet, RF modules, GSM modem for AT command study etc. **Lectures 10, Marks 20**

UNIT III
Real Time Operating System Concept:
Architecture of kernel, task scheduler, ISR, Semaphores, mailbox, message queues, pipes, events, timers, memory management, RTOS services in contrast with traditional OS. Introduction to Ucos II RTOS, study of kernel structure of Ucos II, synchronization in Ucos II, Inter-task communication in Ucos II, memory management in Ucos II, porting of RTOS.

Lectures 10, Marks 20

UNIT V

Embedded Linux:
Introduction to the Linux kernel, Configuring and booting the kernel, the root file system, Root file directories, /bin, /lib etc., Linux file systems, Types of file system: Disk, RAM, Flash, Network. Some debug techniques- Syslog and strace, GDB, TCP / IP Networking- Network configuration, Device control from user space- Accessing hardware directly, Multi processing on Linux and Inter Process Communication- Linux process model and IPCs, Multithreading using pThreads - Threads verses Processes and pThreads, Linux and Real-Time Standard kernel problems and patches. **Lectures 10, Marks 20**

References:

1. Rajkamal - Embedded Systems, TMH.
2. David Simon - Embedded systems software primer, Pearson
3. Steve Furber - ARM System-on-Chip Architecture, Pearson
4. Jean J Labrose - MicroC / OS-II, Indian Low Price Edition
5. DR.K.V.K.K. Prasad - Embedded / real time system, Dreamtech
6. Iyer, Gupta - Embedded real systems Programming , TMH
7. Steve Heath - Embedded System Design , Neuwans

LAB EXERCISE

- Integrated Development Environment Overview (Project creation, down load and debug)
- Study of JTAG Debugger/on-board debugger-emulator.
- ARM Instructions execution (Barrel Shifter, LDR / STR, SMT / LDM)

List of Practical:

GROUP - A

1) Writing basic C-programs for I / O operations
2) C-Program to explore timers / counter
3) C-programs for interrupts
4) Program to demonstrate UART operation

GROUP - B

5) Program to demonstrate I2C Protocol.
6) Program to demonstrate CAN Protocol.

GROUP - C

7) Program to interface LCD
8) Program to interface Keyboard and display key pressed on LCD
9) Program to interface stepper motor

GROUP - D

10) Program to demonstrate RF communication
11) Program to implement AT commands and interface of GSM modem
12) Implementation of USB protocol and transferring data to PC.
13) Implementation of algorithm /program for the microcontroller for low power modes.

uCOS II / Embedded Linux RTOS Examples

GROUP - E

14) Interfacing 4 x 4 matrix keyboards and 16 x 2 characters LCD displays to microcontroller / microprocessor and writing a program using RTOS for displaying a pressed key.
15) Writing a scheduler / working with using RTOS for 4 tasks with priority. The tasks may be keyboard, LCD, LED etc. and porting it on microcontroller/ microprocessor.

GROUP - F

16) Implement a semaphore for any given task switching using RTOS on microcontroller board.
17) Create two tasks, which will print some characters on the serial port, Start the scheduler and observe the behavior.

GROUP – G

18) RTOS based interrupt handling using Embedded Real Time Linux.
19) Program for exploration of (Process creation, Thread creation) using Embedded Real Time Linux.

GROUP – H

20) Program for exploring Message Queues using Embedded Real Time Linux.
21) Ethernet Based Socket Programming using Embedded Real Time Linux.

Note: 1) At least **ONE** practical should be performed from **EACH GROUP**.
2) **TWO** practical should be performed using the **JTAG debugger / on-board Debugger- emulator.**

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TERM - II
DIGITAL IMAGE PROCESSING (ELECTIVE II)

Teaching scheme:
Lectures: 4 hrs / week
Practical: 2 hrs / week

Examination scheme:
Theory Paper: 100 Marks (3 Hours)
Practical : 25 Marks
Term work : 25 Marks

UNIT I

Digital Image Processing:

Introduction, Examples of Fields that use Digital Image Processing, Fundamental Steps in Digital Image Processing, Components of Image Processing Systems, Image Sensing and Acquisition, Image Sampling and Quantization, Representing Digital Images, Spatial and Gray level Resolution, Basic pixel relationship, Distance Measures, Statistical Properties: Histogram, Mean, Standard Deviation, Introduction to DCT, Walsh, Hadamard, and Wavelet Transform.

Lectures 10, Marks 20

UNIT II

Image Enhancement:

Enhancement in Spatial Domain: Basic Gray Level Transformations, Histogram Processing, Enhancements using arithmetic and logical operations, Basics of Spatial Filtering, Smoothening and Sharpening Spatial filters, Enhancement in Frequency Domain: Smoothening and Sharpening frequency Domain Filters. **Lectures 10, Marks 20**

UNIT III

Image Coding and Compression:

Image Coding Fundamentals, Image Compression Model, Error Free Compression, VLC, Huffman, Arithmetic, RLC, Lossless Predictive Coding; Lossy-Compression, Lossy Predictive Coding, Transform Coding, Discrete Cosine Transform, Image Compression Standards, JPEG Baseline Coder Decoder. **Lectures 10, Marks 20**

UNIT IV

Image Restoration and Color Image Processing:

Image Degradation Model, Noise Models, and Restoration in Presence of Noise in spatial Domain, Linear Filtering, Inverse Filter, Wiener Filter, Constrained Least Square Restoration, Geometric Transformation, Spatial Transformation, and Grey Level Transformation. Color Image Processing, Color Image Fundamentals, Color models, RGB to HIS and vice versa, Color Transforms, Smoothing and Sharpening **Lectures 10, Marks 20**

UNIT V

Image Segmentation:

Image Segmentation: Point, line, Edge detection, Canny Edge Detection, Second Order Derivative, Hough Transform, Thresholding, Region Based Segmentation, Region Growing, Region Splitting and Merging, Image Representation, Chain Codes, Signature, Texture, Use of Principal Component for Description. **Lectures 10, Marks 20**

References:

1. Gonzalez and Woods - Digital Image Processing, Pearson Education/ PHI.
2. Arthur Weeks Jr - Fundamentals of Digital Image Processing, PHI.
3. A. K. Jain - Digital Image Processing, PHI
4. Pratt - Digital Image Processing, Wiley
5. Castleman - Digital Image Processing, Pearson

List of Practical:

1. Study of different file formats e.g. BMP, TIFF and extraction of attributes of BMP.
2. Study of statistical properties- mean, standard deviation, profile, variance and Histogram plotting.
3. Histogram equalization and modification of the image.
4. Gray level transformations such as contrast stretching, negative, power law transformation etc.
5. Spatial Domain filtering- smoothing and sharpening filters.
6. DCT / IDCT of given image.
7. Edge detection using Sobel, Prewitt and Roberts operators.
8. Capturing image through grabber card from camera and Process it.
9. Pseudo coloring.
10. Converting color image to B / W image and vice versa
11. Creating noisy image and filtering using MATLAB

Note: Minimum **EIGHT** practicals are to be performed.

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TERM - II

NEURAL NETWORK AND FUZZY SYSTEM (ELECTIVE II)

Teaching scheme:
Lectures: 4 hrs / week
Practical: 2 hrs / week

Examination scheme:
Theory Paper: 100 Marks (3 Hours)
Practical : 25 Marks
Term work : 25 Marks

UNIT I

Introduction:
Biological neurons and their artificial model. Models of neuron: McCulloch-pitts Model, Perceptron, Adaline ,Topology: Basic structures of artificial neural network , Basic learning laws: Hebb's law, Perceptron learning law, Widrow and Hoff LMS learning law, Correlation learning law, Instar and Outstar learning law, Learning Methods: Hebbains learning , Competitive learning, Differential competitive learning , Error correction learning, Reinforcement learning, Stochastic learning.

Lectures 10, Marks 20

UNIT II

Perceptron Layer Network:

Perceptron learning Rule. Perceptron architecture: Single neuron Perceptron, Multiple-Neuron perceptron. Training Multiple neuron Perceptron. Limitations of Perceptron.

Supervised Hebbian Learning:

Linear association, Hebbs rule, Performance analysis, Variation of Hebians rule. Performance Surfaces and Optimum points: Taylor's series, Directional derivatives, Necessary condition for Optimality. **Lectures 10, Marks 20**

UNIT III

Widrow - Hoff Learning:

ADALINE Network, Single ADALINE, Mean square error, LMS algorithm, Analysis of convergence, Adaptive Filtering: Adaptive noise cancellation, Echo cancellation.

Backpropogation Network:

Multilayer Perceptron: Pattern classification, Function approximation. Back propagation algorithm: Performance index, Chain rule, Back propagation the sensitivity. **Lectures 10, Marks 20**

UNIT IV

Fuzzy Mathematics:

Classical sets, fuzzy sets, Fuzzy set operations, Procedure of Fuzzy Sets, Crisp Relations, Fuzzy Relations, Operation of Fuzzy Relations , Fuzzy Tolerance and Equivalence Relations membership functions, Defuzzyfication Methods. Manipulation of Linguistic Variables. **Lectures 10, Marks 20**

UNIT V

Application of Neuro - fuzzy System : Introduction to Neuro - Fuzzy System. Types of Neuro – Fuzzy nets, Neuro – Fuzzy Systems Design and implementation.
Fuzzy classification by equivalence relations: C-means clustering, hardening relations from clustering, Fuzzy pattern recognitions. Control applications: Control system design stages, Control Surface, System Identification Problem, Simple Neuro - Fuzzy Logic Controller, Industrial applications. **Lectures 10, Marks 20**

Reference Books:

1 Fausett - Fundamentals of Neural networks : Architectures, Algorithnors Applications , Pearson
2 B. Yegnanarayana - Artificial Neural Networks, Prentice Hall of India, New Delhi
3 Martin T. Hagan - Neural Network Design , PWS Publishing company (A devision of International Thomson Publishing Inc.)
4 J.M. Zurada - Introduction to Artificial Neural Network, Jaico Publishing House
5 Meherotra Kishan ,Mohan C.K, Ranka Sanjay - Elements Of Artificial Neural networks, Penram Int Pub Mumbai.
6 D.E Goldberg , Addision - Genetic Algorithm in Search Optimization and Machine Learning, Wesley Publication
7 Kalyanmoy Deb - Optimization for Engineering Design Algorithms and Examples, Prentice Hall of India New Delhi
8 George J. Klir / Bo Yuan - Fuzzy Sets And Fuzzy Logic, Prentice Hall of India New Delhi / Pearson
9 T. J. Ross - Fuzzy Logic With Engineering Application , McGraw hill Inc. 1995.

Practical: All the Practicals are based on Any Concerns Software .

1. Design and implementation of artificial neural network to compute XOR for two inputs using feedback artificial neural network.
2. Design a perceptron network to solve Classification problem with different classes of input vectors.(Take two or more classes of input vectors)
3. Design the Perceptron model for pattern recognition. (Take prototype pattern as example)
4. Simulate Adaline algorithm.
5. Implement Back-propagation simulator.
6. Find out the Fuzzy Relation of the given Fuzzy Sets.
7. Verify any one Defuzzification method.
8. Fuzzy pattern recognition.
9. Design any control system using fuzzy logic in simulink

Note: Minimum **EIGHT** practicals are to be performed.

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TERM - II
TELECOMMUNICATION NETWORK MANAGEMENT (ELECTIVE II)

Teaching scheme:	**Examination scheme:**
Lectures: 4 hrs / week	**Theory Paper: 100 Marks (3 Hours)**
Practical: 2 hrs / week	**Practical : 25 Marks**
	Term work : 25 Marks

UNIT I
Foundations and TMN architecture:
Network management standards, network management model, organization model, information model, abstract syntax notation 1 (ASN. 1), encoding structure, macros, functional model. Terminology, functional TMN architecture, Information architecture, physical architecture, TNN tube, TMN and OSI **Lectures10, Marks 20**

UNIT II
Network management application functional requirements:
Configuration management, fault management, performance management, error correlation technology, security management, accounting management, service level management, management service, community definitions, capturing the requirements, simple and formal approaches, semi formal and formal notations **Lectures10, Marks 20**

UNIT III
Information service element and modeling for TMN:
CMISE model, service definitions, errors, scooping and filtering features, synchronization, functional units, association services, common management information protocol specification. Rationale for information modeling, management information model, object oriented modeling paradigm, structure of management information, managed object class definition, management information base (MIB) **Lectures10, Marks 20**

UNIT IV
Simple Network Management Protocol:
SNMPv1: managed networks, SNMP models, organization model, information model, **SNMPv2:** communication model, functional model, major changes in SNMPv2, structure of management information (SMI), MIB, SNMPv2 protocol compatibility with SNMPv1, **SNMPv3:** architecture, applications, MIB security, remote monitoring SM and MIB, RMON1 and RMON2.
Lectures10, Marks 20

UNIT V
Network management examples and tools:
ATM integrated local management interface, ATM, MIB M1, M 2, M 3, M 4 interfaces, ATM digital exchange interface management, digital subscriber loop (DSL) and asymmetric DSL technologies, ADSL configuration management, performance management, network statistics management, network management system, management platform case studies: OPENVIEW, ALMAP **Lectures10, Marks 20**

References:

1. Mani Subramanium - Network management principles and practice , Pearson Education
2. Lakshmi Raman - Fundamentals of Telecommunication Network Management, PHI
3. Airdarous Salah - Telecommunication Network Management Technologies and implementations, PHI

List of Practical:

1. Connectivity of LAN computer to internet using dial up modem / leased line modem (installing and configuration)
2. Installation and configuration of network application like telnet.
3. Users creation, rights assignment, mappling drives, sharing files, printers etc using SNMP. Study and analysis of network
4. Design and implementation of network based on number of nodes and traffic.
5. Implementation of routing algorithms (software based) any TWO practicals, (shortest path)
6. Implementation of encryption and decryption (software based)
7. Campus networking – case study

Note: Minimum **EIGHT** practicals are to be performed, based on above syllabus.

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TERM - II
NANO –TECHNOLOGY (ELECTIVE II)

Teaching scheme:	**Examination scheme:**
Lectures: 4 hrs / week	**Theory Paper: 100 Marks (3 Hours)**
Practical: 2 hrs / week	**Practical : 25 Marks**
	Term work : 25 Marks

UNIT I
Introduction to physics of solid state, Structure of Energy Bands-Insulators, Semiconductors, conductors, Effective masses, Fermi surfaces, localized Particles-Donors, Acceptors, Deep traps.

Nano, size of matter, different kind of small, Nano Challenges, Fundamental science behind Nanotechnology, Electrons, Atoms, Ions, Molecules, Metals, Other material, Biosystems, Molecular Recognition, Electrical conduction and ohm's law, Quantum Mechanics, Quantum ideas **Lectures 10, Marks 20**

UNIT II
Investing and manipulating materials in Nano scale, Electron Microscopies, Scanning probes Microscopies, optical Microcopies for nanoscience and technology
Tools for Measuring Nanostructures, Scanning Probe Instrument, Nanoscale Lithography
Tools for measuring Nanostructures, Scanning probe Instrument, Nanoscale Lithograpthy, Dip. Pen. Lithography, E beam Lithogaphfy, Nanosphere Lithographty, Polarizmatization, nanobricks and building Blocks. **Lectures 10, Marks 20**

UNIT III
Carbon Nano tubes –Synthesis and purification, Filling of Nano tubes, Mechanism of Growth, Electronic Structure, Transport Properties, Mechanical properties, Physical properties, Applications of Nano Tubes such as Field emission and shielding , Computer, Fuel Cell, chemical sensors
Properties of Nanotubes- strength and elasticity, Uses of Nano tubes
Smart Materials, Sensors, nanoscale Bio structure, Energy capture, Transformation and storage, Optics, Electronics, Natural nano scale Sensor, Electromagnetic sensors, Electronics Nose. **Lectures 10, Marks 20**

UNIT IV
Building blocks digital better, Linking brains with computer, FET to SET fabricating new chips, Quantum wells, wires, Dots - preparation of quantum Nanostructures
Synthesis of Quantum Dots - General strategies, Synthesis in Confined Media, Uses of Nano particles.
Semiconductor Quantum Dots, Synthesis of Quantum dots, Electronic Structure of Nanocrystals **Lectures 10, Marks 20**

UNIT V
Nanoelectronics – Introduction, The tools of manufacturing of Micro and nanofabrication optical Lithography, Electron Beam lithography, atomic lithography, Quantum Information and quantum computer , How is quantum computer works and difference between the classical computer.
Application in Medical, Understanding how pharmaceutical, Companies develop drug, Delivering new drug Technology, Oil and Water won't help, Mincells, special delivery cancer with Nanoshell. **Lectures 10, Marks 20**

References:

1. Mark Ratnakar, Daniel Ratnakar – Nanotechnology : A gentle Introduction to Next Big Idea, Prentice hall of India
2. Richard Booker, Eart Boy sen - Nanotechnology Fun and easy way, Wiley
3. Charles P. Poole J.V. Frank J. Owens - Introduction to Nanotechnology , Wiley India ISBN
4. T. Pradeep - Nano: The essentials, understanding Nanoscience and Nanotechnology , TMH
5. Mick Wilson, Kamali Kannangara, Geoff Smith, Michelle Simmons, Burkhard Ragase - NANOTECHNOLOGY basic science and emerging technologies - Overseas press ISBN81 -88689 - 20-3

Note: Minimum **EIGHT** practicals are to be performed, based on above syllabus

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TERM - II
INDUSTRIAL VISIT / CASE STUDY

Teaching scheme:	**Examination scheme:**
NIL	**Term Work : 25 Marks**

EDUCATION TOUR / TECHNICAL VISITS / CASE STUDY AND ITS EVALUATION

1. During (B.E. First Term / Second Term) seventh and / or eighth terms or during vacation between (B.E. First Term / Second Term) seventh and eighth terms, every student; shall visit minimum two industries, factories arranged by colleges and accompanied by teachers. There shall be at least one teacher for a group of 20 students and at least one non-teaching staff accompanied with the students.

2. The colleges should obtain appropriate certificates of visit from the concerned organizations just after the visits.

3. Students should submit written report about the visits individually at the end of (B.E. Second Term) eighth term.

4. The report should contain information about the following points:

   (a) The organization - activities of organization and administrative setup technical personnel and their main duties.
   (b) The project / industry brief description with sketches and salient technical information.
   (c) The work / processes observed with specification of materials, products, equipments etc. and role of engineers in that organization.
   (d) Suggestions (if any) for improvement in the working of those organizations.

5. The evaluation of the report of technical visits will be made by panel of two teachers appointed by principal based on following points:

   (a) Coverage aspect: All above points should be covered.
   (b) Detailed observations: System / Process / Product explained with data, diagram specifications.
   (c) Quality of presentation: Report should be very objective and should consist of clear and systematic organization of topics and information.
   (d) Viva - voce: A viva -voce shall be conducted on the technical visit report by the teachers to assess the specific knowledge gained by the students for technical applications.

6. The case study should include the study problem in Electronics or in Electronics and telecommunication Engineering branch.

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TERM - II
PROJECT II

Teaching scheme:
Practicals: 4 hrs / week

Examination scheme:
Oral : 50 Marks
Term Work : 100 Marks

1. The Project group in (B.E. first Term) seventh term will continue the project work in (B.E. Second Term) eighth term and complete project in all respect (assembly, testing, fabrication, tabulation, test result etc.)
2. The group should maintain a logbook of activities. It should have entries related to the work done, problems faced, solution evolved etc., duly signed by guide.
3. The guides should regularly monitor the progress of the project work.
4. The project work along with project report should be submitted as part of term work in (B.E. Second Term) eighth term on or before the last day of the (B.E. Second Term) eighth term
5. Project report must be submitted in the prescribed format only. No variation in the format will be accepted.
6. Assessment of the project for award of TW marks shall be done by the guide and a departmental committee (consisting of minimum two teachers with experience more than three years) as per the guidelines given in the following table.

B) ASSESSMENT OF PROJECT II TERMWORK (B.E. SECOND TERM)

NAME OF THE PROJECT: ____

NAME OF THE GUIDE: ____

Sr. No	Exam. Seat No	Name Of Students	Assessment by guide (70%)						Assessment by department (30%)			Grand Total
			Fabrication /software / actual work	Executio n of project	Project report	Scope/ Cost / Utility	Attende-nece	Total	Evalu ation (10%)	Prese-ntaion (20%)	Total	
		Marks	20	10	20	10	10	70	10	20	30	100

Sign of Guide Sign. of Committee Members Sign. of H. O. D.

7. The guide should be internal examiner for oral examination (If experience is greater than three years).
8. The external examiner should be from the related area of the concerned project. He should have minimum of five years of experience at degree level / industry.
9. The evaluation at final oral examination should be done jointly by the internal and external examiners.
10. The Project work should be kept in department for one academic year after University Examination .

NORTH MAHARASHTRA UNIVERSITY JALGAON
S.E. (ELCTRICAL) W.E.F 2006 -2007
TERM - I
ENGINEERING MATHEMATICS – III

Teaching Scheme:		Examination Scheme:
Lectures : 4 Hrs/Week	Theory Paper	: 100 Marks (3 Hours)
Tutorials : 1 Hr/Week	Term Work	: 25 Marks

Unit – I : Linear Differential Equations
Linear Differential equation of order n, Solution of LDE with constant coefficient, method of variation of parameters, equations reducible to linear form with constant coefficients, Cauchy's linear equation, Legendre's linear equation.Solution of Simultaneous and Symmetric Simultaneous Differential equation Applications to electrical circuts. Lectures-10, Marks -20

Unit – II : Complex Variables
Functions of complex variables, Analytic functions, C-R equations, Conformal mapping, Billinear transformation, Residue theorem, Cauchy's Integral theorem and Cauchy's Integral formula (without proof). . Lectures-10, Marks -20

Unit – III : Fourier and Z – Transforms
Fourier Transform (FT): Fourier Intergral theorem. Sine and Cosine Integrals. Fourier ,Transform, Fourier Cosine Transform, Fourier Sine Transform and their inverses.,Problems on Wave equation.
Z Transform (ZT): Definition, standard properties (without proof), ZT of standard sequences and Inverse. Solution of simple difference equations, Applications of Z Transform to discrete system analysis.
. Lectures-10, Marks -20

Unit –IV: Laplace Transform (LT)
Definition of LT, Inverse LT. Properties and theorems. LT of standard functions. LT of some special functions viz, error, 1st order Bessel's Periodic, Unit Step, Unit Impulse and Ramp. Problems on finding LT and Inverse LT. Initial and final value theorems.Applications of LT for Network Analysis.
Lectures-10, Marks -20

Unit – V Vector Integration.
a) Applications of partial differential equations to :
1. Vibration of strings or wave equations:

$$\frac{\partial^2 y}{\partial t^2} = a^2 \frac{\partial^2 y}{\partial x^2}$$

2. One dimensional heat flow equation.

$$\frac{\partial u}{\partial t} = a^2 \frac{\partial^2 u}{\partial x^2}$$

3. Laplace equation Two dimensional heat flow equation.

$$\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$$

by separating variables only.

b) Line Integral, Surface and Volume integrals, Gauss's, Stoke's and Green's Theorems (without proof). Applications to problems in Electromagnetic Fields. Lectures-10, Marks -20

REFERENCE BOOKS:

1. Erwin Kreyszig :Advanced Engineering Mathematics , John Wiley and sons
2. H.K. Dass : Advanced Engineering Mathematics , S. Chand
3. Wylie C.R. and Barrett : Advanced Engineering Mathematics , Mc Graw Hill
4. B.S. Grewal : Higher Engineering Mathematics , Khanna Publication, Delhi.
5. B.V. Raman : Engineering Mathematics , Tata Mc- Graw – Hill.
6. P.N. Wartikar and J.N. Wartikar : Applied Mathematics (Volume I and II), Pune Vidhyarthi Griha Prakashan, Pune
7. Thomas L. Harman James Dabney and Norman Richer : Advance Engineering Mathematics with MATLAB, Books/Cole, Thomson Learning 2/e
8. Dr. Gokhale, Dr. Chaudhari and Dr. Singh :Engineering Mathematics – III

Term–I

Electrical Engineering Materials

Teaching Scheme:
Lectures:- 4 Hrs/week
Practical :- 2 Hrs/week

Examination Scheme:
Theory paper :-100 marks (3 Hrs)
Termwork : 25 marks
Practical:25marks

Unit:-I

Introduction :- Classfication of electrical engineering materials based on atomic structure, hydrogen atom,energy levels, bond and arrangement in solid, a generalized treatment and explanation of the microscopic properties of materials from microscopic point of view on the basis of quantum numbers and Pauli's exclusion principle.Crystal structure and defects.

Semi-conducting materials: Bonds in silicon and Germanium ,their electrical properties.Hall effect, its use in Gaussmeter.High resistence materials;Nickel-Chromium alloys,Constantan,Kanthal,tungsten,Molybdenum.

(10 Hrs, 20 Marks)

Unit II

Conducting Materials:Free electrons theory , resistivity of metals,relaxation,collosion time and mean free path. Heat develop in current carring conductor ,Thermal conductivity, wiedmann frenz law, super conductivity,cryotons and other modern application of super conductivity, thermal bimetal,thermocouple materials.

(10 Hrs, 20 Marks)

Unit III

Dielectric properties of insulating material in static field:- static dielectric field, polarisationand dielectric constant , quantitative treatment of dielectric constant of polyatomic molecules, types of polarization , deravation of expression for orientational polarization, internal field and clausius-mossotti relation, ferroelectricity, spontaneous polarization,piezoelectricity.

(10 Hrs, 20 Marks)

Unit IV

Dielectric properties of insulating material in alternating field: complex dielectric constant. Depandance of polarizability on frequency and temperature. Dielectric by circuit equivalent. Breakdown of insulating material, principles of electric breakdown and factor influencing the breakdown strength. Different type of insulating material used for electric machines,transformer, power cable,capacitors and electronic equipment. Testing of insulating material as per i.s. specification.

(10 Hrs, 20 Marks)

Unit V

Magenetic material:- review of magnetic circuit. Magnetic dipole moment, magnetization, induced dipole moment, classification of the maganetic material , domeain structure, spontaneous magnetization and curie wiesse law ,ferromagnetic and ferrites ,electric sheet steel, hot rolled and cold rolled steel, magnetorestrictive naterial, permant magnet material, properties and application of amorphous magnetic material.

(10 Hrs, 20 Marks)

Reference Books

1. A.J.Dekker,Electrical Engineering Materials.
2. S.P.Seth and P.V.Gupta, A course in Electrical Engineering Materials.
3. C.S.Indulkar and S.Thiruvengadam, Electrical Engineering Materials.
4. S.P.Chhaiotra and B.K.Bhat, Electrical Engineering Materials.
5. Electrical Engineering Materials: T.T.T.I Chennai ,TMH.

List of Experiments:-

1.Testing of insulating oil as per I.S.
2.Testing of solid insulating materials as per IS
3. Testing of power capacitors as per IS
4. Measurements of resistivity of conducting materials.
5.Measurements of resistivity of resistive material.
6.Study and use of Gaussmeter.
7.Use of spark gap for measurements of high voltage.
8.To study Seeback and Peltier effects.
9. Study of hysterisis loop of ferromagnetic materials.
10.Study of various insulating materials.

The term work should include a minimum of eight experiment from the above list.

TERM - I
APPLIED THEMODYNAMICS

Teaching scheme	Examination scheme
Lectures:4 Hrs/week	Theory:100 Marks 3 Hrs
Practicals:2 Hrs/week	Termwork : 25 marks

Unit I
Steam generators. Classification, constructional features of process and power boilers, Boiler mountings and accessories, Equivalent evaporation, boiler efficiency ,energy balance , rankine cycle , work power out put, steam consumption ,rankine efficiency ,method to improve efficiency steam turbine classification ,construction and necessity of compounding of steam turbine (10hrs,20 Marks)

Unit II
Internal combustion engine: classification otto and diesel cycles , construction and working of 2 stoke and 4stoke engines, calculations of IP,BP,FP,BSFC,MEP and a efficiencies, heat balance sheet . engine trial and performance. Study of fuel feeding ignition, starting ,governing ,cooling ,lubrication, exhaust and power Take off
(10hrs,20 Marks)

Unit III
Air compressor : uses of compressed air , classification, construction and working of air compressor, power input , concept of clearance volume , swept volume ,single and multi stage compression ,volumetric and isothermal efficiencies and factors affecting these efficiencies. Necessity of cooling of compressor and compressed air , FAD, air motor ,its use, construction and working (10hrs,20 Marks)

Unit IV
Introduction to heat transfer: various models of heat transfer, fundamental laws of conduction , convection and radiation. Concept of thermal conductivity , heat transfer coefficient and emmisivity, concept of black, gray , white body, use of fins on electrical appliances
(10hrs,20 Marks)

Unit V
Refrigeration and air conditioning: Refrigeration effect and its uses. Vapour compression cycle, calculations of vapour compression, Refrigeration system, coefficient of performance, TR capacity. Common refrigerants and their desirable properties. air conditioner and its requirement. Properties of moist air psychometric chart and its use. Psychometric processes such as sensible heating and cooling, humidification and dehumidification. Study of central air conditioning plant. Refrigeration controls and industrial air conditioning . vapour absorption system. (10hrs,20 Marks)

Reference Books

1. P.K.Nag, engineering thermodynamics,.
2. R.K.Rajput., thermal engineering,
3. Gupta and Prakash,. heat transfer,
4. V.Ganeshan, Internal combustion engine,

5. T.Roy chowdhary. Basic thermodynamics,

List of experiments
Group A

1. Study of steam power plant.
2. Study of boiler mountings and accessories.
3. Study of fuel feeding system of an I.C. engine
4. Study of ignition system of an I.C. engine

Group B

5. Study and trial on petrol engine at one load.
6. Study and trial on reciprocating air compressor.
7. Study and trial on refrigeration system.
8. Study and visit of central air conditioning plant.
9. Determination of thermal conductivity of metal rod
10. Determination of Stefan Boltzmann's constant
11. Calculation of fin efficiency in natural and forced convection.
12. Study and trial on diesel engine at one load.

The termwork should include minimum eight experiments, two from group A and six from group B.

Term-I
AC CIRCUITS AND TRANSFORMERS

Teaching scheme	Exam. Scheme
Lectures-4 hrs/week	Theory paper-100marks (3 hrs)
Practicals-4 hrs/week	Term work-25marks
	Practical-50marks

Unit-I

Polyphase systems-Concepts of Polyphase systems, power in balanced and unbalanced three phase circuits, measurment of power in three phase, three wire and four wire systems, two wattmeter method for balanced and unbalanced three phase, three wire system ,balanced three phase loads,modification of two wattmeter method by using a single wattmeter, use of wattmeter readings for determining power factor of the load and its nature (lagging, unity or leading),effect of load power factor on wattmeter readings, measurements of reactive volt-amperes.
Solution of balanced and unbalanced three phase circuits, star-delta and delta-star conversion of impedances , Millmans theorem and its application for solving unbalanced, star connected circuits. (10hrs, 20 Marks)

Unit-II

Single phase Transformers-constructional details ,arrangements of core and coils in shell type and core type transformer, material used for magnetic cores and windings, EMF equation, voltage and current ratios, concept of leakage flux and its effect, resistance leakage reactance and leakage impedances of transformer windings and their effect on the transformer performance, Exact and approximate equipments circuitr referred to either side, general phasor digrams on load and no load, various losses in transformer,their variation with load ,efficiency, maximum efficiency, transformer rating ,voltage regulation, its determination by direct loading and from equivalent circuits, kapps regulation leakage reactance and impedances. (10hrs, 20 Marks)

Unit III

Polyphase Transformers-connecting a bank of three identical single phase transformer for three phase transformation, construction of shell type and core type three phase transformers, comparison between a bank of three identical single phase transformers and a single three phase transformer .
Standard connections for three phase transformers, their voltage phasor diagrams, phasor groups,sutability of particular connection for suppling unbalanced loads, floating neutral. Parallel operation of three phase transformers, three winding transformers, tertiary winding ,use of tertiary windings in three phase transformers, moving coil voltage regulator ,construction and operation. (10hrs, 20 Marks)

Unit IV

Descriptive treatment of non-sinusoidal waveform of the magnetizing currents of a transformer with sinusoidal applied voltage, sketching this waveform and that of the sinusoidal flux from the B-H curve of the magnetic core , concepts of harmonics and the presence of third harmonics in the magnetizing current of a transformer ,autotransformer and

dimmerstat their rating and use., comparision between auto transformer and two winding transformer ,connecting two winding transformer use as an auto transformer,its voltage, current and kva rating as an auto transformer.
Parallel operation of single transformers ,conditions to be satisfied, equivalent circuits and phasor diagrams. Load sharing under various conditions . (10hrs, 20 Marks)

Unit V

Special transformer connections- V and T connection of two single phase transformer for three phase to three phase transformation, their phasor diagrams, applications, scott connection for three phase to two phase transformation and vice-versa ,voltage ratios of the transformers , phasor diagrams of voltage and currents of the input and output sides for balanced and unbalanced loads, application.(4hrs)
Testing of transformers- concept of polarity of transformer windings, standard practice of marking transformer winding terminals ,polarity test using ac supply and voltmeter, polarity test using a battery, tap key and dc galvanometer.
Open circuit and short circuit tests, methods of carrying out the tests and information obtained from these , sumpners test, IS Specifications of transformers, concepts of routing type test, testing of transformers as per IS specifiacations. (10hrs, 20 Marks)

Referance Books

1. M. G. Say , The performance and design of AC machines
2. A. S. Langsdrof , “Theory of AC machinery, second edition”, Tata mcgraw hill.
3. Kerchner and Corcoran , AC Circuits, Wiley eastern.
4. Edward Haughes. ,Electrical tech., 6th edition .
5. V.N.Mittle , Basic elect. Engg., Tata mcgraw hill.

List of Experiments

1. Open circuit and short circuit test on a single phase transformer.
2. Polarity test on single phase and three phase transformer 1)using an ac supply and voltmeter 2)using battery, tap key and dc galvanometer.
3. Sumpners test on two identical single phase transformers.
4. Parallel operation of two single phase transformer.
5. Study of connections for three phase transformers.
6. V connection of two single phase transformers on no load and at balanced load.
7. T connection of two single phase transformer on no load and at balanced load.
8. Scott connection of two single phase transformers on no load and at balanced load.
9. a) Study of two wattmeter method for balanced & unbalanced 3-phase loads.
   b) Effect of load p.f. on wattmeter reading in case of balanced laod.

10) Measurement of reactive voltamperers in 3-phase balanced loads.
11) Verification of millmans theorem
12) Study the no-load current waveform of 1-phase transformer on a CRO.

The term work should include a minimum 10 experiments from the above list.

Term-I
Electrical Measurement-I

Teaching scheme:
Lectures: 4 Hrs/week
Practicals : 2 Hrs/week

Examination Scheme:
Theory paper 100 Marks. (3 Hrs)
Term work : 25 Marks
Practical :50 Marks

Unit I

International system of units, dimension of Electrical quantities, Absolute measurements of current and resistance.

Magnetic measurements: Fluxmeter, B-H curve of a ring specimen, hystersis loop, permeameters, Iron loss test at power frequency, effect of voltage, frequency and form factor iron loss, separation of iron losses.

(10 Hrs, 20 Marks)

Unit II

Measurements of resistance : Classification, Ohm meter, ratio-meter, D.C. potentiometer, Kelvin's double bridge, measurements of high restistance, measurment of earth resistance and resistivity, bridge megger and ductor megger, measurement of insulation resistance.

(10 Hrs, 20 Marks)

Unit III

Measuring instruments (General theory) : Static and Dynamic Characteristic of an instrument, accuracy, linearity, reproductivity, sensitivity, resolution, speed of response.

Galvanometer : Construction, deflection, controlling, damping, balancing systems, D'Arsonval, Ballistic and vibration galvanometers.

(10 Hrs, 20 Marks)

Unit IV

Ammeters and Voltmeters : Construction, Principle of operations, torque equations and errors of PMMC, Moving iron and Electro-static instruments. Extension of ranges using short and multipliers.

Instrument transformers : Theory, expression for ratio and phase angle errors. Design consideration and testing. Precautions in using the instruments transformers.

(10 Hrs, 20 Marks)

Unit V

Wattmeters and Energymeters : Construction and principle of operation of electrodynamic and condution type wattmeter. Construction and working of low P. F. wattmeters, Errors and their compensation. Construction and principle of operation and torque equation for the induction type of energymeter. Error and adjustments.

(10 Hrs, 20 Marks)

Reference Books:

1. E. W. Golding. , Electrical Measurements and Measuring instruments.
2. C. T. Baldwin. , Fundamentals of electrical Measurements.
3. Cooper and Derfllick , Electronic instrumentation and measurements Techniques, 3rd edition, Prentice-Hall of India.

List of Experiments :

1. Barlow method of measurements of power using two CT's
2. Barlow method of measurement of power using P.T.
3. Measurement of the power in 3-phase 4-wire circuit.
4. Calibration of single phase energy meter at different P.F.'s
5. Calibration of three phase two elements energy meter at different P.F.'s
6. Use D.C. potentiometer for calibration of ammeter and voltmeter.
7. Kelvin's double bridge.
8. Anderson's bridge.
9. Epstein square.
10. Measurements of phase angle error and ration error of C.T.
11. Measurements of phase angle error and ration error of P.T.
12. Measurement of earth resistance.

The term work should include a minimum ten experiments from the above list.

Term - II

Analog and Digital Electronics

Teaching Scheme:
Lecture: 4 Hrs./week
Practical: 2 Hrs./week

Examination Scheme:
Theory: 100 Marks(3Hours)
Term work: 25 Marks
Practical: 25 Marks

UNIT –I

Introduction, BJT amplifier with reference to operational analysis of CE and CC configuration, FET amplifier , Multistage amplifier, differential amplifier . Operational amplifier, basic configuration differential, inverting ,non inverting, summer and substractor . Op-amp parameters (concept only) CMRR,slew rate , frequency response and gain limitations. (10 hrs,20 Marks)

UNIT- II

Op-amp applications: Integrator , differential , comparator , Schmitt trigger, instrumentation amplifier , precision rectifiers, zero crossing detectors.

Waveform generation using Op-amp – sine, square , saw tooth, and triangular. IC 555 modes of operation-astable, monostable, clock generation. (10 hrs,20 Marks)

UNIT-III

Feedback type of series voltage regulator , protection circuits , fixed and variable voltage regulators using Ics Viz 78xx,79xx,LM723, LM317, study of VCO and PLL.
ADC-sar,dual slope type
DAC-binary weighted ladder type (10 hrs,20 Marks)

UNIT-IV

Flip flop- RS latches, D-latches, edge triggered, D flip flop, edge triggered JK flip flop, JK flip flop, JKmaster slave flip flop opto coupler , opto isolator, opto decoder, opto encoder (10 hrs,20 Marks)

UNIT-V

Buffer register,shift register controlled shift register, ripple counter, synchronous counter, twisted ring counter,N module counter, down counter, up – down counter, three stage registers. (10 hrs,20 Marks)

Reference Books:-

1.Gaikwad R,Operational amplifier, PHI New Delhi
2.K.R.Botkar,Integrated circuit , Khanna Publication,New Delhi

Lab experiments:-

1) Op-amp as square & sine wave generator
2) Op-amp as comparator & Schmitt trigger
3) Instrumentation amplifier using 3 Op-amps
4) IC 555 application – astable, monostable,square wave generator, square counter
5) IC 565/4046 application ,calculation of lock range and capture range
6) Study of JK flip flop
7) A to D & D to A converter using ADC 0808 and DAC 0808
8) Study of up down counter & N-modulo counter
9) Study of IC 723 as low / high voltage regulator
10) IC 7805 used as fixed voltage regulator, elevated voltage and current, constant current source

Term-II

Digital Computational Techniques & Programing.

Teaching scheme:
Lectures: 4 Hrs./ week.
Practical: 2 Hrs./ week.

Examination Scheme:
Theory Paper:100 marks((3 Hrs)
Term work: 25 Marks.

Unit I

Number systems & errors in digital computations; Transcendental & polynomial equations; concept of roots of an equation & methods to find the same. Bisection method, Secant method, Newton- Raphson method, Muller methods, Regula-Falsi method. Method of matrix Inversion(Shipley inversion method)

(10Hrs, 20 marks)

Unit II

Linear algebraic simultaneous equations: Cramer's rule,Gauss method, Substitution method (Forward & Backward substitution), Gauss Elimination, Gauss Jordan, Jacobi Iteration, Triangular Factorization (L-U Factorization),Gauss Seidal method.
Non Linear algebraic simultaneous equations: Newton- Raphson method.

(10Hrs, 20 marks)

Unit III

Interpolation: Lagrange & Newton interpolations; finite difference operators, interpolating polynomials using finite differences, Least squares approximation.

(10Hrs, 20 marks)

Unit IV

Differentiation & Integration: Numerical differentiation methods based on interpolation, finite differences, undetermined coefficients. Integration using Simpson's & Trapezoidal rule.

(10Hrs, 20 marks)

Unit V

Ordinary differential equations: Euler's method, Taylor series method, Runge-Kutta methods, and predictor-corrector methods.

(10Hrs, 20 marks)

Reference Books:

1) Jain & Iyengar , Numerical Methods for Scientific & Engineering Computation, 3rd edition, , New Age international.
2) S.K. Gupta , Numerical methods for Engineers, New Age international.
3) Anita, Numerical methods for scientists & Engineers, Tata McGraw Hill.
4) S.S. Shashtry, Introductory methods of Numericals, Tata McGraw Hill.
5) Rajaraman,Numerical methods & computations, Tata McGraw Hill.
6) Yashwant Kanitkar., Let us C.

List of Programs: (To be written in ‘C’ language.)

1) Program to evaluate truncation error in a series.
2) To find roots of polynomial using any iterative method.
3) Solution of simultaneous linear algebraic equations.
4) Evaluation of interpolating polynomial.
5) Differentiation using numerical differentiation.
6) Integration using numerical integration.
7) Solution of differential equations.

The term work should include six programs from above list, executed on the computer.
Note: In theory paper, questions may be asked on numerical methods or algorithms/programs used for solving on the computer.

Term-II

Network Analysis

Teaching Scheme:	Examination Scheme:
Lecturer: 04 Hrs/Week	Paper: 100 Marks(03 Hrs.)
Practical: 02 Hrs/Week	Term Work : 25 Marks
Tutorial: 01 Hr./Week	Practical: 25 Marks

Unit I:

Network Definations , lumped, distributed, linear and non linear, bilateral and unilateral and time variant and time invariant, space variant and space invariant networks, mesh and node circuit analysis concept of supper node and supper mesh, concept of voltage and current divider mutual inductance, dot convention for coupled circuits , concept of duality and dual networks

Topological description of network: Graph oriented graph, Branches, nodes, planner and non planner graph, sub graph, trees and chords.

Network equations: Number of network equations, source transformations, formulation of network equations, loop variable analysis, node variable analysis, determines- minor and gauss elimination method, state variable analysis

Initial conditions in network: Initial conditions in elements, procedure for evaluating initial conditions, initial state of network (10 Hrs,20 Marks)

Unit II

Second order differential equation- internal excitation, solution and initial conditions, network excited by external energy source, solution and initial conditions.

Laplace Transformation: Transforms of linear combinations, transforms of derivatives, transforms of integrals, solution of problem with laplace transformation, partial fraction expansion, Heavisides expansion theorem, Example of solution by laplace transmission, laplace transforms of standard functions, shifted waveforms – unit step, ramp and impulse, initial and final value of f(t) from f(s). (10 Hrs,20 Marks)

Unit III

Impedance functions and network theorems: Concepts of complex frequency, transform impedance and transform circuits, series and parallel combinations of elements, super position and reciprocity theorem, Thevenin’s and Norton’s theorem and Milliman’s and Tellegn’s theorem and maximum power transfer theorem.

Network functions, poles and zeros : terminal pairs of ports, network functions for one port and two port network, impedance (or admittance) function, voltage transfer function, transfer impedance, transfer admittance, calculation of network function, lader network, bridge T , parallel T and Lattice networks, poles and zeros of network functions, restrictions on poles and zero location of driving point function- transfer function, time domain behaviour from pole zero plot. (10Hrs,20 Marks)

Unit IV

Two-port parameters : z parameter , y parameter, h parameters, transmission (abcd) parameter, relation between various parameters, inter connection of two port network,

cascade connection of two port network, parallel connection of two port network, series connection and series parallel connection of two port network.
Fourier series and signal spectra: Fourier series, evaluation of Fourier coefficients, waveform symmetries as related to Fourier coefficients, exponential form of Fourier series. (10Hrs,20 Marks)

Unit V
Sinusoidal steady –state analysis : Sinusoidal steady state , sinusoid and e+,solusition using e+jwt, phasor diagram, analysis of series resonating and parallel resonating R-L-C circuit, Q factor resonance frequence and band width of the series resonating and parallel resonating R-L-C circuit, power, power transfer and insertion loss : energy and power, average and complex power, optimizing power insertion loss, (10 Hrs,20 Marks)

Reference Books :

1. M.E. Van Valkenberg ,Network Analysis , third edition, Printice Hall of India.
2. William Hayt, Jack Kemmerly,Engineering circuits analysis, fifth editions, McGraw Hill International edition.
3. D. Roy Choudhary,Networks and systems, New Age International.
4. Franklin Koo, Network analysis and Synthesis, New Age International
5. Shyam Mohan and sudhakar, Network Analysis, TMH Publications.

List of Experiments:

1. Verifications of Thevenin’s Theorem for two port network.
2. Verification of Norton’s Theorem for two port network.
3. Verification of Superposition Theorem for two port network.
4. Pole and Zero plot of one port network.
5. Measurement of Z parameter of two port network.
6. Measurement of Y parameter of two port network.
7. Measurement of ABCD parameter of two port network.
8. Two plot frequency response of series RLC circuit.
9. Two plot frequency response of parallel RLC circuit.
10. To study power transfer and insertion loss.

The termwork should include minimum eight experiment from the above list.

Term -II

Electrical Machines-I

Examination scheme:
Theory Paper:100 marks(3hrs)
Practical:2Hrs/week
Term work: 25 marks

Teaching scheme:
Lectures:4Hrs/week
Practical: 25 marks

Unit -I

D.C .Machines: Construction of field system, flux distribution and fringing, magnetic leakage, magnetization curve, construction of armature and its main parts, commutator,
Brush rockers and brush gears, type of armature windings type of enclosures

D.C.generator: Basic principles of working e.m.f. Equation, types, characteristics and applications of different types of d.c.generator. building up of e.mf .in d.c. shunt generator and causes of failures, remedies (10 Hrs, 20 Marks)

Unit-II

D.C.Motors:-Basic principles of working,significance of back e.m.f. torque equation,types,characteristics and applications of different types of d.c. motors,starting,
Reversing and speed control by armature voltage and field control.and starers. Armature reaction in d.c. machines,effect on field with and without brush lead,
Effect of saturation ,demagnetising and crossmagnetising mmfs and their estimation,remedies to overcome armature reaction (10 Hrs, 20 Marks)

Unit –III

Process of commutation, types of commutation, reactance voltage, straight line commutation,with variable current density,under and over commutation ,causes of bad commutation and remedies. Interpoles,compensating windings

Losses and efficiency of d.c.machines, condition of maxium efficiency and maximum power output,effect of saturation and armature reaction on losses

Testing of d.c.machines: insulation resistance test ,break test,Swinburne's test,regenerative test on series and shunt motors,separation of various losses,retaration test,heat run and temperature rise test , commutation test,armature faults,types of routine tests according to I.S.I.specification. (10 Hrs, 20 Marks)

Unit-IV

Poly phase induction machines:-construction ,production of rotating magnet fields,
Principles of working,induction motor as grneralised transformer,simplified theory with constant flux,slip,rotor e.m.f.,current,.power,torque relations,torque slip characteristics,condition for maximum torque ,exact and approximate equivalent circuit,circle diagram computation,experimrntal test for ploting circle diagram

(10 Hrs, 20 Marks)

Unit-V

Methods of starting of slipring and cage rotor induction motor,varies types of starters,high starting torque squirrel cage motors,double squirrel cage motors,industrial applications of different types of motors,cogging,crawling and noice production in induction motor

Speed and power factor control of motors: -Rheostatic speed control,phase advancers,speed adjustment by pole changing,speed control by change of frequency,cascading.
Induction voltage regulators,induction generator.test as per I.S.I.specification.

(10 Hrs, 20 Marks)

Reference Books: -

1) E.W.Clayton.Design and performance of d.c.machines-
2) M.G.Say. Design and performance of a.c.machines-
3) Langsdorf A.C.machines,TMH.
4) P.C.Sen. D.C.machines- - Langsdorf,TMH.
5) Nagrath and Kothari   Electric machine –TMH

Lists of experiments.

Group A

1) Determination of magnetization ,external and internal characteristics of d.c. shunt generator.
2) Determination of magnetization ,external and internal characteristics of d.c. series generator.
3) Determination of external characteristics of d.c. compound generator.as 1) differtial compound ii) cumulative compound generator.
4) Speed control of D.C shunt motor by armature and field control
5) A) Study of 3 and 4 point starters B) Reversal of motor rotation.
6) Load test on d.c.shunt motor.

Group B

7) Load test on induction motor
8) Determination of performance of induction motor from circle diagram.
9) Study of induction motor starters.
10) Speed control of slip ring induction motors using rotor resistance method.
11) Determination of equivalent circuit from no load and blocked rotor test
On induction motor.

The term work should include minimum eight experiments (four from each group A and B)

Term-II
POWER SYSTEM -I

TEACHING SCHEME: Examination scheme:
Lectures:4 Hrs/week Paper: 100 Marks(3Hrs)
Term work: 25Marks

UNIT I:

Generation: types of generating plants, basic requirements, site selection, principle of working ,main components and auxiliary components ,schematic block diagram and role played by each block for Hydro ,thermal, nuclear plants using conventional fuels.

(10 hrs,20 Marks)

UNIT II:

Non-conventional sources of energy: like solar, tidal, MHD, fuel cells, geo-thermal energy, principle of working, main components and auxiliary components, schematic block diagram and role played by each block

(10 hrs,20 Marks)

UNIT III:

Power plant terminology: load, demand. Classification of power plants as Base load Peak load & Intermediate load plants. Hydrograph, Flow duration curve. Load curves, Load duration curve , Load factors , Demand factor , Diversity factor, Plant capacity factor, Plant use factor.

(10 hrs,20 Marks)

UNIT IV

Major electrical equipments in power plants: descriptive treatment of ratings, special features, field of use of equipments like alternators, transformers, busbars, exciters, and excitation systems, control panels, metering and control room equipments in generating stations.

(10 hrs, 20 Marks)

UNIT V

Transmission : Importance of 3 phase overhead transmission lines in power systems & factors to be considered while planning their layout. Resistance, skin effect, Inductance and its estimation for two-wire-single-phase, 3-wire-3-phase, single and double circuit lines, with and without transposition, equal/unequal and horizontal spacing. Circuit representation of lines: Classification of lines based on length as short, medium & long transmission lines. Representation of transmission line as tee & pie ckts using r-l-c parameter, voltage and current relation of short & medium transmission line (10 hrs,20 Marks)

Reference Books: -

1. B.R.GUPTA, Generation of electrical energy, S Chand publication
2. William Stevenson ,Elements of Power System Analysis M-H international addition
3. OllE Elgerd, Electrical energy system theory second edition, TMH.
4. J.B.Gupta A course in electrical power system, Dhanpat Rai and sons' Publication.

NORTH MAHARASHTRA UNIVERSITY, JALGAON

SE (ELECTRICAL) REVISED SYLLABUS TERM-II
(WITH EFFECT FROM JULY 2006)

ELECTRICAL WORKSHOP

Teaching scheme:	Examination Scheme:
Practical: 2 Hours/week	Term Work: 50 Marks

1) **Study of different wires** – size of wires, standard wires, TRC and CTS wires, weather proof wires, Flexible wires.
2) **Study of wiring accessories-** Types of switches, types of lamp holders, ceiling rose, mounting blocks, socket outlets plugs, wooden boards, main switches (ICDP/ICTP), Junction boxes, Distribution boxes, Fuse boards, fuses.
3) **Lamp circuits-** Simple circuit, series parallel circuit, Motor switches circuit.
4) **Underground Cable-** Fiber optic cable, Cable insulation, Types of three Phase cable, Cable joining, Coaxial cable, Twisted pair cable, Flat ribbon cable.
5) **Study and use of DC / AC voltmeter-** Study and use of DC/AC ammeter.
6) **Study and use** of Analog multi-meter to measure electrical quantities. Study and use of Digital multi-meter to measure electrical quantities.
7) **Study and use** of Megger.
8) **Electrical Shocks and safety precautions**.
9) **Industrial Visit-** Electrical substation, electrical workshop, electrical process industries (minimum two visits) and its reports.

Reference Books-

1) S L Uppal ,Electrical wiring, Estimation and Costing
2) Surjit Singh, Electrical wiring, Estimation and Costing
3) S K Bhattacharya, Electrical wiring, Estimation and Costing
4) B R Gupta, Electrical wiring, Estimation and Costing

Faculty of Engineering & Technology

।।अंतरी पेटवू ज्ञानज्योत।।

NORTH MAHARASHTRA UNIVERSITY, JALGAON.

Syllabus For

THIRD YEAR ENGINEERING (T.E.)

ELECTRICAL ENGINEERING

TERM- I & II

(W.E.F.2007-2008)

NORTH MAHARASHTRA UNIVERSITY, JALGAON
STRUCTURE OF TEACHING AND EVALUATION
T.E.(*ELECTRICAL ENGINEERING*)
FIRST TERM
W.E.F. 2007-08

Sr. No	Subject	Teaching Scheme Hours/week			Examination Scheme				
		Lectures	Tutorial	Practical	Paper Duration Hours	Paper	TW	PR	OR
1	Electrical Installation, Estimation and Distribution	4	--	2	3	100	25	--	--
2	*Electromagnetic Engineering	4	1	--	3	100	25	--	--
3	Power System-II	4	--	2	3	100	25	25	--
4	Electrical Machines-II	4	--	2	3	100	25	25	--
5	Microprocessor and Micro controller	4	--	2	3	100	25	25	--
6	Software Applications	--	--	2	--	--	50	--	--
	Total	**20**	**1**	**10**	**--**	**500**	**175**	**75**	**--**
	Grand Total	**31**			**750**				

SECOND TERM

Sr. No	Subject	Teaching Scheme Hours/week			Examination Scheme				
		Lectures	Tutorial	Practical	Paper Duration Hours	Paper	TW	PR	OR
1	Power Electronics	4	--	2	3	100	25	--	--
2	Electrical Measurement-II	4	--	2	3	100	25	25	--
3	Control System-I	4	--	2	3	100	25	25	--
4	Electrical Machine Design-I	4	--	4	3	100	50	--	25
5	Industrial Organization and Management	4	1	--	3	100	25	--	--
6	Practical Training / Mini Project / Special Study	--	--	2	--	--	25	--	--
	Total	**20**	**1**	**12**	**--**	**500**	**175**	**50**	**25**
	Grand Total	**33**			**750**				

* Common with TE (Electronics, Electronics and Communication, Electronics and Telecommunication).

NORTH MAHARASHTRA UNIVERSITY JALGAON
T.E. (ELECTRICAL)
W.E.F : 2007- 08
TERM – I

Electrical Installation , Estimation and Distribution

Teaching Scheme	**Examination scheme :**
Lectures : 4 Hrs/ week	**Paper :** 100 marks (3Hrs)
Drawing : 2 Hrs / week	**Term work :** 25 marks

Unit I

Supply Systems : typical transmission and distribution system from generation to utilization (overall layout). A.C. transmission , d.c. transmission and comparison between them .

Types of transmission : overhead transmission , underground transmission and comparison between them.

Various systems of transmission: dc systems –two wire dc, two wire dc with midpoint earthed, dc three wire system; single –phase systems – single –phase two wire , -single phase two wire with midpoint earthed , single phase three wire system; two –phase ac systems ; two phase three wire system, two phase four wire system ; three phase a.c. system- three phase three wire system, three- phase four wire system.

Cost of conductors in overhead and underground systems.

Different types of tariffs. **(10 Hrs. : 20 marks)**

Unit II

Overhead transmit line components : The support –poles , towers , and their types ; cross arm and clamps ; guys and stays. Conductors-characteristics of conductor material , types of conductor- solid conductor , bundle conductor, concentrically standard conductor (AAC, ACAR conductor). Insulators – types (pin , strain, shackle and suspension insulator), comparison between them, requirement of material, failure of insulators, testing and protection od insulators..

Fuses –types and operation .

Underground cables ; classification , construction of cable, requirements of insulating materials , insulation resistance , capacitance dielectric stress in single-core/multi-core/ sheathed /armored cables. Grading cables – capacitance grading and inter sheath grading. Causes of failure of underground cables, cable faults and location of faults.

(10 Hrs. : 20 marks)

Unit III

Earthing : Neutral Earthing methods-solid ,resistance ,reactance, voltage transformer, zig-zag transformer .

Design of distribution system : A.C. distribution – service mains design , design of radical and ring distributors for concentrated , distributed loads and combination of both types of loads, feeder design based on Kelvin's law Lamp Flickers-types and design, Application of capacitors to distribution system. **(10 Hrs. : 20 marks)**

Unit IV

Alarm and timer circuits ; basic alarm circuits for audible and visible signals, types of timers, time sequence charts for reset and sequential timers, time delay relay circuits, thermal time delay and electronic time delay relays, contactors.

Control panel : Introduction , advantages , symbols used on control panels, types of control panel, control panel components , toggle switches , controllers, timers, relays, protection circuits; introduction to SCADA and PLC panels ,distribution automation

(10 Hrs. : 20 marks)

Unit V

Illumination : nature of light , definitions –plane angle , luminous flux luminous intensity , illuminance and their units, luminous efficiency ; laws of illumination – inverse square law and Lambert's cosine law , polar curves.

Requirements of good lighting scheme: Polar curves, direct, indirect , semi direct , semi-indirect lighting.

Design of lighting scheme : factors to be considered , working plane space to height ratio, absorption factor, maintenance factor , depreciation factor , coefficient of utilization ; design of illumination schemes for industrial workshops assembly halls, street lighting.

Design of flood lighting schemes: factors like reflection factor , waste light factor and beam factor and design of such schemes for typical installation.

Design and Estimation : design and estimation of installation of domestic , commercial , industrial heads as peer IE rules and IS 732 ; design and estimation of town or village electrification schemes as per IE rules and IS 732 **(10 Hrs. : 20 marks)**

Drawing sheets;

1. Transmission line components : Five insulators –one piece pin, three piece pin type , suspension insulator (one disc) string insulator (one disc), shackle insulator; towers for single circuit and double circuit lines; lightening arrestor, stays, clamps, pin; typical pole including service mains, HT, LT lines supporting pole , 'H' type pole.
2. Distribution substation; Two views (front view and side view) of distribution substation layout ; single line diagram, pipe earthing , plate earthing.
3. Wiring diagrams and symbols**:** minimum 25 symbols as per IS standards.
   Any four circuit diagram out of the following: 1 Rotor resistance starter, 2. Scooter /motor cycle electric wiring diagram,
4. Lift (passenger /goods) or crane, 4. Automatic star /delta starter, 5. Auto synchronous motor starter, 6. Battery charging circuit, 7. Maximum demand indicator.
5. Project on illumination design of laboratory / workshop or small scale industrial establishment along with estimation.
6. Project on electrification of given area showing distributors , feeders and substations along with estimation.

The term work should include five drawing sheets and reports based on the above topics.

References

	Author	Name	Publisher
1.	J.B.Gupta	Transmission and Distribution	S.K.Kataria and Sons, New Delhi.
2.	S.L.Uppal	Electrical Wiring , Estimation and costing	Khanna Publishers, New Delhi.
3.	W.N.Alerich	Electric motor control	D.B.Taraportwala and Sons, Mumbai
4.	S.L.Uppal	Electric Power	Khanna publishers, New Delhi.
5.	H.Pratap	Art and Science of Electrical Utilization	Dhanpat Rai and Sons, New Delhi.
6.	B.D.Arora	Electric Wiring, Estimating and Costing	New Heights, New Delhi

7. I.E.Rules.
8. Practical Relay Circuits, Frank J.Oliver, D.B. Taraporewala and Sons , Mumbai -1

NORTH MAHARASHTRA UNIVERSITY JALGAON
T.E. (ELECTRONICS, ELECTRONICS and COMMUNICATION, ELECTRONICS and TELECOMMUNICATION,ELECTRICAL)
W.E.F : 2007- 08
TERM – I

ELECTROMAGNETIC ENGINEERING

Teaching scheme:
Lectures : 4 hrs/week
Tutorial : 1 hrs/week

Examination scheme:
Theory Paper : 100 Marks (3 Hrs).
Term Work : 25 Marks

UNIT – I

Electrostatics:- Coulomb's law, Electric field due to line charge, Sheet charge and volume charge densities,
Electric flux density, Gauss's law and Divergence theorem. Energy, Potential and Work-done, Potential
gradient. Dipole and its electric field, Dipole movement. Energy density in electrostatic field.
Lectures-10, Marks -20

UNIT-II

Conductor, Dielectrics and Capacitance:- Current and current density. Current continuity equation, Properties of conductors, Boundary conditions (C.D.I. and D.D.I.). Energy stored in capacitors, Poisson's and Laplace's equation's, Capacitance between parallel plates and co-axial cable using Laplace's equation. **Lectures-10, Marks -20**

UNIT-III

Magnetostatics:- Biot-Sarverts law and its vectorial form, Magnetic field due to infinitely long current carrying conductor ,Ampere's Circuital law. Application to co-axial cable. Curl operator, Magnetic flux density, Stoke's theorem. Scalar and Vector magnetic potential. Lorentz's Force equation. Energy stored in magnetic field. **Lectures-10, Marks -20**

UNIT-IV

Time Varying Fields:- Faradays law , Maxwell's equations (Differential , Integral and Phasor forms). Uniform plane waves. Representation of wave motion in free space, perfect dielectrics and Lossy dielectrics (Wave equations). Pointing Theorem and Power density. Propagation in good conductor and Skin effect. Reflection of Uniform plane waves. VSWR.
Impedance matching ,Single stub and Double stub transmission line. Introduction to Smith Chart. **Lectures-10, Marks -20**

UNIT-V

Radiation and antennas: - Radiation resistance. Radiation pattern. Calculation of Radiation resistance for short dipole, Short monopole, Half-wave dipole and Quarter-wave monopole antennas. Directivity, Reciprocity between Transmitting and Receiving antennas, Hertzian dipole, Vector retarded potential.
Types of Antennas: - Folded dipole, Yagi-uda, Horn antenna, Parabolic and Cassegrain feed antenna. Broadside, End fire, Binomial, Tchebysheff antenna arrays. Principle pattern multiplication, General pattern of two isotropic radiators,. **Lectures-10, Marks -20**

REFERENCES:

1) **"Engineering Electromagnetic" by W. Hayt, TMH. (5th or 7th edition).**
2) **"Antenna and Wave Propagation" by K. D. Prasad , Satya Prakashan.**

Topics	Reference No / Name and Author	Lectures
Unit-I	1(Hayt)	10 Lectures
Unit-II	1(Hayt)	10 Lectures
Unit-III	1(Hayt)	10 Lectures
Unit-IV	1 and 2 (Hayt) and K. D. Prasad	10 Lectures
Unit-V	1(Hayt) K. D. Prasad	10 Lectures

Termwork:- Assignment for the termwork will be based on the problems on each unit (min.FIVE Assignment).

NORTH MAHARASHTRA UNIVERSITY JALGAON
T.E. (ELECTRICAL)
W.E.F : 2007- 08
TERM – I
POWER SYSTEM-II

Teaching scheme:	**Examination scheme:**
Lectures-4 hrs/week	**Theory scheme**: 100 marks (3hrs)
Practical: 2 hrs/week	**Term work**: 25 marks
	Practicle: 25 marks

Unit-I

Introduction: - Growth of national and international power system, constituents of power systemand role, role of digital computers in operation control and analysis of power system, different aspect of power system analysis and necessity ,relationship, and use of both under normal and abnormal condition .

Complex power: Real, reactive , complex power component, load on system and it's composition, nature and variation, load voltage frequency ,real power load frequency, real power load voltage frequency, reactive power load voltage dependency and method of voltage control. **(10 hrs, 20 marks)**

Unit-II

Long transmission line: V/I relation, hyperbolic equation, ABCD constants, propagation constant, surge impedance and loading, incident and reflected voltage/ current efficiency and regulation on load, equivalent " T " and " π " models, Ferranti effect.

Power system model: Single line impedance and reactance diagrams and their use, PU system, relation, selection of base, reduction of common base and advantages, application of impedance diagrams, representation and modeling of 3 winding transformer,

(10 hrs, 20 marks)

Unit-III

Symmetrical Fault analysis:- 3 phase s.c. analysis of unloaded alternator – subtransient, transient and steady state current , impedances , dc offset ,effect of instant s.c. on the waveforms ,estimation of fault currents with and with-out pre fault current for simple power system ,selection of circuit breakers and current limiting reactors.

Unit-IV

Unsymmetrical Fault analysis: method of Symmetrical components, relationship, advantages, representation of power system by positive, negative, zero sequence diagrams with p.u. values, nature of sequence impedances, L-L, L-G, L-L-G Fault analysis of unloaded , pre-loaded , alternators and simple power system with and with –out Fault impedances.

(10 hrs, 20 marks)

Unit-V

Load flow analysis: Development of mathematical model of simple system by network reduction, nodal voltage/mesh current forms, concept of Z and Y matrices and their ,relation Concept of Load flow analysis, formulation of power flow equations (PFE's) consideration of constraints, bus classification in adopting final strategy solution of power flow equations, outline of Gauss, Gauss seidal and N-R method to solve non linear equations in the form of power flow equations. **(10 hrs, 20 marks)**

References:-

1. W.D. Stevenson – Elements of Power System Analysis, Tata McGrawHill
2. Olle I. Elgard, Introduction to electrical energy system theory, Tata McGraw- hill.
3. I. J. Nagernath, D. P.Kothari, Modern power system Analysis,Tata McGraw hill.
4. B. R. Gupta , Power system analysis and Design,

List of Experiments;

1. Measurements of ABCD constants of long transmission line and plotting of circle diagram to estimate performance parameters.
2. The effect of VAR compensation on receiving and voltage profile of transmission line using capacitor bank.
3. Determination of steady state power limit of a transmission line.
4. Measurement of sub-transient reactance of salient pole synchronous machine by static/Dalton- Cameron method.
5. Study of load flow on a three-bus power system using A.C. network analyses or by actual simulation.
6. Measurement of sequence reactance of a synchronous machine.
7. Fault analysis for symmetrical 3 phase fault by simulation or by ac dc analyzer
8. Unsymmetrical fault analysis for LL,LG, LLG FAULT ON A.C / D.C network analyzer.
9. Computer- added solution of a 3 bus load flow problem using gauss seidal method
10. Formulation of " Y bus " matrix using computer program.

The term works should include a minimum eight experiment from the above list.

NORTH MAHARASHTRA UNIVERSITY JALGAON
T.E. (ELECTRICAL)
W.E.F : 2007- 08
TERM – I

Electrical Machines-II

Teaching Scheme:	**Examination:**
Lectures: 4Hrs./Week	Paper:100 marks
Practical: 2Hrs./Week	Termwork:25 marks
	Practical: 25 marks

Unit-I

Synchronous machines:- Principle of generator action and motor action ; construction – rotating field type ; rotating armature type ,salient pole type , Arrangement of armature winding, E.M.F. equation , winding factors.
3 Ø Synchronous generator :- Alternator on- load ,no load condition; effect of armature current ; armature reaction ;resistance drop; Concept leakage flux; and leakage reactance; armature reactions rotating m.m.f.;production of electromagnetic torque; concept of synchronous reactance and synchronous impedance.

Unit-II

Voltage regulation –definition; regulation by direct load testing, short circuit ratio. Regulation of non salient pole alternator by synchronous impedance method; (e.m.f. method); m.m.f. method; potier triangle; and A.S.A.method.
Two reaction theory for salient pole machines, direct axis and quadrature axis reactance; their determination by slip test; phasor diagram of salient pole alternator and calculation of regulation.
Power: - power angle relation for non salient pole machines and salient pole (steady state power angle charct.) losses in alternator and efficiency.

Unit-III

Parallel operation of alternator: alternators working single and alternator working with infinite bus bar Parallel operation of alternator; load sharing between 2 parallel alternators.
Parallel generator theorem- synchronizing –lamp method and use of synchroscope, synchronizing torque; operating chart of alternator working with infinite bus bar.
Time period oscillation. an alternator connected to infinite bus bar working as motor ,if prime mover is failed. Representation of syn. M/c in a power system network

Unit-IV

Synchronous motors:- motor action , phasor diagram on the basis of synchronous impedance, expression for gross mechanical power develop; power flow. Operatation with const. Load and variable excitation : locus of tip of current phasor under the above condition and v curve
Operatation with const. exciation and variable load : locus of tip of current phasor circle phasor. Starting method, hunting and it causes and remedies.

Unit-V

Harmonics- Concept of time and space harmonicsand their generation, effect of harmonics on performance of synchronous machines, remedies.

1 Ø Induction motors- construction, rotating field theory, equivalent circuitand T-N characteristics, test to determine equivalent circuit parameters.

Types, constructions, connections, T-N characteristics, comparison with 3 Ø I.M.;

Special purpose machines:- universal motor, repulsion motor, reluctance motor, hystresis motor, printed circuit motor, linear induction motor,.

REFERENCES

Author	**Name**	**Publisher**
M.G.Say	Performance and design of A.C.machine	ELBS.
A.S.Langsdort	Theory of alternating current machinery , Second edition	Tata McGraw - Hill
Nagrath and Kothari	Theory and Problems of Electrical machines	Tata McGraw – Hill
E.D.Taylor	Performance and Design of A.C.Commutator	ELBS
S.K.Bhattacharya	Electrical machines Second Edition	Tata McGraw – Hill

List of Experiments:

1. Direct loading test on three phase alternator.
2. O.C. and S.C. test on alternator: determination of its regulation by e.m.f. method and m.m.f. method.
3. Zero power factor test on alternator: regulation by Potier method and A.S.A. method.
4. Slip test on salient pole synchronous machine: determination of direct and quadrature-axis synchronous reactance and hence regulation by two reaction theory.
5. Synchronizing alternators: lamp methods and use of synchroscope.

Group B :

6. V- Curves of synchronous motor at constant load.
7. Load test on synchronous induction motor or synchronous motor at constant excitation.
8. Study of various types of single-phase induction motors.
9. No load and blocked rotor tests on capacitor – start single –phase induction motor and determination of parameters of equivalent circuit.
10. Load test on single phase induction motor.

The term work should include a minimum of eight experiments four each from groups A and B of the above list. The term work marks will be based on performance in theory and practicals having a weightage of 40 % and 60 % respectively.

MICROPROCCER &MICROCONTROLLER

Teaching scheme:
Lectures-4 hrs/week
Practical: 2 hrs/week

Examination scheme:
Theory scheme: 100 marks (3hrs.duration)
Term work: 25 marks
ORAL: 25 marks

Unit-I

8085 Intel microproccer: Organization, architecture, Generation of control signal,Addressing mode, Instruction format , Instruction set, classification of instructions, interrupt.- interrupt structure , Assembler , types of Assembler.

(10 Hour, 20 marks)

Unit-II

stack , subroytine, types of subroutine , Programming in assembly language, Programms on 8085, data transfer technique, -synchronous & asynchronous, interrupt driven data transfer, and polling data transfer, parallel data transfer ,memory organization & interfacing, chip capacity, memory module, address space,. Memory specification, Types of memory- ROM, RAM, PROM, EPROM, EEPR0OM, static & dynamic.

(10 Hour, 20 marks)

Unit-III

Study of common peripheral devices, their architecture & different modes of operation- 8255 PPI, mode 0, 1, BSR mode, ; 8279 keyboard display interface, , 8155, static RAM, I/O ports, timers. DMA controller 8257 **(10 Hour, 20 marks)**

Unit-IV

8086 Microproccesor- architecture, memory segmemtation,parrelel processing, addressing modes,reviw of instruction set of 8086.
D to A – types, Ladder, R-2R
A to D converters, SAR type, dual slope. **(10 Hour, 20 marks)**

Unit-V

Microcontroller-

Signal description of 8051, register set of /8051, timmer & modes i/o port strucher.
Microproccer Applications in –b power system, measurement of voltage, frequency, power factor, Electrical drives- stepper motor control, D.C. motor speed control,

(10 Hour, 20 marks)

REFERENCE:

1. Microproccer Architecture, programming, & Applications with 8085, third edition, R.S.Gaonkar.
2. 8085 Assembly languages programming Leventhal, McGraw hill
3. Microproccer & digital system second edition, Douglas V. Hall McGraw hill
4. Fundamental of Microproccer & Microcomputers B, Ram, Dhanpat Rai & co.
5. Microprosser & interfacing programming& hardware.D.V.hall McGraw hill

List of Experiments-

1. Study of Architecture of 8085. Microproccer & write program of 8 bit addition & subtraction.
2. Instruction set of 8085. & write program of 16 bit addition & subtraction.
3. write program for asending/ desending/comparision of given number.
4. study of different memories & write program of block transfer.
5. Study of 8255 PPI
6. Study of 8253 PIT
7. Study of D/A & A/D converter.
8. Study of 8259 interrupter controller.
9. Study of Architecture of 8086.
10. Applications in power measurement
11. Applications in Electrical drives speed control
12. Study of micro controller based system.

The term work should contain minimum 8 experiments from above lists

NORTH MAHARASHTRA UNIVERSITY JALGAON
T.E. (ELECTRICAL) W.E.F 2007--2008
TERM - I
SOFTWARE APPLICATION – I

Teaching scheme: **Examination scheme:**
Practical : 2 hrs/week **Term Work : 50 Marks**

Objectives:
To make the students aware of:
1. Programming practice in C for numerical methods .
2. Use of application specific software tools in the design development simulation and testing of electronic circuits .
3. Use of mathematical software packages for understanding and modeling electrical signals and linear systems .

Section- A : **Numerical computational techniques**:
Instruction of following techniques assited by C programme/ function implimentation of at least THREE of them is expected .
Solution of transcendental &polynomial equation, bisection method,Newton Raphson ,secant, successive methods, solution of linear equations using Gauss elimination .Gauss-Jordan methods Newton's forward and backward difference equations, interpolation, numerical integration and differentiation: trapezoidal rule Simpson's 1/3 and 3/8 rule, Euler's Method.

List of suggested assignments:
1: Program to solve numerical methods : bisection method, Newton Raphson method using users defined functions. Functions should incorporate parameter passing techniques.
2. Program using Functions to solve differential equations by Euler's modified method.
3. Program using Function to find integration by Simpson's 1/3 and 3/8 method.

Section B: Simulation of typical circuits using circuit simulation tools
(1) Two stage amplifiers.
(2) Series regulatator.
(3) Combinational Logic
(4) Timer Circuit

REFERENCES:
W H Hayt / J E Kemmerly / S M Durbin : Engineering circuit Analysis, TMH 6/e

Note: Term work should be based on minimum **FIVE** assignments, **THREE** from section **A** and TWO from section **B .**

NORTH MAHARASHTRA UNIVERSITY JALGAON
T.E. (ELECTRICAL)
W.E.F : 2007- 08
TERM – II
POWER ELECTRONICS

Teaching scheme:	**Examination scheme:**
Lectures-4 hrs/week	**Theory scheme**: 100 marks (3hrs.)
Practical: 2hrs/week	**Term work**: 25 marks

Unit-1

Modern Power Semi-conducting Devices: Introduction, Basic Structure, ON-OFF Control and Operational Charact. and Applications. Viz;
Gate Assisted Turn-off Thyristors (GATT), Bi-directional Diode Thyristors (DIAC), Bi-directional Triode Thyristors (TRIAC), Silicon Unilateral Switch (SUS), Silicon Controlled Switch (SCS), Insulated Gate Bipolar Transistor (IGBT), Metal- Oxide Field Effect Transistor (MOSFET), Programmable Unijunction Transistor (PUT), Light Activated Silicon Controlled Rectifiers (LASCRs), Gate Turn Off Thyristors (GTO), Static Induction Thyristors (SITH), Field Controlled Thyristors (FCT), MOS Controlled Thyristors (MCT). **(10 Hours, 20 marks)**

Unit-2

Thyristors: Principle of Operation, Operating Charact. of SCR, Turn on Methods, di / dt , dv/dt Protection,
Commutation: Forced and Natural, Classification of Forced Commutation- Class A, Class B, Class C, Class D, Class E, Class F. Gate Triggering Circuits- R, RC, UJT Triggering.
Internal Power Dissipation and Temp. rise, Multi-Connections of SCRs. Series, Parallel connection, String Efficiency, SPICE Thyristor model.
(10 Hours, 20 marks)

Unit-3

Full Wave controlled Rectifiers: M-2 and M-6 Connections, Bridge Circuits, Single Phase B-2 Connection, Three Phase B-2 Connection, Analysis of Bridge Circuits, Half Controlled Bridge Circuits, Single Phaseand Three Phase, Analysis of Line Commutated Control rectifiers, Input-Output Charact. Effect Source Impedance and Load Impedance, Effect of Overlap angle, Inter-Phase Reactor Connection.
Power Factor Improvement: Phase Angle, Symmetrical Angle, PWM.
(10 Hours, 20 marks).

Unit-4

Inverters: classification, Series inverter, Parallel inverter, Single Phase and Three Phase Current Source Inverters (CSI), Voltage Source Inverters, Bridge Inverters With Conduction modes, Inverter Fed Induction Motor with V/ F Control.
Dual Converters : Principle of Operation Ideal and Non-ideal, Dual Converters With and Without circulating current Schemes.
Cycloconveters: Principles, Single Phase Cycloconveters, Control Circuit.
(10 Hours, 20 marks

Unit-5

Dc Choppers: Basic Principle of Operation, Step Up / Step Down Chopper, Chopper Configuration, Class A, Class B, Class C, Class D, Class E, Multi-purpose Choppers.

Ac Choppers: Single Phase and Three Phase with R, RL Load.

Frequency Changer, Doubler, Tripler, High Frequency Conversion.

AC Regulators: Single Phase Half and Full wave R,RL load, Three Phase AC regulators.

Solid State Speed Control of Dc motors: Chopper fed Separately Excited DC motors.

(10 Hours, 20 marks)

References:

1) M. Rashid, Power Electronics, PHI Pub.
2) M.D. Singh and Khanchandani, Power Electronics, TMH Pub.
3) M. Rammamurty, An Introduction to Thyristors and its Applications, East-West Press.
4) Shingare, Industrial and Power Electronics, Electo-Tech. Pub.

List of practical

1) Triggering Circuit of SCR
2) Characteristics of SCR,MOSFET,
3) Commutation circuit class C, class D
4) Single phase full wave controlled rectifiers R, R-L characters tics
5) Single phase semi-converter
6) Three phase full wave controlled rectifiers
7) Step up chopper
8) Step down chopper
9) Series and parallel inverter
10) Three phase inverter

Minimum eight experiments out of ten are to be conducted.

NORTH MAHARASHTRA UNIVERSITY JALGAON
T.E. (ELECTRICAL)
W.E.F : 2007- 08
TERM – II

ELECTRICAL MEASUREMENT-II

Teaching scheme:
Lectures-4 hrs/week
Practical: 2 hrs/week

Examination scheme:
Theory scheme: 100 marks (3hrs.)
Term work: 25 marks
Practical: 25 marks

Unit-I

A .C. Bridges : classification, Maxwell, Anderson ,hay, Schering, Campbell,and wein bridge ,accessories and errors ,Special measuring instruments- construction and principles of 1 Ø and 3 Ø p.f.meters ,frequency meters ,synchronoscope, trivector meter , max. Demand indicators, multimeter, C.R.O. **(10 hours, 20 marks)**

Unit-II

Introduction to instrumentation: definition, purpose, measurement – definitions, types and classification of instruments, generalized measurement system, standards, and calibrations. **Instrument Response -** Instrument Response to step, ramp, sinusoidal i/p up to second order system. Errors – types – gross, systematic, random, limiting, sources of errors, techniques to minimize them. **(10 hours, 20 marks)**

Unit-III

Introduction to transducers - definition, classification, selection of transducer.
Measurement of temperature - using R T D, thermocouple, bimetallic thermocouple. Pressure thermometers, pyrometers.
Pressure Measurement- Bourdon Tubes, bellows, diaphragms.
Vacuum Measurement- McLeod gauge, pirani gauge. **(10 hours, 20 marks)**

Unit-IV

Flow measurement- Rota meter, electromagnetic flow meter, hot wire anemometer, ultrasonic flow meter.
Level measurement – mechanical, pneumatic methods , electrical methods- capacitance level gauge, hot wire / carbon resistance method nucleonic level gauge, ultrasonic method.
Displacement measurement – LVDT, strain gauge, -types, working principles, measurement circuitry, temperature compensation, and application. **(10 hours, 20 marks)**

Unit-V

Recorders- necessity, construction, working, types- strip chart, circular chart, self balance potentiometric, X-Y recorder, ultraviolet recorder.
Electronic technique – for measurement of voltage, current, power, energy, phase angleand rms values. **(10 hours, 20 marks)**

<u>Reference</u>:-

1) Golding, widding, Y.P.Chopra ,Electrical Measurement and measuring Instruments – 5th edition, (A.H.Wheelerand co.Ltd.)
2) C.T.Baldwin ,Fundamental electrical measurement- 2 nd edition, lyall book depot.,
3) E.B.Deoblin,Measurement system- Application and design, 4 th Edition , Mcgrawhill.
4) B.C.Nakva,Instrumentation, measurement and analysis- TAta McGraw hill.
5) A.K.Sawhne.A course in electrical and electronic measurement and Instrumentation, 11 th Edition, Dhanpat Ray and co.
6) H.S.kalsi ,Electronics Instrumentation TAta McGraw hill.

<u>List of Experiments</u>-

1. Measurement of inductance by Andersons Bridge.
2. Measurement of capacitance and loss angle of capacitor by Schering bridge.
3. Measurement of frequency / mutual inductance by campbell's bridge.
4. Strain Measurement using strain gauge .
5. Study of LVDT.
6. Measurement of temperature by RTD/Thermocouple.
7. Study of pressure transducers.
8. Study of recorders.
9. Measurement of speed by magnetic pick-up / photo electric method.
10. Study of CRO of it's different types and Applications.
11. Step response of meters.
12. Measurement of systematic errors of wattmeter..

The term works should include a minimum eight experiment from the above list.

NORTH MAHARASHTRA UNIVERSITY JALGAON
T.E. (ELECTRICAL)
W.E.F : 2007- 08
TERM – II

CONTROL SYSTEM-I

Teaching scheme:
Lectures-4 hrs/week
Practical: 2 hrs/week

Examination scheme:
Theory scheme: 100 marks (3hrs.)
Term work: 25 marks
Practical: 25 marks

UINT I

Introduction to atomic control: open loop and close loop system, servomechanisms, mathematical modeling of physical system, transfer function- definitions assumptions, transfer function of simple electrical and mechanical system, block diagram-constructions of block diagram for system equations, block diagram reduction techniques, single flow graphs, and mason's gain formula. Effect of feed back on sensitivity to parameter variation and reduction of noise. **(10 Hrs. 20 Marks)**

UNIT II

Control system components: electrical/ electromechanical components such as ac/ dc. servo motors ,stepper motors potentiometer, techogenerators, there functional analysis and operating characteristics and there applications, pneumatic controls devices

(10 Hrs. 20 Marks)

UNIT III

Time response analysis: time responses of first and second order systems to standard inputs. Transient response specifications, types of system, error analysis, error coefficient, steady state errors, dynamic errors series. Approximate methods for higher order system proportional, derivative and integral control **(10 Hrs. 20 Marks)**

UNIT IV

Stability: Stability of control systems, characteristics equations, impulse response, Routh Hurwitz stability criterion, relative stability. Root locus: construction of root locus, determination of roots from root locus, condition of variable parameters for stability effect of addition of poles and stability. Stability of control systems, characteristic equation, impulse response, Routh Hurwitz stability criterion, relative stability

(10 Hrs. 20 Marks)

UNIT V

Frequency Response of linear system

Specification of polar plots of various systems, Nyquist criteria / Nyquist plots and stability analysis, bode plots from open loop transfer functions for various systems, gain margin and phase margin, stability analysis from Bode plots, Estimation of approximate transfer functions from the frequency response. **(10 Hrs. 20 Marks)**

Reference books:

1) Nagrath I.J ,Control system engg. –.- Wilay Eastem
2) Ogate K.Modern control system: -prentice hall of India
3) Kuo B.C ,Linear control system -.- khanna publications.

List of experiments:

1) Study of potentiometer as on
   a) Error detector
   b) Determination of sensitivity
   c) Determination of input and output characteristics.
2) Study of
   a) synchro characteristics.
   b) Electrical zeroing of syncro.
   c) Synchronous as error detector.
   d) synchros on position control system
3) To determine the transfer functions of armature and field controlled dc generator.
   40to determine transfer function of dc generator.
5) To study performance characteristic of dc motor angular position control system.
6) To plot the torque speed characteristic of two phase ac servomotor.
7) Frequency response plot of second order system.
8) To determine transfer function of AC servomotor...
9) Operation of stepper motor in single step and multistep.
10) Study of P, PI, and PID controller.

The term work should include a minimum of 8 experiments from the above list.

NORTH MAHARASHTRA UNIVERSITY JALGAON
T.E. (ELECTRICAL)
W.E.F : 2007- 08
TERM – II

ELECTRICAL MACHINE DESIGN-I

Teaching scheme:	**Examination scheme:**
Lectures-4 hrs/week	**Theory scheme**: 100 marks (3hrs.)
Practical: 4 hrs/week	**Term work**: 50 marks
	Oral-25 marks

Unit-I
Introduction- principles of design and design factors, rating, specifications, standards, performances, brief study of magnetic, electric, dielectric and other material.

Design of Induction Motors-1 phase and 3 phase.

(10 hours,20 marks)

Unit-II
Design of electric Apparatus and devices:- detailed design of heating coils, rotor resistance starters, regulators, field coils, choke coils, and Introduction to design of lifting magnets.

(10 hours,20 marks)

Unit –III
Design of Transformer- Design of distribution and power Transformer,-types, classifications, specifications, design of main dimension, core, yoke, winding, tank, cooling tubes, radiators, estimation of leakage reactance for equal height of H.V. and L.V. winding, resistance of winding, calculation of losses, determination of voltage regulation and efficiency, calculation of mechanical forces develop during short circuit, their estimation and remedies.

(10 hours,20 marks)

Unit- IV
D.C.Machine Windings- types of d.c. Windings, choice and design of simplex and duplex lap and wave Windings, equalizer connections, dummy coils, concept of multiplex Windings , reason for choosing them. **(10 hours,20 marks)**

Unit- V
A.C. Machine Windings- single and double layer, single phase ac Windings with integral and fraction slots, three phase Windings. **(10 hours,20 marks)**

Reference:-

1. A. K .Sawhney, Electric machine design tenth edition, Danpat ray and sons.
2. A. E .clayton, Performance and design of DC machine, third edition, ELBS, Isaac pitman sons.
3. A. E. clayton Performance and design of AC machine, third edition, ELBS, Isaac pitman sons.
4. N. Vinogradov, Electric machine winder, MIR publication.
5. N. PerelmuterRepair of Windings and insulation of Electric machine, N.Perelmuter.
6. Say and Taylor, D.C. Electric machine, Say and Taylor, ELBS, pitman sons.
7. Feinberg,Macmillan,Modern power Transformer design practices.first edition, Feinberg,Macmillan,
8. Transformers BHEL.

Drawing Sheets-

1. **one of electric devices From following:**
   a) Rotor resistance starter for slip ring I.M.
   b) DC series/shunt generator field regulator.
   c) DC series/shunt generator field regulator for speed control.
   d) Lifting Magnet.
2. Details and assembly of three phase Transformer.
3. Details and Layout of DC Windings.
4. Details and Layout of AC Windings.

The term work should include four drawing sheets and reports based on actual design of the above topics.

NORTH MAHARASHTRA UNIVERSITY JALGAON
T.E. (ELECTRICAL)
W.E.F: 2007- 08
TERM – II

INDUSTRIAL ORGANISATION and MANAGEMENT

Teaching scheme:
Lectures-4 hrs/week

Examination scheme:
Theory scheme: 100 marks (3hrs.)
Term work: 25 marks

UNIT-I

Basic management-meaning and definition of management, administration, organization concept, contributors to management science, whether management is science, art or profession. MBO, characteristics of MBO , objective benefits, limitations

Forms of business organization - different forms of business organization, organization structure in industry. **(10 hours 20 marks)**

Unit-II

Elementary economics- Basic economics concept, law of demand and supply, law of diminishing utility, elasticity of demand and supply, money- it's evaluation, different, cost and types of cost elasticity of demand, price elasticity, types, MMF of elasticity, demand forcasting **(10 hours 20 marks)**

Unit – III

Plant location and layout- factors affecting Plant location, different types of Plant layout. CPM PERT , quality control manufacturing system

Work study- techniques of Work study-method study, work measurement, therbligs, different charts, diagrams used in method study. **(10 hours 20 marks)**

Unit-IV

Personnel management – manpower planning, recruitment, selection and training of employees, wages, different methods of wage payment, administration, job evaluation,

Merit rating, incentives, essential of good incentive plan.

Financial management – capital, types of capital, source of capital, financial institutes, elements of costs, depreciation, stores and inventory control, money market, capital market, role OF SEBI. **(10 hours 20 marks)**

Unit- V

Marketing management –marketing and selling concept, market survey and research, management productivity, advertising-media of advertising market forcasting

Industrial Laws- The factories Act, minimum wages act, pollution control act, works man compensation act, industrial safety- Causes of accidents, prevention of accidents, legal provisions. Domestic and international market, brand, trademarks, strategies, pricing, distribution channel **(10 hours 20 marks)**

References-

1. O.P.Khanna. Industrial Engineering management-
2. Banga and Sharma, Industrial. Organization and Engineering economics
3. Dutta, Sundaram. Elementary economics,
4. S.A. Sherlekar. Modern business organization and management
5. Philip Kotler, Marketing management.
6. C.B. Mamoria, Personnel management-.

NORTH MAHARASHTRA UNIVERSITY JALGAON
T.E. (ELECTRICAL)
W.E.F: 2007- 08
TERM – II
PRACTICAL TRAINING / MINI PROJECT / SPECIAL STUDY

Teaching scheme:	Examination scheme:
Practical : 2 hrs/week	Term Work : 25 Marks

- Every student has to undergo industrial / practical training for a minimum period of two weeks during summer vacation between (S.E. Second Term) fourth and (T.E. First Term) fifth term or during winter vacation between fifth and sixth term (T.E. First Term and Second Term).
- The industry in which practical training is taken should be a medium or large scale industry
- The paper bound report on training must be submitted by every student in the beginning of (T.E. Second Term) sixth term along with a certificate from the company where the student took training.
- The report on training should be a detailed one.
- Maximum number of students allowed to take training in a company should be five. Every student should write the report separately.
- In case if a student is not able to undergo practical training, then such students should be asked to

prepare special study report on a recent topic from reported literature .

or

a mini project related to the Electrical branch of engineering.

1. The circuit for mini project must be designed by a student.
2. The circuit should be simulated using any of the standard simulation software available.
3. Result verification for paper design and simulation should be carried out and discrepancies should be discussed.
4. Verified circuit should be assembled and tested on general purpose PCB/ Protoboard for actual working and practical results.
5. Layout of circuit using standard Layout tool (Orcad / Protel / CADstar / Pads / Ultiboard) should be designed and PCB making process should be carried out.
6. Assemble and test the circuit on PCB. Prepare bill of materials.
7. Project report should be detail of work, carried out by student, including layouts, circuits, bill of materials and relevant details

- The practical training / special study / mini project shall carry a term work of 25 marks. Every student shall be required to present a seminar in the respective class in the presence of two teachers. These teachers (fixed by the head of department in consultation with the Principal) shall award marks based on the following:

(a) Report	**10 marks.**
(b) Seminar presentation	**10 marks.**
(c) Viva -voce at the time of Seminar presentation	**05 marks.**

Total	**25 marks.**

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NORTH MAHARASHTRA UNIVERSITY, JALGAON
STRUCTURE OF TEACHING AND EVALUATION
B.E. (ELECTRICAL ENGINEERING)

FIRST TERM

W.E.F. 2008-09

Sr. No.	Subject	Teaching Scheme Hours/week			Examination Scheme				
		Lectures	Tutorial	Practical	Paper Duration Hours	Paper	TW	PR	OR
1	Power System operation and Control	4	--	--	3	100	25	--	--
2	Industrial Electrical Engineering	4	--	2	3	100	25	25	--
3	Energy Audit and Conservation	4	--	--	3	100	25	--	--
4	High Voltage Engineering	4	--	2	3	100	25	--	25
5	Elective-I	4	--	--	3	100	25	--	--
6	Seminar	--	--	2	--	--	25	--	--
7	Project – I	--	--	4	--	--	25	--	25
	Total	**20**	**--**	**10**	**--**	**500**	**175**	**25**	**50**
	Grand Total	**30**			**750**				

SECOND TERM

Sr. No.	Subject	Teaching Scheme Hours/week			Examination Scheme				
		Lectures	Tutorial	Practical	Paper Duration Hours	Paper	TW	PR	OR
1	Switchgear and Protection	4	--	2	3	100	25	--	25
2	Power System Stability	4	--	2	3	100	25	--	25
3	Industrial Drive and Control	4	--	2	3	100	25	--	25
4	Elective-II	4	2	--	3	100	25	--	--
5	Project – II	--	--	4	--	--	100	--	50
6	Industrial Visit / Case Study	--	--	--	--	--	25	--	--
7	Entrepreneurship Development Skills	--	--	2	--	--	--	--	--
	Total	**16**	**02**	**12**	**--**	**400**	**225**	**--**	**125**
	Grand Total	**30**			**750**				

Elective-I
1. Control System-II
2. Computer Methods on Power System
3. Electromechanical Energy Conservation
4. Optimization Techniques
5. Power System Dynamics

Elective-II
1. Flexible AC Transmission
2. Power System Design Practice
3. Electric Traction Engineering
4. Generation Planning and Load Dispatch
5. Extra High Voltage Transmission

NORTH MAHARASHTRA UNIVERSITY, JALGAON
B.E. (ELECTRICAL) W.E.F : 2008- 09
Term I

1) Power System Operation & Control

Teaching Scheme	**Examination Scheme**
Lectures : 4 hrs/week	**Paper : 100 marks**
	Duration: 3 Hrs.
	Term work:25 Marks

UNIT I: ECONOMIC LOAD DISPATCH & OPTIMAL OPERATION OF POWER SYSTEM
Input Output characteristics, Heat-rate characteristics, Incremental fuel rate and cost, Incremental production cost, , optimum scheduling of generation between different units. (Neglecting transmission losses), Transmission loss as a function of plant generation (A simple system connection two generating plants to load) and incremental transmission loss for optimum economy, Calculation of loss coefficients (Two plants system), Optimum scheduling of generation between different plants considering transmission loss concept and significance of penalty factor, Automatic load dispatch, function and applications

(10 Hrs., 20 Marks)

UNIT II: GENERATOR VOLTAGE CONTROL
Automatic voltage control, generator controllers, Cross coupling between P–f and Q–V control channel, automatic voltage regulator, types of exciters and excitation systems, exciter modeling, transfer function modeling for control static performance and dynamic response of AVR loops.

(10 Hrs., 20 Marks)

UNIT III: LOAD FREQUECNY CONTROL
Automatic load frequency control, speed governing system and hydraulic valve actuator for individual generator, Turbine modeling, generator and load modeling transfer function representation of power control mechanism of generator.

(10 Hrs., 20 Marks)

UNIT IV: ELECTRIC POWER CONTROL
Concept of control area, division of power system into control areas, Load frequency of single areas, two area and multi area (control) power system with and without integral controls. Advantage of pool operation, tie line bias control area exchange.

(10 Hrs., 20 Marks)

UNIT V: VOLTAGE STABILITY AND COMPENSATION
Power system security, Operating stage (State transition diagram), Voltage stability, Comparison of angle and voltage stability, Reactive power flow and voltage collapse, voltage stability analysis and prevention of voltage collapse.
Compensation in power system: Load compensation, load ability of compensated and uncompensated over head transmission line, compensation of transmission line (Shunt& Series). Introduction of FACTS

(10 Hrs., 20 Marks)

Reference:

1) Electrical Energy system theory & Introduction Olle L. Elgerd, TMH.
2) Modern Power system analysis : I. J. Nagrath & D. P. Kothari, TMH.
3) Elements of Power system analysis : Willium D. Stevenson Jr., TMH.
4) Electric Power control : Dr. C.S. Indulkar.
5) Economic Control of power system : L.K. Kirchmayer
6) Electrical Power System Analysis : C L Wadhwa, New Age International Publication

NORTH MAHARASHTRA UNIVERSITY, JALGAON
B.E. (ELECTRICAL) W.E.F : 2008- 09
TERM I

2) Industrial Electrical Engineering

Teaching Scheme	**Examination scheme**	
Lectures: 4Hrs/week	**Paper**	**:100 Marks**
Practical: 2Hrs/week	**Duration**	**: 3 Hrs.**
	Term work	**: 25 Marks**
	Practical	**: 25 Marks**

UNIT I :- ELECTRIC DRIVES
Industrial group and collective drives, types of motors, their running characteristics , characteristics of load, starting , speed control and reversing of d.c. and 3 phase induction motors, electric braking, plugging, rheostatic braking, regenerative braking. Types of Enclosures.

(10 Hrs., 20 Marks)

UNIT II: - TYPES OF DUTIES
Continuous, intermittent and short time rating , temperature rise and rating calculations for these duties mechanical features , features of load diagram construction, load equalization & use of flywheel.

(10 Hrs., 20 Marks)

UNIT III:- TRACTION SYSTEMS
Requirements of ideal traction system, Systems of track electrification and their comparison, speed time curve, energy consumption calculation, calculation of tractive effort.

(10 Hrs., 20 Marks)

UNIT IV: - TRACTION MOTORS:
General features and types, characteristic and control of locomotive motor coaches, series parallel control .Electric breaking including regenerative breaking, overhead equipment control gear for overhead equipment.

(10 Hrs., 20 Marks)

UNIT V: - NATURE OF LIGHT
Units, luminous efficiency, glare production of light Types & applications of electric lamps polar curves, control of light by reflection , refraction and diffusion, Design of factory lighting, flood lighting, street lighting .
Methods of electric heating & its advantages, transfer of heat, resistance oven, induction heating electric welding.

(10 Hrs., 20 Marks)

Reference Books:

1) J.B.Gupta -- A course in Electrical power
2) S.K. Bhattacharya - Electrical Machines (2nd edition) - Tata Mc Graw Hill
3) V.V.L.Rao - Utilization of electrical energy -TMH
4) O.E.Taylor - Utilization of electrical energy -TMH
5) S.K.Pillai - A course in electrical energy TMH
6) H. Partab - Art & Science of Utilization of electrical energy.

List of experiments:-

1) To perform load test on single phase induction motor &plot its performance characteristics.
2) To perform load test on DC series motor& plot its performance characteristics.
3) Speed control of DC series motor.
4) Rheostatic breaking of three phase induction motor.
5) To perform load test on three phase induction motor & plot its performance characteristics.
6) Rheostatic breaking of DC shunt motor.
7) Speed control of three-phase slip ring induction motor by rotor resistance method.
8) To perform the load test on DC shunt motors and plots its performance characteristics.
9) Study of illumination system.
10) Study of induction heating &Welding.
11) Study of different types of enclosures.

The term work should include a minimum **eight** experiments from above list.

3) Energy Audit and Conservation

Teaching Scheme	**Examination Scheme**
Lectures: 4 Hrs/Week	**Paper : 100 Marks**
	Duration : 3 Hrs.
	Term Work : 25 Marks

UNIT I: - ENERGY AUDIT

Energy audit, pre-requisite of energy conservation, principles of energy audit, preliminary energy audit and detailed energy audit, procedures of carrying out energy audit. Energy production relationship, specific energy consumption, least square methods consume technique, data energy flow diagram, sankey diagram. Instruments used for energy audit. Policy of government to promote renewable energy.

(10 Hrs., 20 Marks)

UNIT II: - ECONOMICS OF ENERGY CONSERVATION:

Simple payback period analysis, advantages &limitations of payback period, time value of money, net present value method, internal rate of return method, and profitability index for benefit cost ratio. Study and selection of proper tariff for particular application, fixed &variable components in tariff, impact of tariff on energy management.

(10 Hrs., 20 Marks)

UNIT III: - ENERGY MANAGEMENT:

concept of energy management –energy inputs in industrial ,residential, commercial, agricultural and public sector-comparison of different energy inputs on the basis of availability , storage feasibility, cost (per unit output)etc. electrical energy management-energy accounting and management of power factor, voltage profile, current energy requirement ,power demand monitoring target setting etc.

Concept of supply side management and demand side management (DSM), load management, voltage profile management from receiving end .methods of implementing DSM. Advantages of DSM to consumers, utility and society.

(10 Hrs., 20 Marks)

UNIT IV: - ENERGY CONSERVATION

Objectives of energy conservation, planning for energy conservation

i) Motive power: potential for saving electrical energy in motors - oversizing or under loading, speed, improving, efficiency of an existing motor, energy efficient motors, use of soft starters, variable or adjustable speed drives for energy conservation selection of cost effective drive.
ii) Lighting: level of illumination for different areas. Use of right source of lamp for different applications, energy efficient lamps, fixtures and types of illumination controllers.
iii) Heating processes: most efficient space, furnace water heating and welding processes.
iv) Cooling systems: energy saving in air coolers air conditioners, ventilating systems and refrigeration.

(10 Hrs., 20 Marks)

UNIT V: - SCOPE OF CONSERVATION

Energy conservation in industrial, agricultural, commercial, domestic and municipal sectors.

i) Energy conservation in generation, Co-generation, Tri-generation, transmission and distribution, effective measures to reduce the T and D losses.
ii) Energy Efficient motors:- Features of energy efficient motors, high efficiency motor design, European agreement on low voltage electric motor efficiency, NEMA, high efficiency motors,
iii) Determination of cost effectiveness, implementation of motor management program.

(10 Hrs., 20 Marks)

Reference books

1. S. C. Tripathy-Electrical Energy Utilization and conservation – THM Publication.
2. S.Rao-Energy Technology-Khanna Pub.
3. Dr. S.P. Sukhtme-Solar energy.
4. Preceding of the Seminar on " Energy Audit & Demand Side Management" held at Govt. College of Engineering, Pune-5 organized by M.S.E.B.(SEA) ON 16.09.1998
5. Hand Book on energy efficient motors , International Cooper proposition council , B.E. Kushare.

NORTH MAHARASHTRA UNIVERSITY, JALGAON
B.E. (ELECTRICAL) W.E.F: 2008- 09
TERM I

4) High Voltage Enggineering

Teaching Scheme	**Examination scheme**
Lectures: 4Hrs/week	**Paper : 100 Marks**
Practical: 2Hrs/week	**Duration : 3 Hrs.**
	Term work : 25 Marks
	Oral : 25 Marks

UNIT I: - BREAKDOWN IN GASES, LIQUIDS & SOLIDS
Classification of insulating material, gases as insulating media, Ionization and decay process, breakdown in gases, Townsend's law. The streamer mechanism of spark, Paschen's law, corona discharge, electronegative gases. Breakdown in pure and commercial liquids, solid dielectric and composite dielectric, high voltage bushing guarding, shielding and field plotting.

(10 Hrs., 20 Marks)

UNIT II: - LIGHTING AND SWITCHING OVER VOLTAGE PROTECTION
Lighting strokes to lines and towers mechanism & characteristics. Protection of transmission lines from lighting, lighting arrestors, insulation co-ordination of HV and EHV power system and substation.

(10 Hrs., 20 Marks)

UNIT III: - GENERATION OF HIGH VOLTAGE & CURRENTS
Generations of high dc, ac and impulse voltages, standard impulse wave shapes, generation of weitching surges and high impulse generator

HVDC Power transmission
Kinds of dc links, limitations and advantages of ac & dc transmission. Principle application of dc, ground return advantages & application.

(10 Hrs., 20 Marks)

UNIT IV: - MEASUREMENT OF HIGH VOLTAGE AND CURRENTS
Methods of measurement of peak voltage, impulse voltage and high direct current, non destructive measurement and testing, high voltage dielectric loss and capacitance measurements, ratio frequency & partial discharge measurements.

(10 Hrs., 20 Marks)

UNIT V :-TTESTING AND EHV LINE INSULATION
Basic technology , testing of insulators bushing , cables , transformer, surge diverters & threshold current , capacitance of long objects, Electromagnetic interference, E.H.V line insulation design based upon transient over voltages.

(10 Hrs., 20 Marks)

Reference Books:-
1) M.S. Naidu & V.Kamaraju - High voltage Engg - Tata McGraw Hill
2) E.Kuffel and W.S Zaenglo -High voltage Engg - PERgamon Press
3) EHV, Rakash Das - Begamudre
4) C.L. Wadhawa - H.V Engg Wley Eastern
5) K.R. Padiyar; HDVC power transmission systems technology & system interaction -New Age International
6) H.V. Engg - R.S.Jha

List of Experiments:-

1) Measurement of insulation resistance of 600/250 V.P.T by megger.
2) Power frequency withstand test on 11KV, 10/5 amp CT
3) Study of corona discharge
4) Determination of insulating break-down strength of solid, liquid and gaseous dielectric media.
5) Power frequency high voltage withstand test on cable
6) Study of impulse generator.
7) Dry & Wet power frequency withstand test in insulator
8) Flash over test on insulator.
9) Double voltage double frequency withstand test on insulator.
10) Study of calibration of sphere gap.
11) Study of 100KV high voltage testing set.

The term work should include a minimum **eight** experiments, from the above list.

NORTH MAHARASHTRA UNIVERSITY, JALGAON
B.E. (ELECTRICAL) W.E.F : 2008- 09
TERM I
5) <u>Elective-I</u>
I) CONTROL SYSTEM – II

Teaching Scheme	**Examination scheme**
Lectures: 4Hrs/week	**Paper : 100 Marks**
	Duration : 3 Hrs.
	Term work : 25 Marks

<u>UNIT I</u>: - STATE SPACE TECHNIQUES

State, state space and state variables. States variable models of SISO/MIMO linear systems, from differential equations, transfer function and block diagrams, state diagram (Signal flow graphs)

Decomposition of transfer functions in phase variable forms, canonical forms, Jordan canonical form, transfer function from the state model, transfer matrix.

Solutions of state equations, state transition matrix (STM) various methods to obtain STM, Resolvent matrix time response of SISO system.

Controllability and observability of linear systems. Gilibert's method and kalman's test to test the controllability and observability of SISO/MIMO system.

System design using pole placement technique for close loop system via state variable feedback for SISO controllable system.

(10 Hrs., 20 Marks)

<u>UNIT II</u>: - SAMPLE DATA CONTROL SYSTEM

Representation of sample data (Discrete system) review of Z transforms, sample and hold zero order hold. Sampling theorem Z-transform analysis of sampling data control system. (Open loop and closed loop), Z transfer function of systems. Solutions of different equation by Z transfer methods. Response of discrete system.

Pulse transfer functions of open loop and closed loop system with different sample locations.

Digital controller and its transfer functions. Stability analysis, relation between S and Z domain, stability by Jury's test and bi-linear transformation and root locus method.

(10 Hrs., 20 Marks)

<u>UNIT III</u>: - NON LINEAR SYSTEM ANALYSIS I

Behavior of non linear system, various general non linear ties and their characteristics.

Stability analysis by describing function method. Existence and stability of limit cycles.

Limitation of describing function method.

(10 Hrs., 20 Marks)

<u>UNIT IV</u>: - NON LINEAR ANALYSIS II

Liberalization in a small region operating point. Singular point and their nature. Phase plane method of analysis of nonlinear system, construction of phase trajectories by isoclines method. Limit cycle behavior stability analysis, limitation of phase plane method.

(10 Hrs., 20 Marks)

<u>UNIT V</u>: - STABILITY ANALYSIS BY LIAPUNOV METHOD

Concept of stability, asymptotic stability in the large, instability, the sense of a Lipunov, Positive of a scale function, quadratic forms. Second method of Lipnov, stability theorems, Lipunov fuctions stability of linear time invariant systems, Lipunov equations.

Krasowakii's method for time examining the stability of non-linear time invariant system.

(10 Hrs., 20 Marks)

Reference Books :

1) Nagrath & Gopal : Control system engineering - Wiley Eastern
2) OgataK : Modern controll theory - Prentice Hall Of India
3) Naresh Sinha - control system - Wiley Eastern
4) Kuo B.C: Automatic control system - Prentice Hall Of India.

NORTH MAHARASHTRA UNIVERSITY, JALGAON

B.E. (ELECTRICAL) W.E.F: 2008- 09

TERM I

5) Elective-I

II) COMPUTER METHODS ON POWER SYSTEM

Teaching Scheme	**Examination scheme**
Lectures: 4Hrs/week	**Paper : 100 Marks**
	Duration : 3 Hrs.
	Term work : 25 Marks

UNIT – I NETWORK TOPOLOGY

Topology of Electric power system-Network Graphs, Incidence matrices, fundamental loop and cutset matrix, primitive impedance and admittance matrix, singular transformation of network matrix.

(10 Hrs., 20 Marks)

UNIT – II INCIDENCE MATRIX

Formation of bus impedance and admittance matrices by algorithm – Modification of bus impedance and admittance matrix to account for change in networks. Derivation of loop impedance matrix.
Algorithm for formulation of 3- phase bus impedance matrix.

(10 Hrs., 20 Marks)

UNIT – III SHORT CIRCUIT STUDIES

Three phase network, Symmetrical components. Thevenin's theorem and short circuit analysis of multimode power system using bus impedance matrix. Short circuit calculations for balanced and unbalanced short circuit bus impedance and loop impedance matrices.

(10 Hrs., 20 Marks)

UNIT – IV LOAD FLOW STUDIES

: Slack bus, loop buses, voltage control buses, Load flow equations, power flow model using bus admittance matrix, Power flow solution through Gauss-Seidal and N-R methods sensitivity analysis, Second order N-R method, fast decoupled load flow method, Sparsity of matrix.

(10 Hrs., 20 Marks)

UNIT – V FAULT ANALYSIS

Simultaneous faults, Simultaneous Faults by two port network Theory (Z, Y and H-type Faults), Simultaneous faults by matrix Transformations, Analytical simplifications of series and shunt fault.

(10 Hrs., 20 Marks)

References:-

1. J. J. Gringer/W.D. Stevenson, power System Analysis, McGraw Hill. 1994
2. G.W.Stagg and A.H.EI-biad,Computer Methods in Power System Analysis, Mc Graw Hill, 1968.
3. I.J.Nagrath and D.P.Kothari, Modern Power System Analysis, Tata McGraw Hill,1980.
4. G.L.Kusic, Computer Aided Power System Analysis, Prentice Hall, 1986.
5. Hadi Sadaf, Power System Analysis, Tata McGraw Hill.

NORTH MAHARASHTRA UNIVERSITY, JALGAON

B.E. (ELECTRICAL) W.E.F: 2008- 09

TERM I

5) Elective-I

III) Electromechanical Energy Conservation

Teaching Scheme	**Examination scheme**
Lectures: 4Hrs/week	**Paper : 100 Marks**
	Duration : 3 Hrs.
	Term work : 25 Marks

UNIT I: - MAGNETICALLY COUPLED CIRCUITS AND TRANSFORMER:

Self and mutual flux linkages and inductances. Voltage
Equation of coupled circuits. Coefficients of coupling and leakage coefficient.
Two winding transformers:
Steady state and transient analysis using mutual and self inductances. Variable frequency transformers.
Energy flow considerations.

(10 Hrs., 20 Marks)

UNIT II: - ELECTROCHEMICAL ENERGY CONVERSION PRINCIPLES:

Electrochemical System, Energy process in electromagnetic systems.
Law of conversation of energy as applied to electromechanical system. Linear and non-linear, singly and doubly excited magnetic systems;
Energy and co-energy, various expressions for forces and torques; Energy, forces and torque in a system of rigid currents. Application to various magnetic field transducers.

(10 Hrs., 20 Marks)

UINT III: -ELECTRIC FIELD AND TRANSDUCERS

Quasi-static electric fields as coupling medium, Energy forces and torques in a system of charged conductors, Application of electric field transducers. Incremental motion transducers (detailed analysis of few cases).

(10 Hrs., 20 Marks)

UNIT IV: - BASIC ROTATING MACHINES:

Common structural features of rotating machines. Machine windings and their basic properties.
Distributed bindings as current sheets.
Equivalence between concentrated and distributed windings M.M.F. and flux distributation and various windings. Rotating magnetic field.

(10 Hrs., 20 Marks)

UNIT V: - TYPES OF ROTATING MACHINES:

Commutator, Synchronous and asynchronous machines
Induced e.m.f.s and electromagnetic torque in non salient pole machines.

(10 Hrs., 20 Marks)

Reference Books:

1. Rakosh Das, Begamudre- Electromachinical Energy Conversion- Wiley Eastern Publication.
2. Gourishankar- Electromechnical Energy Conversion.
3. Fitzgerald, Kingsley & Kusko- Eletric Machinary- McGraw Hill Kogo Kusha Ltd.

NORTH MAHARASHTRA UNIVERSITY, JALGAON

B.E. (ELECTRICAL) W.E.F: 2008- 09

TERM I

5) Elective-I

IV) OPTIMIZATION TECHNIQUES

Teaching Scheme	**Examination scheme**
Lectures: 4Hrs/week	**Paper : 100 Marks**
	Duration : 3 Hrs.
	Term work : 25 Marks

UNIT I:- LINEAR PROGRAMMING

Linear Programming, Simplex Method, Revised Simplex Method, Duality, Sensitivity Analysis.

(10 Hrs., 20 Marks)

UNIT II:-NON LINEAR PROGRAMMING

Non Linear Programming, One-Dimensional Minimization, Elimination Methods. Fibonacci Method, Golden Method, Interpolation method, Qadratic and Cubic Interpolation methods.

(10 Hrs., 20 Marks)

UNIT III:-UNCONSTRAINED OPTIMIZATION METHODS

Unconstrained Optimization Methods, Univariate and Pattern Search Methods, Rosenbrock's Method of Coordinates,

(10 Hrs., 20 Marks)

UNIT IV:-OPTIMIZATION METHODS

Simplex method. Descent Methods, Steepest descent Method, Conjugate Gradient Method Reevs Method, Davidon, Fletcher-Powell Method.

(10 Hrs., 20 Marks)

UNIT V:-CONSTRAINED OPTIMIZATION

Constrained Optimization, Complex method, Cutting Plane Method, Method of Feasible Directions. Integer Programming, Dynamic programming.

(10 Hrs., 20 Marks)

References,

1. S.S.Rao, Optimization Theory and Applications, Willey Eastern Limited.
2. H.A.Taha, Optimization Research.
3. R.L.Fox, Optimization methods for engineering design.
4. Hummel Blau, Non-linear Programming.

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B.E. (ELECTRICAL) W.E.F: 2008- 09

TERM I

5) Elective-I

V) POWER SYSTEM DYNAMICS

Teaching Scheme	**Examination scheme**
Lectures: 4Hrs/week	**Paper : 100 Marks**
	Duration : 3 Hrs.
	Term work : 25 Marks

UNIT I: - INTRODUCTION

Reliable electrical power services, Stability of Synchronous machine, Tie-line oscillation, Method of simulation.

Synchronous machine:

Review of synchronous machine equations, parameters, Equation in a-b-c phase co-ordinates and Park's co-ordinates, Representation of external system Phasor diagram p.u. reactances.

(10 Hrs., 20 Marks)

UNIT II: - SYSTEM RESPONSE TO LARGE DISTURBANCES

System of one machine against infinite bus, Classical model, Mechanical and electrical torques, Critical clearing angle and time, Automatic reclosing, Precalculated swing curves and their use.

(10 Hrs., 20 Marks)

UNIT III: - SYSTEM RESPONSE TO SMALL DISTURBANCES

Two machine system with negligible losses, Clarke diagram for two machine series reactance system, Extension of Clarke diagram to cover any reactance network, Equation for steady state stability limit, Two Machine system with losses, Effect of inertia, Effect of governor action, Conservative Criterion for stability, Effect of saliency, saturation and short circuit ratio on steady state power limits.

(10 Hrs., 20 Marks)

UNIT IV: - REGULATED SYNCHRONOUS MACHINES

Demagnetizing effect of armature reaction and effect of small speed changes, Modes of oscillations of unregulated multimachine system, Voltage regulator and governor coach with delay Distribution of power impacts.

(10 Hrs., 20 Marks)

UNIT V: - EFFECT OF EXCITATION ON STABILITY

Effect of excitation on generator power limits, transient and dynamic stability, Examination of dynamic stability by Routh's criterion, Root locus analysis of a regulated machine connected to an infinite bus. Approximate System representation, Supplementary Stabilizing Signals, Linear analysis of stabilized generator.

(10 Hrs., 20 Marks)

REFERENCES:-

1. Synchronous Machines by C.Concordia, John Wiley& Sons.
2. Power System Stability by E.w..Kimbark,Vol.-3,John Wiley & Sons, New York.
3. Power System Control & Stability by P.A. Anderson, Galgotia Publ.
4. Power System Stability by S.B.Crary, John Wiley&Sons.

SEMINAR

Teaching scheme | **Examination scheme**
Practical: 2 hrs/ week | **Term Work :25**

1. For seminar every student will individually study a topic in depth assigned to him / her and submit a report and shall deliver Seminar on the topic at the end of term.
2. Selection of topic should be done by students in consultation with concerned guide
   a. Topic should be related to branch but it should be extended part of the branch (latest and advance topic), preferably outside the syllabus.
   b. The topic should be such that the student can gain latest knowledge. Student should preferably refer at least one research paper
3. Seminar topic should not be repeated in the department and registration of the same should be done on first come first served basis
4. Seminar report should be submitted in paper bound copy prepared with computer typing
   a. Size of report depends on advancement of topic.
   b. Student should preferably refer minimum 5 reference books / magazines / proceedings / journals.
   c. Format of content
      i. Introduction.
      ii. Literature survey.
      iii. Theory 1) Implementation 2) Methodology 3) Application 4) Advantages, Disadvantages.
      iv. Future scope.
      v. Conclusion.

5 FORMAT FOR ASSESSMENT OF SEMINAR for TERM WORK

Title of seminar: ____________________________________

Name of guide : ____________________________________

Sr. No.	Exam Seat No.	Name of Student	Assessment by examiners					Grand Total
			Topic Selection 5	Literature Survey 5	Report Writing 5	Depth of understanding 5	Presentation 5	25

6 . Assessment of Literature survey will be based on
   a. Collection of material regarding history of the topic.
   b. Implementation.
   c. Recent applications.

7. Assessment of Depth of understanding will be based on
    a. Questioning by examiners.
    b. Questioning by students.
    c. What the student understands i.e. conclusion regarding seminar.

8. Assessment of presentation will be based on;
    a. Presentation time (15 minutes)
    b. Presentation covered (full or partial)
    c. Way of presentation
    d. Questioning and answering (5 minutes)

9. Examiners should be a panel of two one of them must be guide. Examiner must have experience at least 3 years.
   Examiners will be appointed by HOD in consultation with Principal.

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TERM I

PROJECT-I

Teaching Scheme	Examination Scheme
PRACTICAL:	**Term Work: 25(Term I)**
4Hrs. /Week (For Term-I)	**Oral : 25 Marks (Term I)**

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1. Every student individually or in a group (of appropriate group size) shall take a project in the beginning of the B.E. First Term in consultation with the guide or sponsored by the industry and the project must be completed in the B.E. Second Term.
2. The project proposal must be submitted in the institute in the beginning of the B.E. first Term. While submitting project proposal care is to be taken that project will be completed within the available time of two terms. The final title of the project work should be submitted at the beginning of the B.E. Second Term.
3. Project title should be precise and clear.
4. Selection and approval of topic:
   Topic should be related to real life application in the field of electrical engineering.
   .OR Manufacturing / Fabrication of a prototype unit include selection, concept, design, material manufacturing of the component, testing and performance evaluation.
   OR Computer aided design and analysis of system/electrical equipments.
   OR Problems related to material handling system.
   OR Energy audit of organization / use of renewable energy source.
   OR Low cost automation, electric / microprocessor control of electrical machines, control system, power systems etc.
   OR Software development for solution of problems in control / power systems.
   Interdisciplinary projects should be encouraged. The examination will be conducted independently in respective departments.
5. The group should maintain a logbook of activities. It should have entries related to the work done, problems faced, solutions evolved etc., duly signed by guide.
6. The group is expected to complete detailed system design, layout etc. in B.E. first Term as a part of term work in the form of a joint report. Project report must be submitted in the prescribed format only.
7. The guides should regularly monitor the progress of the project work.
8. Assessment of the project for award of TW marks shall be done by the guide and a departmental committee (consisting of minimum two teachers with experience more than three years) as per the guidelines given in the following table.

A) ASSESSMENT OF PROJECT- I TERMWORK at B.E. FIRST TERM

NAME OF THE PROJECT ____

NAME OF THE GUIDE: ____

Sr No	Exam Seat No	Name Of Student Marks	Assessment by guide (70%)					Assessment by Departmental committee (30%)			Grand Total	Out of 25 Marks
			Liter-ature survey	Topic Se le-tion	Docum-Entation	Atte-nden-ce	To-tal	Eval-uation (10%)	Pres-ntaion (20%)	Total		
			10	05	15	05	35	05	10	15	50	25

Sign of Guide Sign. of Committee Members Sign. of H. O. D.

9. The guide should be internal examiner for oral examination .

10. The external examiner should be from the related area of the concerned project. He should have minimum of five years of experience at degree level / industry.

11. The evaluation at final oral examination should be done jointly by the internal and external examiners.

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TERM - II

1) SWITCH GEAR & PROTECTION

Teaching Scheme	**Examination Scheme**
Lectures: 4Hrs /Week	**Paper : 100 Marks**
Practical: 2Hrs/Week	**Duration : 3 Hrs.**
	Term work : 25 Marks
	Oral : 25 Marks

UNIT – I:- ARC PHENOMEN AND INTERRUPTION

Arc phenomenon, maintenance of arc, properties of arc, interruption theories, transient recovery Voltage, transient analysis, RRRV, Interruption of capacitive current, CB rating, current chopping, construction & Operation of air blast & bulk oil CB.

(10 Hrs., 20 Marks)

UNIT – II:-CIRCUIT BREAKERS AND FUSES

Construction & Operation minimum oil C.B, SF6 & vacuum Ckt. C.B., Earth leakage & moulded case C.B, Testing installation & maintenance Of CBs Rewirable Fuses , HRC fuses Characteristics & application.

(10 Hrs., 20 Marks)

UNIT – III:-PRINCIPLES OF RELAYING

Basic Principle of relaying essential features & characteristics , relaying schemes, terminology ,CT's & PTs, electromagnetic relays constructional features, principle of operation , characteristics and application of attraction type and induction type over current, directional distance and differential relays.

(10 Hrs., 20 Marks)

UNIT –IV: PROTECTION SCHEMES

Protection of transmission lines, Relaying practice using over current, earth fault, directional distance and differential relays, parallel feeders and ring mains,

Protection of electrical equipments and machines like transformer, motors, generators and buses. Static relaying basic concepts, equipments and protection schemes.

(10 Hrs., 20 Marks)

UNIT –V:-MICROPROCESSOR AND MICROCONTROLLER BASED PROTECTION

Evolution of microprocessor, advantages of digital, use of microprocessor & microcontroller in protection, configuration of microprocessor based control for overcurrent, overvoltage, undervoltage, overfrequency, under frequency, DSP & it's use in power system.

(10 Hrs., 20 Marks)

Reference Books :-

1) T.S. Madharao - Power system protection (static rElay), Tata MacGraw Hill
2) C.R.Mason - The art and science of protective relaying.
3) B.Ram &Vishwakarma D.N - Power system protection & switch gear -TMH
4) Sunil S.Rao - Switchgear & Protection - Khurana Pun
5) Geosonoviz - High voltage circuit beakers
6) B.Ravindranath & M. Chandar, Power system protection & switch gear, New age International.
7) A.R.Warrington-Protective relay.
8) A.G. Phadke & Thorpe- Power system protection their theory & practice Chapman & Hall.

List of experiments:

1) Study of relaying components and control circuit developments.
2) To plot operating characteristics of Inverse time over current relay
3) To study the through fault stability of differential relay.
4) Study of MHO distance relay to plot.
    a) R- X diagram
    b) Relay voltage Vs Admittance characteristic
5) Study of combined over current & earth fault protection scheme of alternator.
6) Protection 3 phase transformer using differential relay (Merz- Price protection scheme)
7) To plot the characteristic of rewirable fuses and MCB
8) Study oil Arc extinction phenomenon.
9)Demonstration of microprocessor base protection of 3 phase IM using MM-30 L & T k make
10)Study of different types fuses.

The term should include a minimum of eight experiments from the above list.

NORTH MAHARASHTRA UNIVERSITY, JALGAON
B.E. (ELECTRICAL) W.E.F: 2008- 09
TERM - II

2) Power System Stability

Teaching Scheme	**Examination scheme**
Lectures: 4Hrs/week	**Paper : 100 Marks**
Practical: 2Hrs/week	**Duration : 3 Hrs.**
	Term work : 25 Marks
	Oral : 25 Marks

UNIT I: - BASIC CONCEPT

Meaning of stability, steady state transient & dynamic stability limits, Park's transformation equations, Analysis of transient and subtransient state operation of salient and non salient pole machines, phasor diagrams, voltage behind the transient and subtransient impedances, time constants. Determination of parameters and time constants.

(10 Hrs., 20 Marks)

UNIT II: - STEADY STATE STABILITY

SSSL of short transmission lines, Analytical and graphical methods of solutions, loosy lines effect of inertia conservative criterion, synchronizing co efficient multi machine system.

(10 Hrs., 20 Marks)

UNIT III: - FACTORS AFFECTING STEADY STATE STABILITY

Effect of saturation, saturated reactance, equivalent reactance, graphical method to find equivalent effect of short circuit ration effect of governor action, effect of automatic voltage regulator.

(10 Hrs., 20 Marks)

UNIT IV: - TRANSIENT STATE STABILITY

Review of basic concept, TTS and equal area criterion, swing equation, point by point solution, critical cleaning angle and critical angle and critical clearing time.

(10 Hrs., 20 Marks)

UNIT V: - FACTORS AFFECTING TRANSIENT STATE STABILITY

Effects of types of fault, effect of grounding, effect of high speed reclosing Precalculated swing curves and their use, effects of fault clearing time, effects of excitation and governing action, Methods of improving stability, multi-machine problem .

(10 Hrs., 20 Marks)

Reference Books:

1) E .W. Kimbark - Power system stability, Vol- 1 & 3 - John Wiley
2) S. B.Cray - Power system stability vol- 1 & 2 - John Wiley
3) Nagrath & Kothari - Modern power system analysi -TMH

List of Experiment:

1) Parameters and time constants of synchronous machines
2) Synchronous machine of infinite bus
3) Effect of saturation and & determination of equivalent reactance's of synchronous machines.
4) Retardation test on synchronous machines to find moment of inertia of rotating part and angular momentum.
5) To obtain power angle characteristics of lossy & lossless lines.
6) To study steady state stability by point by point method.
7) To determine the steady state stability limit of short transmission line.
8) To determine SSSL of long transmission line.
9) Study of clerk's diagram.
10) Study of different types of automatic voltage regulator.

The term work should include a minimum **eight** experiments, from the above list.

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B.E. (ELECTRICAL) W.E.F: 2008- 09
TERM - II
3) INDUSTRIAL DRIVES AND CONTROL

Teaching Scheme	**Examination scheme**
Lectures: 4Hrs/week	**Paper : 100 Marks**
Practical: 2Hrs/week	**Duration : 3 Hrs.**
	Term work : 25 Marks
	Oral : 25 Marks

Unit – I: - ELECTRICAL DRIVES

Concept, classification, advantages, parts of drives, choice of electric drives, fundamental torque equation, types of practical mechanical loads, dynamics of electrical drive- stability of an electrical drive, constant torque drive, constant power drive, selection of a D.C and A.C drive, modes of operation.

(10 Hrs., 20 Marks)

Unit - II: - SPEED-TORQUE CHARACTERISTICS AND CONTROL OF ELECTRICAL DRIVES

Characteristics and equivalent circuits; Dc motor; separately excited, series, shunt, compound.
Induction motors, Synchronous motors.
Basic principles of Speed control; closed loop control, current & speed sensing, Phase locked loop, closed loop position control.

(10 Hrs., 20 Marks)

Unit – III: - SOLID STATE CONTROLLERS:

Dc motor: Using thyristors, Phase control, chopper fed, Dual converters.
Single phase Induction motor: Using triac, Inverter circuit, Using cycloconverters, Speed control of universal motor.
Three phase induction motor: Basic schemes using chopper.
Synchronous motor: Self commutation circuits for three phase Synchronous motor.

(10 Hrs., 20 Marks)

Unit – IV: - AC DRIVES AND SYNCHRONOUS MOTOR CONTROL

Stator voltage control using Ac voltage controller, Inverter fed induction motor (VSI / CSI fed), chopper control in rotor circuit. Slip Energy recovery scheme,
CLC for Induction motor.
open loop control, Self Control Strategy, variable frequency operation, margin angle control.

(10 Hrs., 20 Marks)

Unit – V:- DC DRIVES

Single phase DC Drives for separately & self excited Dc motor (continuous & Discontinuous armature current operation), CLC & TRC Controller, chopper fed Dc Drives. Three phase drives for Dc motors, Full converter & semi- converter operation of Series connected converter.

Micro-processor based control for Drives: Micro-processor based chopper fed Dc motor, Micro-computer based control of Dc drives, using dual converter, Micro-processor based speed control of three phase Induction motor, Synchronous motor control.

(10 Hrs., 20 Marks)

Reference Books :

1) Thyristerised control of Electric Drives – V. Subramanyam, Tata McGraw Hill, New Dehli.
2) Thyristor Power Control- Dubey, Joshi, Sinha, Willey Eastern Publication.
3) Power Electronics Circuit Devices & Applications –M. Rashid, Prentice Hall of India.
4) Fundamentals of Electrical Drives – G. K. Dubey , Narosa Publishing House.
5) Fundamentals of Electrical Drives - Mohammad A. EL-sarkawi, vikas Publishing House.

List of experiments:-

1) Control of d.c motor using single phase half controlled rectifier.
2) Control of d.c motor using single phase fully controlled rectifier.
3) One quadrant chopper control of d.c motor.
4) Two quadrant chopper control of d.c motor.
5) Speed control of single phase induction motor using ac voltage regulator
6) Study of stepper motor drive circuit.
7) Speed control of universal motor.
8) Study of Micro-computer based control of Dc drives,
9) Study of vector control method for induction motor.
10) Study of reversible drives

The term work should include a minimum of eight experiments from above list.

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B.E. (ELECTRICAL) W.E.F: 2008- 09
TERM - II
ELECTIVE-II
I) FLEXIBLE A.C.TRANSMISSION

Teaching Scheme	**Examination scheme**
Lectures: 4Hrs/Week	**Paper : 100 Marks**
Tutorial : 2Hrs/Week	**Duration : 3 Hrs.**
	Term work : 25Marks

UNIT I:- DEVICES AND CONVERTERS

Advanced Power Semiconductor Devices, Voltage Source Converter, Single Phase Full Wave Bridge Converter Operation. Three Phase, Full Wave Bridge Converter. Three Level Voltage source Converter, PWM Converter. Generalized technique of harmonic elimination and voltage control, current sourced converter, and current source verses voltage sourced converters.

(10 Hrs., 20 Marks)

UNIT II:-FACTS CONCEPTS

FACTS Concepts, Flow of Powers in AC System, Dynamic stability consideration of transmission interconnection. Relative importance of controllable parameters, facts controllers.

(10 Hrs., 20 Marks)

UNIT III:-SHUNT COMPENSATORS

STATIC Shunt Compensator, Methods of Controllable VAR Generation, Static VAR Compensators, Static VAR System.

(10 Hrs., 20 Marks)

UNIT IV:-SERIES COMPENSATORS

STATIC Series, compensator, Variable Impedance Type Series Compensators, Switching Converter, Types and Compensators, External Control for series Reactive Compensators.

(10 Hrs., 20 Marks)

UNIT V:-COMBINED COMPENSATORS

Combined Compensator, Unified Power Flow Controller, Interline Power Flow Controller, Generalized Multifunctional FACTS Controllers.

(10 Hrs., 20 Marks)

References,

1. N.G.Hingorani,' Understandig FACTS', IEEE Press, 1999
2. Yang hue Song,'Flexible AC Transmission Systems (FACTS), IEEE Press, 1999

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TERM - II

ELECTIVE-II

II) POWER SYSTEM DESIGN PRACTICE

Teaching Scheme	**Examination scheme**
Lectures: 4Hrs/Week	**Paper : 100 Marks**
Tutorial : 2Hrs/Week	**Duration : 3 Hrs.**
	Term work : 25Marks

UNIT I:- DESIGN FUNDAMENTALS

Electrical & mechanical design of transmission line. Design of EHV transmission lines.

(10 Hrs., 20 Marks)

UNIT II: - DESIGN OF DISTRIBUTION SYSTEMS

Improvement and expansion of power system. Bus bar arrangements, isolating switches.

(10 Hrs., 20 Marks)

UNIT III:- CIRCUIT BREAKERS

Circuit breakers: operating mechanism, rating and selection, operating under special conditions, specification and technical details for deranged tender preparations.

(10 Hrs., 20 Marks)

UNIT IV: - LIGHTING ARRESTORS

Rating characteristics, testing technical defects, standards followed for details insulation co ordination. Power transformers different types, tapping , fittings, cooling, drying rating, cost comparison, testing technical details for ordering and tender preparations.

(10 Hrs., 20 Marks)

UNIT V: - SHUNT CAPACITORS

Need, construction, location, connections, protection, analysis, special types, testing, technical details. Earthing: Earthing systems, step potential, touch potential and transfer potential.

(10 Hrs., 20 Marks)

REFERANCES:-

1) Pratapsingh Satnam & P.V. Gupta. – Substation Designed equipments, Dhanpat Rai & Sons.
2) M. V. Deshpande: - Electrical Power system Design.

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TERM - II
ELECTIVE-II
III) ELECTRIC TRACTION ENGG.

Teaching Scheme		**Examination scheme**	
Lectures: 4Hrs/Week		**Paper**	**: 100 Marks**
Tutorial : 2Hrs/Week		**Duration**	**: 3 Hrs.**
		Term work	**: 25Marks**

UNIT I: - TRAIN MOVEMENT AND PERFORMANCE

Speed time curve, its analysis and construction, schedule speed and factors affecting it, train resistance and its components. Tractive effort calculations, average acceleration and speed, energy output and consumption.

(10 Hrs., 20 Marks)

UNIT II: - POWER TRANSMISSION AND WEIGHT TRANSFERENCE

Methods of transmission of power from motor to wheels .Idea about riding quantities of an electric loco motive, grouping of motor and weight transference, adhesive weight factors affecting slip.

(10 Hrs., 20 Marks)

UNIT III: - TRACTION MOTORS

Performance of (i) d.c. motors (ii) a.c. single phase series motors at low frequencies and at commercial frequency and (iii) poly phase induction motors, under traction service conditions, specific problems and method of overcoming them, special features of construction effect of differences in driving wheel diameters and speed time curves on division of load, traction motor ratings, speed factor, track and overhead equipments.

(10 Hrs., 20 Marks)

UNIT IV: - POWER SUPPLY FOR TRACTION

Overhead and conductor rail system, third rail construction, Bonding of conductor and track rails, overhead construction for trolley, buses and railways, quaternary's construction, temperature effects, current collectors, out times of feeding and distributing system for d.c low frequency, a.c and commercial frequency, a.c. traction voltage drop control, Electrolytic and inductive coordination, power loading curves, Positions of substations and load - sharing .

(10 Hrs., 20 Marks)

UNIT V :- BRAKING ON ELECTRIFIED RAILWAYS

Mechanical versus electric breaking, rheostatic braking, Regenerative braking, method and energy saved in the process, Magnetic track brakes.

Traction control: Duty cycle, Methods of traction motor control, series-Parallel and other types of controllers, use of interlocks, run back prevented, multiple unit control, Master controllers, Reverses, Dead man's handle, use of Metadyne and Megavolt.

(10 Hrs., 20 Marks)

Reference Books:-

H. Partab: Modern Electric traction, Dhanpat Rai & sons.

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B.E. (ELECTRICAL) W.E.F: 2008- 09

TERM - II

ELECTIVE-II

IV) GENERATION PLANNING AND LOAD DISPATCH

Teaching Scheme	**Examination scheme**	
Lectures: 4Hrs/Week	**Paper**	**: 100 Marks**
Tutorial : 2Hrs/Week	**Duration**	**: 3 Hrs.**
	Term work	**: 25Marks**

UNIT-I: - GENERATION

Hydropower, fossil fuels nuclear power generation system. Chronological Load curves, power duration curve, integrated duration curve hydrography, flow duration curve, mass duration curve or hydro power generation stations.

Co-ordination of steam, hydro & nuclear power stations. Optimum generation allocation- line losses neglected & including the effect of transmission losses for thermal power generations.

Low range& short range hydro thermal scheduling of generation the short term and long term hydro thermal scheduling of generation.

(10 Hrs., 20 Marks)

UNIT-II:-PLANNING

Objectives of generation system planning, long term and short term planning. Stages in planning. Policy studies.

(10 Hrs., 20 Marks)

UNIT-III:- LOAD ENERGY FORECASTING

Classification of loads, load forecasting methodology.

peak demand forecasting- non whether sensitive forecast- weather sensitive forecast-total forecast- annual and monthly peak demand forecast.

(10 Hrs., 20 Marks)

UNIT-IV: - GENERATION SYSTEM COST ANALYSIS

Capacity cost, production cost, tuning of addition production analysis- production analysis involving nuclear unit production analysis involving hydro unit. Fuel inventories, energy transition off peak energy utilization.

(10 Hrs., 20 Marks)

UNIT-V:-GENERATION SYSTEM RELIABILITY ANALYSIS

Probabilistic generation unit- model &load model effective load- reliability analysis for isolated system-interconnected system- reliability of interconnected system.

(10 Hrs., 20 Marks)

Reference Books:-

1) Generation of Electric Energy – B.R. Gupta,
   Euresia Publishing House Pvt. Ltd., New Dehli.
2) Power System Planning – R.L.Sullivan, McGraw Hill.
3) Economic Control of Interconnected System – Kirchmayers L.K.,
   John Wiley & Sons, New York.

NORTH MAHARASHTRA UNIVERSITY, JALGAON
B.E. (ELECTRICAL) W.E.F: 2008- 09
TERM - II
ELECTIVE-II

V) EXTRA HIGH VOLTAGE TRANSMISSION

Teaching Scheme	Examination scheme	
Lectures: 4Hrs/Week	Paper	: 100 Marks
Tutorial : 2Hrs/Week	Duration	: 3 Hrs.
	Term work	: 25Marks

UNIT I:-AC POWER TRANSMISSION

Basic aspects of A.C. Power transmission, power-handling capacity and line loss, surface voltage and conductors, electrostatic field of EHV lines. Measurement of electrostatic fields. Electromagnetic interference. Traveling waves and standing waves, Line energization with trapped-charge voltage. Reflection and refraction traveling waves. Transient response of system with series and shunt lumped parameters. Principles of traveling protection.

(10 Hrs., 20 Marks)

UNIT II:-LIGHTNING AND PROTECTION

Lightning & lightning Protection, Insulation coordination based lightning.

(10 Hrs., 20 Marks)

UNIT III:-OVERVOLTAGES IN EHV SYSTEM

Over Voltage in EHV system caused by switching operation, Origin of over voltage and their types caused by interruption of inductive and capacitive currents, Ferro-response over voltage, calculation surges, Power frequency voltage control and over voltages, Power circle diagram.

(10 Hrs., 20 Marks)

UNIT IV:-STABILITY CONSIDERATIONS

Reactive power flow and stability in power systems. Steady-state static real power and reactive power stability, transient stability. Basic principles of system voltage control. Effects of transformer tap changing in the post disturbance effect of generator excitation adjustment, Voltage collapse in EHV lines, reactive power requirement for voltage in long line. Voltage stability

(10 Hrs., 20 Marks)

UNIT V:-MAXIMUM POWER TRANSFER AND STABILITY LIMIT

Power Transfer at voltage stability limit of EHV lines, Magnitude of receiving end voltage, Voltage Magnitude of receiving end voltage during maximum power transfer. Magnitude of Maximum power and stability limit. Optimal reactive power at voltage stability limit

(10 Hrs., 20 Marks)

References,

1. A.Chakrabarti, D.P.Kothari, A.K. Mukhopdadhyay, Performance, operational & control of EHV power system, Wheeler publications.
2. Rakosh Das Begamudre,'Extra high-voltage A.C. transmission Engineering' New Age International.
3. S.Rao, EHVAC & HVDC transmission Engineering & practice' - Khanna publications.

NORTH MAHARASHTRA UNIVERSITY, JALGAON
B.E. (ELECTRICAL) W.E.F: 2008- 09
TERM - II

PROJECT -II

Teaching Scheme | **Examination Scheme**

PRACTICAL:
4Hrs. /Week (For Term-II)

Term Work: 100(Term II)
Oral : 50 Marks (Term II)

1. The Project group in, BE. first Term will continue the project work in B.E. Second Term, and complete project in all respect (assembly, testing, fabrication, tabulation, test result etc.)
2. The group should maintain a logbook of activities. It should have entries related to the work done, problems faced, solution evolved etc., duly signed by guide.
3. The guides should regularly monitor the progress of the project work.
4. The project work along with project report should be submitted as part of term work in B.E. Second Term on or before the last day of the term
5. Project report must be submitted in the prescribed format only..

Submission of project report:

The student shall submit a detailed report base on his/her project work to his/her institutional guide. It shall include relevant circuit diagrams, graphs, photographs, specification sheets etc.

Format for the project report shall be as follows:

a) The report shall be neatly typed on white paper .The typing shall be of normal spacing and only on one side of the "A4 "size paper.

b) The report shall be submitted with front and back cover card paper, neatly cut and bound together.

c) Front cover shall have the following details in block capitals in the following sequence.
Title at the top, followed by the name of the candidate with roll no and exam seat no in the next line. Name of the guide with designation below the details of the candidate. The name of the institute and year of submission on separate lines at the end.

d) Project work approval sheet in the form of a certificate duly signed, shall be included.

e) The format of the text of the project report:
The synopsis shall be followed by literature survey. The report of analytical or experimental work done, if any shall then follow. The discussion and conclusion shall form the next part of the text. It shall be followed by nomenclature and symbols used and then acknowledgement .The bibliography shall form the last section.

The total number of typed pages, excluding cover, shall be about 50 to100.All the pages shall be serially numbered.

Number of copies of the project report submitted to the department shall be equal to number of students in a group plus three.The oral examination will be base on the project report.

6. Assessment of the project for award of TW marks shall be done by the guide and a departmental committee (consisting of minimum two teachers with experience more than three years) as per the guidelines given in the following table.

B) ASSESSMENT OF PROJECT II TERMWORK (B.E. SECOND TERM)

NAME OF THE PROJECT: ____

NAME OF THE GUIDE: ____

Sr. No	Exam. Seat No	Name Of Students	Assessment by guide (70%)						Assessment by department (30%)			Grand Total
			Fabrication /software / actual work	Execution of project	Project report	Scope/ Cost / Utility	Attende-nece	Total	Evaluation (10%)	Prese-ntaion (20%)	Total	
		Marks	20	10	20	10	10	70	10	20	30	100

Sign of Guide. Sign of Committee Members Sign. of H. O. D.

7. The guide should be internal examiner for oral examination .

8. The external examiner should be from the related area of the concerned project. He should have minimum of five years of experience at degree level / industry.

9. The evaluation at final oral examination should be done jointly by the internal and external examiners.

NORTH MAHARASHTRA UNIVERSITY, JALGAON
B.E. (ELECTRICAL) W.E.F: 2008- 09
TERM - II
INDUSTRIAL VISIT

Term work:25 Marks.

EDUCATION TOUR / TECHNICAL VISITS / CASE STUDY AND ITS EVALUATION

1. During B.E. First Term / Second Term or during vacation between B.E. First Term / Second Term every student; shall visit minimum two industries, factories arranged by colleges and accompanied by teachers. There shall be at least one teacher for a group of 20 students and at least one non-teaching staff accompanied with the students.

2. The colleges should obtain appropriate certificates of visit from the concerned organizations just after the visits.

3. Students should submit written report about the visits individually at the end of B.E. Second Term .

4. The report should contain information about the following points:

   (a) The organization - activities of organization and administrative setup technical personnel and their main duties.
   (b) The project *I* industry brief description with sketches and salient technical information.
   (c) The work *I* processes observed with specification of materials, products, equipments etc. and role of engineers in that organization.
   (d) Suggestions (if any) for improvement in the working of those organizations.

5. The evaluation of the report of technical visits will be made by panel of two teachers appointed by principal based on following points:

   (a) Coverage aspect: All above points should be covered.
   (b) Detailed observations: System *I* Process / Product explained with data, diagram specifications.
   (c) Quality of presentation: Report should be very objective and should consist of clear and systematic organization of topics and information.
   (d) Viva - voce: A viva -voce shall be conducted on the technical visit report by the teachers to assess the specific knowledge gained by the students for technical applications.

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NORTH MAHARASHTRA UNIVERSITY, JALGAON
B.E. (ELECTRICAL) W.E.F: 2008- 09
TERM - II
ENTREPRENEURSHIP DEVELOPMENT SKILLS

Practical: 2 hours/week.

1. Entrepreneurship:
Aim alternative to seeking jobs- promote self- employment end accelerate industrialization. Entrepreneurship development program in India and Maharashtra an overview. Institutions promoting entrepreneurship, their objectives and mode of functioning.

2. Motivation, requirement and constraints:
Affiliation, power, achievement, GOAL SETTING, FINCIAL AND CARRER RISK AND Rewards. Sources of information- "where to go and for what?" Entrepreneurial personality, creavity and qualities.

3 Selecting the right entrepreneurship field
Search and scanning: Small scale/ medium scale industries/ manufacturing/ transporting/ consultancy. Criteria for selecting product for elopements/ manufacturing.

4 feasibility report: Market survey, selecting right infrastructure, location and government subsidies, sources of technology, recruiting right people, identifying customers, finding out competitors, preparation of feasibility report, project report.

5 Organizational set-ups: advantages and limitations of proprietorship, partnership, co- operatives, private limited and public limited

NORTH MAHARASHTRA UNIVERSITY, JALGAON
STRUCTURE OF TEACHING AND EVALUATION
S.E. (MECHANICAL ENGINEERING)

FIRST TERM

W.E.F. 2006-07

Sr. No.	Subject	Teaching Scheme Hours/week			Examination Scheme				
		Lectures	Tutorial	Practical	Paper Duration Hours	Paper	TW	PR	OR
1	***Engineering Mathematics-III	4	--	--	3	100	--	--	--
2	***Strength of Materials	4	--	--	3	100	25	--	--
3	***Material Science	4	--	2	3	100	25	--	25
4	Manufacturing Engineering-I	4	--	--	3	100	--	--	--
5	Applied Thermodynamics	4	--	2	**3**	100	25	--	25
6	Machine Drawing	--	--	2	--	--	25	--	--
7	**Computer Graphics	--	--	2	--	--	25	25	--
8	***Workshop Practice -III	--	--	2	--	--	50	--	--
	Total	**20**	--	**10**		**500**	**175**	**25**	**50**
	Grand Total	**30**			**750**				

** Common with Automobile Engineering
******* Common with Production Engineering and Automobile Engineering

SECOND TERM

Sr. No.	Subject	Teaching Scheme Hours/week			Examination Scheme				
		Lectures	Tutorial	Practical	Paper Duration Hours	Paper	TW	PR	OR
1	**Theory of Machines	4	--	2	3	100	25	--	25
2	***Industrial Engineering	4	--	--	3	100	25	--	--
3	***Fluid Mechanics	4	--	2	3	100	25	--	25
4	***Electrical Machines and Industrial Electronics	4	--	2	3	100	25	--	--
5	Manufacturing Engineering-II	4	--	--	3	100	25	--	--
6	***Workshop Practice-IV	--	--	4	--	--	25	--	50
	Total	**20**	--	**10**		**500**	**150**	**00**	**100**
	Grand Total	**30**			**750**				

** Common with Automobile Engineering
******* Common with Production Engineering and Automobile Engineering

Engineering Mathematics-III

(Common with Production Engineering And Automobile Engineering)

Teaching Scheme
Lecture: 4 Hours/Week

Examination Scheme
Theory Paper: 100 Marks
Paper Duration: 3 Hours.

Unit: I Linear Differential Equations

Linear Differential Equations of order n, Solution of LDE with constant coefficient, method of variation of parameters, Equations reducible to linear form (with constant coefficient), Cauchy's linear equation, Legendre's linear equation. Whirling of Shafts.

(10 Hrs, 20 Marks)

UNIT: II

a) Simultaneous differential equation. Introduction to Applications to mass spring system.
b) Solution of Partial Differential Equations.
    (i) One dimensional heat flow equation : $\partial u/ \partial t = a^2 \partial^2 u/\partial x^2$
    (ii) Laplace's equations (Two dimensional heat flow equation):
    $\partial^2 u/dx^2 + \partial^2 u/dx^2 = 0$ by separating variables only. Applications of Partial Differential equations to problems of Mechanical and Allied Engineering.

(10 Hrs, 20 Marks)

Unit: III Lap lace transforms

Laplace Transform (LT): Defination, Exisistance, Laplace transforms of elementary/slandered functions, Theorems & Properties of LT(without proof), Inverse LT, Solution of differential equations using LT

(10 Hrs, 20 Marks)

Unit: IV Statistics

Introduction to Mean, Mode, Median, Standard deviation.
Variance, Coefficient of variation, Moments, Skewness and Kurtosis.
Correlation and Regression, Chi-square tests.

(10 Hrs, 20 Marks)

UNIT: V a) Probability

Revision of probability theorems. Probability distribution, Binomial, Poission & Normal distributions.

b) Fourier Transform (FT)

Fourier Integral theorem, Sine & Cosine Integrals. Fourier Transforms, Fourier Cosine Transforms, Fourier Sine Transform and their inverse.

(10 Hrs, 20 Marks)

* No question is to be set on introductory part.

Text Books

1. P.N. Wartikar & J.N. Wartikar A text of applied Mathematics (Volume –III), Pune Vidyarthi Griha Prakashan, Pune.
2. B.S. Grewal Higher Engineering Mathematics, Khanna Publication, New Delhi.
3. H.K. Das, Advance Engineering Mathematics S. Chand & Co. New Delhi.

Reference Books

1 Erwin Kreyszig, Advanced Engineering Mathematics (7^{th} edition) Wiley Eastern Ltd., Bombay.

2. C.R. Wylie, Advanced Engineering Mathematics McGraw Hill Publications, New Delhi.

3 Peter V.O'Neil, Advanced Engineering Mathematics (5^{th} edition) Thomson Brook Cole, Singapore.

4 Kishore S, Trivedi, Probability & Statistics with reliability, queuing & Computer Science application Prentice Hall of India Pvt. Ltd., New Delhi.

STRENGTH OF MATERIALS

(Common with Production Engineering And Automobile Engineering)

Teaching Scheme	Examination Scheme
Lecture: 4 Hours/Week	Theory Paper: 100 Marks
	Term Work: 25 Marks
	Paper Duration: 3 Hours.

UNIT: I SIMPLE STRESSES AND STRAIN

Concept of stress and strain (linear, lateral, shear and volumetric), Hook's law, Poisson's ratio, modulus of elasticity, modulus of rigidity, stress-strain diagram for ductile and brittle materials, factor of safety and working stress, concept of 3-D stress state, bulk modulus, inter relation between elastic modulus.

Axial force diagram, stress-strain, deformations in determinate homogeneous and composite bars of following types.

1) Prismatic
2) Linearly varying
3) Stepped section under concentrated loads and self-weights.

Axial stresses and strain in determinate members –axial stress, strain and deformation in following indeterminate, homogeneous and composite bars.

1) Prismatic
2) Linearly varying
4) Stepped section under concentrated loads, self-weights and temperature changes.

(9 Hrs, 20 Marks)

UNIT: II PRINCIPLE STRESSES AND STRAINS

Normal and shear stress on any oblique plane, concept of principle plane, derivation of expression for principle stresses and planes and plane of max. Shear stress, position of principle plane and plane of max. Shear, graphical solution using Mohr's circle of stresses, combined effect of shear and bending in beams.

Strain energy and impact-concept of stain energy, derivation and use of expression for deformation of axially loaded members under gradual, sudden and impact loads. Strain energy due to self-weight.

Theories of failure- Maximum stress, maximum strain, maximum shear stress, maximum total strain energy.

(9 Hrs, 20 Marks)

UNIT: III SHEAR FORCE AND BENDING MOMENT DIAGRAM

Concept and definition of shear force and bending moment in determinant beams due to concentrated loads, UDL, UVL and couple.

Relation between SF, BM and intensity of loading, construction of shear force and bending moment diagram for cantilever, simple and compound beams, defining critical and maximum value and position of point of contra flexure.

Construction of BMD and load diagram from SFD, Construction of load diagram and SFD from BMD.

Slope and deflection for member in bending relation between moment and slope, slope and deflection of determinate beams, double integration method (Macaulay method) Derivation of formulae for slopes and deflections for standard cases, moment area method, conjugate beam method.

(9 Hrs, 20 Marks)

UNIT: IV BENDING STRESSES

Theory of simple bending, assumptions in bending theory, Derivation of flexural formula, Area center and moment of inertia of common cross section (regular section, T- section, channel section, I-section) with respect to centroidal and parallel axis, bending stress distribution diagram, moment of resistance and section modulus calculations.

Direct and bending stresses in short column and other structural component, Stress distribution diagram, axial load for single eccentric self weight combined with lateral loads, concept of core section, middle third rule.

Shear stresses: - Concept, derivation of shear stress distribution formula, shear stress distribution diagram for common cross section, maximum and average shear stresses, shear connection between flange and web.

(9 Hrs, 20 Marks)

UNIT: V TORSION IN CIRCULAR SHAFTS

Stresses, strains and deformations in solid and hollow shafts, homogeneous and composite circular cross-sections subjected to torsion. Derivation of torsion equation. Stress due to combined torsion, bending and axial force on shafts.

Thin and thick walled pressure vessels: - Stress, strain and deformation in thin wall seamless cylindrical and spherical vessel due to internal fluid pressure, change in volume, constants, effects of additional compressible and incompressible fluid injected under pressure, use of I.S.code.

(9 Hrs, 20 Marks)

REFERENCE BOOKS

1) Timoshenko, Mechanics of Materials, CBS Publisher &Distributor
2) Ramamruthum, Strengths of Materials, Dhanpat Rai Publication
3) Junnarkar & Advi, Mechanics of Structure, Charorar Publication House, ANAND
4) Bear &Johnson, Mechanics of Materials
5) Shigley J.E., Mechanical Engineering Design

MATERIAL SCIENCE

(Common with Production Engineering And Automobile Engineering)

Teaching Scheme
Lecture: 4 hrs/week
Practical: 2-hrs/week

Examination Scheme
Theory Paper: 100 Marks
Term work: 25 Marks

Oral: 25 Marks
Paper Duration: 3 hrs.

UNIT-I Nature of Engineering Materials

Nature of metals and alloys, structure-property relationship, atomic structure, atomic bonds, atomic arrangements in materials, crystal structure of metals, development of grain structure, elastic and plastic deformation of single crystals, dislocation theory of slippage, strain hardening or work hardening, plastic deformation in polycrystalline metals, ductile and brittle fractures, cold working, recrystallization and hot working.

Non-metallic materials: Plastic elastomers, ceramics and composites, property and structures. Application of these materials in various engineering fields.

(9 Hrs, 20 Marks)

UNIT-II Mechanical Properties and Testing

Static property, tensile test, engineering and true stress, true strain curves, evaluation of properties and significance of test, typical engineering stress-strain diagrams, compression test, cupping test on sheet metals. Hardness test- Brinell, Poldi, Vickers, Rockwell superficial, Micro hardness test, Sceleroscope, Durometer, Mohr's test, relationship among the various hardness test, relationship of hardness to tensile strength, Dynamic properties, Impact tests, Charpy and Izod, Fatigue test and the endurance limit, temperature effects, creep test, machinability, formability and weldability.

Non-destructive testing: Advantages and limitations of destructive and non-destructive testing, liquid penetrant, magnetic particle inspection, and ultrasonic test, radiography and eddy current test.

(9 Hrs, 20 Marks)

UNIT-III Equilibrium Diagrams

Equilibrium Diagrams: Introduction, alloys, alloy types, phases, Hume Rothery's rule of solid solubility, Gibb's phase rule, Polymorphism, cooling curves, plotting of equilibrium diagrams, utilization of diagrams, solidification of alloy, types of equilibrium diagram, Isomorphs, eutectic and partial eutectic and layer type, Non-equilibrium cooling and it's effects.

Strengthening mechanisms: Refinement of grain size, solid solution, hardening, desperation hardening, age hardening, martensitic transformation.

(9 Hrs, 20 Marks)

UNIT-IV Powder Metallurgy and Pyrometry

Powder Metallurgy: Introduction Basic process, power manufacturing, powder testing and evaluation, powder mixing and blending, compacting, sintering, hot isostatic pressing, secondary operations, applications, merits and demerits.

Pyrometry: principle, operation and uses of various pyrometers, thermocouples, thermocouple materials, resistance pyrometer, disappearing filament pyrometer, radiant pyrometer.

(9 Hrs, 20 Marks)

UNIT-V Corrosion and Prevention

Corrosion and Prevention: Cost of corrosion, dry corrosion, wet corrosion, electrochemical mechanism, corrosion tendency and electrode potential polymerization, corrosion rates, passivity, forms of corrosion, galvanic pitting, crevice and intergranular corrosion, stress corrosion etc. Prevention of corrosion: selection of materials, modification of environment, design of components, cathodic protection, coating, anodizing, Inhibitors

Methods of surface improvement, surface treatment, coating, painting, paint application, methods- spray painting, electrostatic deposition, electro- coating, hot dip coating, chemical conversions coatings, electroplating, anodizing, electroless plating, vaporized metal coating, vacuum metallizing, spurting, chemical vapuor deposition.

(9 Hrs, 20 Marks)

Term Work:

1. Tensile test on mild steel and aluminum test pieces.
2. Rockwell and Rockwell superficial test on different samples with different scales.
3. Brinell hardness test on steel, cast iron, brass and aluminum alloys.
4. Vicker's hardness test on mild steel, hardened steel and cast iron.
5. Poldi hardness test on samples of three different metals.
6. Erichson cupping test.
7. Non-destructive tests: Dye penetrant test.
8. Magnetic particle testing or eddy current test.
9. Izod and charpy impact test.
10. Effect of cold working on hardness of minimum two materials.
11. Testing of bulk properties such as flow rate, apparent density and tap density of metal powder.

MANUFACTURING ENGINEERING-I

Teaching Scheme
Lecture: 4 Hours/Week

Examination Scheme
Theory Paper: 100 Marks
Paper Duration: 3 Hours.

UNIT: I CASTING

Molding Sand: Types and Properties, Patterns: Types, Allowances, Cores: Types, Chaplets, Moulding Box, Principle of Operation, sketch, applications of Sand mould casting, Die Casting, Permanent mould Casting, Centrifugal Casting, Investment Casting, Continuous Casting. Defects in Casting, Cleaning and finishing of casting, Inspection and testing of casting.

(9 Hrs, 20 Marks)

UNIT: II MECHANICAL WORKING OF METALS

Re-crystallization temperature, Hot Working and Cold Working of Metals, Principle of Operation, Sketch, Advantages, limitations and applications of: Rolling-rods, Wires, Tubes; Sheet Metal Working-Shearing, Piercing, Blanking, Drawing, Bending; Forging-Open Die, Closed Die, Drop Forging, Press Forging, Machine Forging, Cold Forging.

(9 Hrs, 20 Marks)

UNIT: III JOINING PROCESSES

Welding, Classification of Welding Processes, Principle of Operation, Sketch, Advantages, limitations and applications of: Forge Welding, Friction Welding, Thermit Welding, Spot Welding, Seam Welding, Projection Welding, Arc Welding, Difference between AC and DC Welding, Shielded Metal Arc Welding, Gas Welding: Flames and Techniques, Tungsten Inert Gas Welding, Metal Inert Gas Welding, Submerged Arc Welding, Brazing, Soldering, Welding Defects.

(9 Hrs, 20 Marks)

UNIT: IV GEAR AND THREAD MANUFACTURING

Gear Manufacturing Processes, Form Cutter Method, Gear Generating Method, Gear Cutting by Single Point Cutting Tool, Gear Shaping, Gear Manufacturing by –Casting, Roll Forming, Extrusion, Cold Drawing, Stamping, Hot Forging, Gear Finishing Operations-Gear Shaving, Gear Burnishing, Gear Grinding. Thread Manufacturing Methods-Casting, Chasing, Thread Rolling and Die Threading and Tapping, Thread Milling, Thread Grinding.

UNIT: V MACHINING PROCESSES & CAPSTAN AND TURRET LATHE

Machining Processes – Turning, shaping, planning, boring, drilling, milling

Capstan & Turret Lathe --Introduction, Difference between Engineering Lathe, Capstan and Turret Lathe, Indexing mechanisms, Bar feeding mechanisms, Work holding devices, tool holding devices, Automates-single and multi spindle automates.

(9 Hrs, 20 Marks)

Reference Books

1 Bawa, Manufacturing Technology- I (Ascent Series),Tata McGraw Hill, New Delhi

2 P.C. Sharma, A text Book of Production Technology - S. Chand Publication.

3 K. C. Jain Production Engineering – Tata McGraw Hill,New Delhi

4 E. Paul De Garmo, Materials & Processes in Manufacturing – Prentice Hall of India

5 Hajara Choudhari, Bose S.K. Elements of Workshop Technology Volume I&II Asia Publishing House

APPLIED THERMODYNAMICS

Teaching Scheme	Examination Scheme
Lecture: 4 Hours/Week	Theory Paper: 100 Marks
Practical: 2 Hours/ Week	Term Work: 25 Marks
	Oral: 25 Marks
	Paper Duration: 3 Hours.

UNIT: I FUELS AND COMBUSTION

Types of fuels, Ultimate and proximate analysis of fuel, Gravimetric and volumetric analysis and their conversions, Physical law of combustion, basic combustion equations, composition of dry air, Stoichiometric air-fuel ratio, Actual air fuel relation, excess air, determination of actual quantity of air from combustion analysis, Fuel gas analysis, Orsat apparatus, Enthalpy of formation, Enthalpy of combustion, calorific values and their determination.

(9 Hrs, 20 marks)

UNIT: II STEAM GENERATORS

Classification of boilers, introduction to water tube and fire tube boiler, introduction to IBR laws, characteristics and features of high pressure boilers, Stirling, Lamount, Loeffler, benson boilers, Boiler mountings and accessories, boiler draught, natural and artificial draught, draught losses, regulation and calculation for chimney height, Condition for maximum discharge, Equivalent evaporation, boiler efficiency, Heat balance.

(9 Hrs, 20 Marks)

UNIT: III STEAM CYCLES AND CONDENSERS

Introduction to steam power plant, carnot vapour power cycle, Rankine cycle, work ratio, back work ratio, specific steam consumption. Effect of operating variables (boiler pressure, condenser pressure and super heat) on Rankine cycle, Reheat and regenerative Rankine. Introduction to condensers, Jet and Surface condensers, types of condensers, condensres vacuum and vacuum efficiency, air pumps, capacity of air extraction pumps, sources of air leakage and effect of air leakage, cooling towers.

(9 Hrs, 20 Marks)

UNIT: IV COMPRESSIBLE FLUID FLOW AND STEAM NOZZLES

Static and stagnation properties, sonic velocity, Mach number, types of nozzles, one dimensional steady isentropic flow through nozzles and diffusers, critical pressure ratio and maximum discharge, supersaturated flow, effect of variation in back pressure on nozzle characteristics, shocks and losses, effect of friction and nozzle efficiency.

(9 Hrs, 20 Marks)

UNIT: V RECIPROCATING AIR COMPRESSORS

Introduction, uses of compressed air, classification of compressors, air compressor terminology, Constructions and workings of single cylinder, single stage, single and double acting reciprocating air compressors, indicated work done (polytropic, isothermal and isentropic) without clearance, isothermal efficiency, effect of clearance, volumetric efficiency, F.A.D., theoretical and actual indicator diagrams, methods of improving volumetric efficiency, Multistage compression: requirement, work done in multistage compression, inter cooling and after cooling, condition for maximum efficiency.

(9 Hrs, 20 Marks)

LIST OF EXPERIMENTS

Minimum eight experiments should be performed from following lists:

1. Determination of calorific value of solid/ liquid/gaseous fuel.
2. Analysis of flue gases by Orsat / PUC apparatus.
3. Study of high-pressure boilers.
4. Determination of Isothermal and Volumetric efficiency of reciprocating air compressor.
5. Study of steam nozzles.
6. Study of steam condensers and cooling towers.
7. Study of thermal power plant by actual visit.
8. Study of boiler draughts.
9. Study of Rankine cycle (five numericals based on the syllabus)

10 Study of on boiler efficiency and heat balance sheet. (Assignment on the same)

REFERENCE BOOKS

1. R. K. Rajput, Thermal Engineering, Laxmi Publication, New Delhi.
2. Domkundwar, Refrigeration & Air Conditioning, Dhanpatrai and Sons, New Delhi.
3. P.L. Ballany, Thermal Engineering, Khanna Publication, New Delhi.
4. Kumar, Vasandani Heat Engineering, Metropolitan Book Company. Pvt.Ltd. New Delhi.
5. Rudramurthy, Thermal Engineering, Tata McGraw Hill, New Delhi.
6. S.C. Gupta, Thermal Engineering, Pearson Education Pvt. Ltd. New Delhi.
7. P. K. Nag, Thermodynamics, Tata McGraw Hill, New Delhi.

Machine Drawing

Teaching Scheme	Examination Scheme
Practical: 2 Hours/Week	Term Work: 25 Marks

Term work shall consist of:

Two projects consisting of a full imperial size sheet each involving assembly drawing with a part list, overall dimensions and detailed drawing of couplings, bearings, lathe parts, screw jack, vices, valves etc.

Manufacturing tolerances, surface finish symbols and geometric tolerances should be specified so as to make it a working drawing.

Third sheet should contain all the machining symbols, tolerances, welding symbols etc.

REFERENCE BOOKS

1. N D Bhatt, Machine Drawing, Charotar Publishing Company.
2. J E Shigley & C R Mischke, Mechanical Engineering Design, 5th Edition, McGraw Hill Publications New Delhi.
3. N Sidheswar & Kannaiah, Machine Drawing, Tata McGraw Hill Publications New Delhi.

WORKSHOP PRACTICE – III

(Common with Production Engineering And Automobile Engineering)

Teaching Scheme	Examination Scheme
Practical: 2 Hours/Week	Term Work: 50 Marks

1. Jobs: -

A. CARPENTARY SHOP [4 hrs]

Preparation & Manufacturing of solid pattern involving Wood Turning from component drawing. (1 job)

B. MACHINE SHOP [8 hrs]

One composite job involving different machine operation on Lathe, Shaper, Slotter, Drilling, Milling & Grinding operations.

NOTE: Group of maximum 3 to 4 students depending upon the work involved.

C. FOUNDRY SHOP [4 hrs]

Preparation of mould of above pattern, casting from this mould. Actual weight calculation, yield & casting of item should be performed.
(1 job)

D. WELDING SHOP [4 hrs]

One job on welding (fabrication) preparing a component comprising welding joints such as shoe rack, book rack, stands for flower pots, house hold applications etc.

2. Journals and Demonstration: -

A journal containing records of following assignments based on the demonstration on machine tools (sketches and relevant description)

(i) Block Diagrams (any Two)
1. Lathe,
2. Universal Milling Machine,
3. Radial Drilling Machine,
4. Cylindrical Grinder.

(ii) Mechanisms (any Two)
1. All geared head stock of a Center Lathe,
2. Spindle arbor (assembly) drive of a Milling Machine,

3. Crank and slotted lever quick return drive of Shaping Machine,
4. Spindle assembly in a Drilling Machine.

(iii) Accessories (any Two)
1. Taper turning attachment for a Center Lathe,
2. Universal Driving Head,
3. Milling Cutter.

(iv) 1. Process planning sheet of the components of the job to be under taken.
2. Tool profile sheet for job of turning.
3. Introduction to industry.

Special grinding machines – honing, lapping, super finishing, buffing, burnishing.

NOTE

A) The candidates are required to finish the job to the following limits.
1. Lathe: - + /- 0.05 mm
2. Grinding: - + /- 0.05 mm
3. Shaper: - + /- 0.05 mm
4. Milling: - + /- 0.05 mm

B) Work Book shall include description with detailed drawing i.e. <u>Working drawing of each job showing all dimensions, limits, finishing processes, material used, machining symbol etc.</u>

C) Theory concered is to be taught in workshop only to every batch going to work shop for practical, during only in practical hours only.

Reference Books

1. Hajara Chauidhary Bose S. K., Element of Workshop Technology Volume II, Asia Publishing House.
2. P.N. Rao, Production Technology Volume I & II, Tata McGraw Hill Publication.
3.R.K. Jain, Production Technology, Khanna Publishers.
4.P.C. Sharma Production Technology, Khanna Publishers.
5.Chaprnan W.A. J., Workshop Technology, Volume II, ELBS Publishers.
6.HMT, Production Technology Tata McGraw Hill Publication.

COMPUTER GRAPHICS
(Common with Automobile Engineering)

Teaching Scheme	Examination Scheme
Practical: 2 Hours/Week	Term Work: 25 Marks
	Practical: 25 Marks

Term work shall consists of:

a) Two assignments on AutoCAD (preferably latest version).
b) Two assignments on Auto LISP (such as Design and drafting of any mechanical component through Auto LISP)

REFERENCE BOOKS

1. AutoCAD reference manual
2. Auto LISP reference manual
3. George Omura, ABCs of Auto LISP, BPB. Publication.

THEORY OF MACHINES-I

(Common with Automobile Engineering)

Teaching Scheme	Examination Scheme
Lecture: 4 Hours/Week	Theory Paper: 100 Marks
Practical: 2 Hours/ Week	Term Work: 25 Marks
	Oral: 25 Marks
	Paper Duration: 3 Hours.

UNIT: I

Fundamentals of kinematics, Types of motion, degree of freedom, Grubler's criterion, mechanisms with lower pairs, hooks joint, steering gear mechanism, straight line mechanism, Geneva mechanism ,Inversion of mechanism.

1. Velocity analysis by ICR method, relative velocity method.
2. Acceleration analysis by relative acceleration method, Coriolis acceleration. (9 Hrs, 20 Marks)

UNIT: II

1. Algebraic method of velocity & acceleration analysis.
2. Klein's construction.
3. Static force analysis.
4. Inertia force analysis of IC engine mechanism, geared system.
5. Dynamical equivalent system, compound pendulum, bifilar suspension & trifler suspension method for inertia analysis.

(9 Hrs, 20 Marks)

UNIT: III

1. Velocity & acceleration analysis by complex algebra method.
2. Velocity & acceleration by vector algebra method.

(Four bar & single slider mechanism only)

UNIT: IV

1. Friction, laws, efficiency of inclined plane, screws, clutches.
2. Friction circle and friction axis of mechanism.
3. Lubrication, system,types,proper

(9 Hrs, 20 Marks)

UNIT: V

1. Types of friction drives, open belt, cross belt, length of belt.
2. Slip. Creep, crowning of pulleys, steeped pulley.
3. Power transmitted, maximum power transmitted by belt drive.
4. Chain, types, length of chain, power transmitted.

(9 Hrs, 20 Marks)

List of Practicals:

1. To determine the mass moment of inertia of compound pendulum.
2. To determine the mass moment of inertia of bifilar/triflar suspension method.
3. To determine the slip of belt drive.
4. Velocity analysis by ICR method (2 problems)
5. Relative velocity & acceleration method (4 problems)
6. Klein's construction (4 problems)
7. Inertia force analysis of IC engine mechanism by graphical method.

Assignments: Five assignments on above topics in addition to above practicals

References:

1) P.L.Ballany Theory of Machines & Mechanism ,Khanna Publication New Delhi
2) Jagdish Lal, Theory of Machines & Mechanism

3) S.S Ratan, Theory of Machines & Mechanism,Tata McGraw Hill

4) R.S.Khurmi, Theory of Machine

5) Sadhu singh , Theory of Machine, Pearson Education

6) Thomas Bevan ,The Theory of Machine ,CBS Publication and Distributors

7) Shighley J.E, Theory of Machines,Tata McGraw Hill

8) Hannah & Stephen, Mechanics of Machines

INDUSTRIAL ENGINEERING

(Common with Production Engineering And Automobile Engineering)

Teaching Scheme
Lecture : 4Hrs/week

Examination Scheme
Paper : 100 Marks
Paper Duration : 3Hrs
Term Work : 25 Marks

UNIT I: -

1) Introduction to Industrial Engineering, origin and growth, contribution of Taylor, Gilberths relevance and importance in the economics & industrial development through productivity.
2) Work study
    a) Work study and productivity improvement; scope and application.
    b) Method study:-
    i) Introduction, scope and application
    ii) Select criteria for selecting assignments; record charting symbols. Flow process chart, multiple activity chart. Examine- questioning technique,. Develop motion economy, work place layout, improvement and working condition, implement and maintain
    c) Work Measurement
    i) Aims objectives scope and application
    ii) Stop watch study- equipment and procedure, rating allowance and standard time; activity sampling- principle, procedure and applications.

(9 Hrs, 20 Marks)

UNIT II: -

1) PLANT LAYOUT AND MATERIAL HANDLING

a) Criteria for plant location, site selection, types of plant layout, planning for utilities

b) Material Handling- necessity of material handling, procedure for analyzing material handling system, methods and equipment of material handling. Effect of layout and material handling system on productivity and profitability

c) Safety in material handling and factory operation

2) a) Factories act

c) Indian Boiler Act

(9 Hrs, 20 Marks)

UNIT III: -

PRODUCTION AND MATERIAL PLANNING CONTROL

a) Production Planning

1. Production and material planning as in integral and interdependent system
2. Production Planning- for casting, capacity estimation, planning scheduling and control

b) Material Planning- need and basis for material planning, planning and control of raw material. Ark- in and brought out components

c) Progress Control - introduction, step involved, bar chart, Gantt char, transmission of report and corrective action.

(9 Hrs, 20 Marks)

UNIT IV: -

Wage administration- job analysis, job description, job rating, wage survey, wage scale.

i) Job evaluation and payment of result:-

Job evaluation- necessity and principles of job evaluation, systems of job evaluation, application.

ii) PBR as a motivating factor, incentive scheme- basis of schemes, Taylor, Rowan, Halsey and Bedoux plan, incentive to indirect workers, preplanning for introduction incentive scheme.

iii) Value analysis/ engineering- concepts, procedure and steps in value analysis/engg. Scope and application

(9 Hrs, 20 Marks)

UNIT V: -

Ergonomics:

Definition and importance: historical background. Human machine systems- interfaces. Anthropometry: need, important body dimensions, data collections, statically analysis, percentile. Applied Anthropometry and work space design and seating, ergonomics and safety.

(9 Hrs, 20 Marks)

References:-

1) Maynard, Industrial Engineering. Hand book, McGraw Hill book company
2) ILO, Introduction to Work Study
3) Khanna O.P. , Industrial Engineering. and Management, Dhanpat Rai Publication, New Delhi.
4) Factory Act -1948
5) Indian Boiler Act- 1923 (Revised 1983)
6) L.C. Jhamb " A text book of Industrial Engineering", Everest Publishing House, India.

FLUID MECHANICS

(Common with Production Engineering And Automobile Engineering)

Teaching Scheme	Examination Scheme
Lecture : 4 Hrs/week	Theory : 100 Marks
Practical : 2 Hrs/week	T/W : 25 Marks
	Oral : 25 Marks
	Paper Duration: 3 Hours

UNIT – 1

FLUID STATICS

Fluid properties & definition, definition of fluid, Viscosity, Bulk modulus of elasticity, Vapour pressure, Surface tension, Capillary, Speed of sound, Pressure at a point, Liquid pressure on plane area, Curved surface, Center of pressure, Manometer, Buoyancy, Stability of floating and submerged body, Metacentric height, Uniform rotation of open vessels, Pascal's law.

(9 Hrs, 20 Marks)

UNIT – 2

KINEMATICS OF FLUID FLOW

Types of flow, Definition of steady, Unsteady, Uniform, Non uniform, Laminar, Turbulent, 1D-2D flows, Stream line, Streak line, Path line, Irrotational flow, concept of Velocity, potential & stream function flow net (no mathematical treatments) , Continuity equation,2D Eulers equation, Bernoulli's equation along a stream line for compressible and incompressible flow and its application , pitot tube, Ventury meter, Differential monocircular sharp edge mouth pieces and orifice rotometer, Orifices, Orifices meter.

(9 Hrs, 20 Marks)

UNIT – 3

LAMINAR FLOW

Definition, Relation between shear stress & pressure gradient, Flow between parallel plates, Circular tube, Lubrication mechanism, Hagen poiseuille's theory.

TURBULENT FLOW:

Definition, Prandtl's mixing length theory, Velocity distribution, Variation of flow through pipe, Minor loses in pipes & fittings, Darcy-Weisbach equation for frictional head loss, Moody diagram.

(9 Hrs, 20 Marks)

UNIT-4

FLOW THROUGH PIPES

Reynolds's experiment, pipe discharging from a reservoir, pipe connecting two reservoir, pipes in series and parallel, siphon, transmission of power and flow through nozzle.

Introduction to compressible flow, sound wave and Mach no. introduction to unsteady flow in closed conduit oscillation of liquid , phenomenon of surges and water hammer and other there control .

Dimension: - Dimensional homogeneity, dimensional analysis method. Raleigh's method and Buckingham's pi theorem, model analysis, dynamic forces, dimensional less no. , -similitude – based on Reynolds and mach numbers .

(9 Hrs, 20 Marks)

UNIT – 5

RECIPROCATING PUMP

Introduction, main parts, working, single & double acting, slip of reciprocating pump, classification, variation of velocity & acceleration, indicator diagram, air vessel's

HYDRAULIC CIRCUITS

Flow control valve, direction control valves, pressure regulating valves, symbols, different types of hydraulic circuits

(9 Hrs, 20 Marks)

List of practical :-(any eight)

1. Determination of viscosity of given liquid
2. Study Of Manometer
3. Study of stability of floating body.
4. Study of forced vertex motion
5. Flow net by Electrical Analogy Method
6. Calibration of venturi meter/ orifice meter
7. Verification of Bernoullis theorem.
8. Study of Sharp edged circular orifice / mouth piece.
9. Study of momentum equation
10. Study of Laminar and Turbulent flow by use of Reynolds apparatus
11. Study of flow through pipe

Reference Books :

1. R.K. Bansal , Text book of Fluid Mechanics & Hydraulic Machines , Laxmi Publications, Delhi.
2. Dr. P.N Modi , S.M Seth, Hydralic and Fluid Mechanics .
3. S. Ramamurtham ,Fluid Mechanics, Hydraulics and Hydraulic machine ,Danpat Rai & Sons
4. K.L.Kumar , Engineering Fluid mechanics, Eurosa publications House Delhi.
5. S.K Agarwal., Fluid Mechanics & Machinery

Electrical Machines & Industrial Electronics

(Common with Production Engineering And Automobile Engineering)

Teaching Scheme	Examination Scheme
Lecture: 4 Hours/Week	Theory Paper: 100 Marks
Practical: 2Hours/Week	Term Work: 25 Marks
	Paper Duration: 3 Hours.

UNIT-I D.C. MACHINES

Construction, types of generators, Action of motors, significance of back emf, Types of Dc motors, Voltage & current relationship of different motors, Different method of starting (Need of starters), Different methods of speed control, Different types of motor reversing & jogging, Motor stopping, applications.

(9Hrs,marks20)

UNIT-II Induction Motors

Single phase AC Motors, Single phase Induction Motors, Stepper Motor, Servo Motor, their construction, operation & application.

Three-phase induction motors: construction, principle of operation, slip, power flow diagram, torque equation, Maximum & Full load torque, torque slip characteristics, various methods of speed control, different types of starter & application.

(9 Hrs, 20 Marks)

UNIT-III Synchronous Machine

Alternators: construction, synchronous speed, frequency of induced emf, and regulation by synchronous impedance methods.

Synchronous Motors: principle of working, effect of variation of load & excitation, Hunting, method of starting, applications.

Relays: Electromechanical control relays, solid-state relay, timing & latching relays,

(9 Hrs, 20 Marks)

UNIT-IV INDUSTRIAL CONTROL DEVICES

Primary & pilot control devices, manually operated switches, mechanically operated switches. Transducers, Strain guage, LVDT.

Sensors: Proximity sensors, light sensors, Hall effect sensors, Ultrasonic sensors, pressure & temperature sensors, thermistors, IC sensors.

(9 Hrs, 20 Marks)

UNIT-V

Actuators: Classification of actuators, selection criteria of control valves, single acting & double acting cylinders, Electro hydraulic: 3/2 valves, 4/2 valves, and 5/3 valves.

Different types of control systems: motion, pressure, temperature, time, count & sequence controls.

Process & Machines control systems: Types of processes, structure of control systems, controller responses, data acquisition system, computer numerical control & robotics, Basics of PLC programming. Computers in process & machine control

(9 Hrs, 20 Marks)

LIST OF EXPERIMENTS: - (Any Eight)

1. Study of DC Motors.
2. Single phase & 3 phase Alternators.
3. Study of DC generator.
4. Study of AC & DC starters.
5. Study of Single phase & 3 phase Induction motors.

6. Study of LVDT
7. Study of photoconductive & solar cell.
8. Study of Speed control of DC Motor by solid-state devices.
9. Study of Data Acquisition Systems.
10. Study of Transducers

REFERENCE BOOKS

1. Stephen J Chapman, Fundamentals of Electrical Machinery International Student Edition.
2. Nagrath & Kothari, Electrical Machines Tata Mc Graw Hill Publication.
3. Dr. P.S. Bhimra, Generalise Theory of Electrical Machines, Khanna Publication.
4. Frank D. Petruzulla, Industrial Electronics, Mc Graw Hill International Editions.
5. Singh & Khanchandani , Power Electronics, Mc Graw Hill

MANUFACTURING ENGINEERING- I I

Teaching Scheme
Lecture: 4 Hours/Week

Examination Scheme
Theory Paper: 100 Marks
Term Work: 25 Marks
Paper Duration: 3 Hours.

UNIT: I THEORY OF METAL CUTTING

Introduction, Mechanics of chip formation, single point cutting tool, method of machining, type of chips, determination of shear angle, undeformed chip thickness, force relation, Energy considerations in metal cutting, Tool wear and tool life, Tool material, economic of metal cutting, Machinability, design of single point cutting tool.

(9 Hrs, 20 Marks)

UNIT: II JIG AND FIXTURES

Definition, purpose and advantages, elements of jig and fixtures, principle of jig and fixture design, locating devices, design principle for location purpose, champing devices, material for location and clamping elements, drill jigs, drill bushes, drill bush material, types of drill jigs, Milling fixture lathe fixture, Economic of jig and fixture selection.

(9 Hrs, 20 Marks)

UNIT: III PRESS TOOL DESIGN

Introduction, Press operation, classification of power presses, Press selection, press working terminology, working of cutting die, principle of metal cutting, clearance, cutting forces, die design fundamentals, blanking and piercing die construction, pilots, strippers and presser pads, press work materials, strip layout, bending die, drawing operations, variable that affect metal flow during drawing, determining blank size, drawing force.

(9 Hrs, 20 Marks)

UNIT: IV ADVANCE MACHINES

Introduction to CNC Machines, Advantage of CNC, classification of CNC machine, CNC Machine block diagram, part of CNC, steps in CNC manufacturing, CNC part programming, Computer assisted part programming, APT programming.

(9 Hrs, 20 Marks)

UNIT: V FINISHING AND UNCONVENTIONAL MACHINING PROCESSES

Principle of operation, Sketch, advantages, limitations and applications of: Grinding, Honing, Lapping, Buffing, Burnishing, Polishing, Abrasive Jet Machining, Electric Discharge Machining, Electro Chemical Machining, Ultrasonic Machining, Electron beam machining, Laser Beam Machining, Plasma Arc Machining, Ion Beam Machining.

(9 Hrs, 20 Marks)

TERM WORK:

1. Any Assignment on Unit. I
2. Design of jig/ fixture for drilling / milling operation of a given component.
3. Any Assignment on Unit. III
4. Write a program for manufacturing a component on CNC Milling or CNC Lathe.
5. Any Assignment on Unit. V

REFERENCE BOOKS

1 Bawa, Manufacturing Process I & II - Tata McGraw Hill Publication Company. Ltd.

2 E. Paul DeGarmo, J.T. Black, Ronald A. Kohser, Materials and Process Manufacturing - John Willey Publication Ninth edition.

3 Erik K. Henriksen ,Jig and Fixture Design Manual - Industrial Press Inc.

4 Donaldson, Lecain, Goold Tool Design - Tata McGraw Hill Publishing Company. Ltd.

5 P. C. Sharma ,A Textbook of Production Engineering by - S. Chand & Company. Ltd.

6 Grover M. P. CAD/CAM by Grover- Tata McGraw hill Publication Company. Ltd.

WORKSHOP PRACTICE – IV

(Common with Production Engineering And Automobile Engineering)

Teaching Scheme	Examination Scheme
Practical: 4Hours/Week	Term Work: 25 Marks
	Oral: 50 Marks

A] Machine shop

A mini project on die making for Sheet Metal Working, Rubber or Plastic die/ vice assembly/ hammer assembly/ pulley assembly/ coupling assembly/ drilling jig.

B] Plumbing Shop

One pipe assembly including Union, T-joint, Elbow, Cock fitting.

C] Disassembly and assembly of following mechanisms for preventive maintenance

a) All geared head stock
b) Apron mechanism
c) Quick return mechanism
d) Spindle assembly in a Drilling Machine

D] CNC Lathe

One job of programming and manufacturing on CNC, Lathe or Trainer.

E] CNC Milling

One job of programming and manufacturing on CNC, Milling Machine or Trainer.

NOTE: - All jobs specified A to E should be allocated to batch of 5 students and different batches should have different designs of jobs.

DEMONSTRATIONS OF FOLLOWING MACHINES AND PROCESSES TO BE CARRIED OUT IN THE WORKSHOP ONLY.(One hour for each demonstration). (Any Four).

1. Gear Hobbing or Gear Shaping Operation.
2. Operations on Capstan & Turret Lathe and Single Spindle Atocrats.
3. Sheet metalworking on Mechanical or Hydraulic Process.
4. Super finishing operations like Lapping, Honing, etc.
5. Plastic moulding operation Ton-injections moulding machines.
6. Die forging on power hammer.
7. Spot Welding Machine.
8. Different types of grinding wheels, selection criteria, standard marking system of grinding wheel, wheel balancing, truing & dressing operation.
9. Planner.

SCOPE OF THE THEORY: - Theory concerned with different machines, their capabilities, applications & limitations, tool holding, work holding devices etc. for above jobs & demonstrations is to be taught in the workshop only for every batch going to the workshop. Concept of alignment & geometric tolerance required for job No. 1 is to be taught in the classroom.

1. Marketable utility items should be selected & it should be manufactured as per IS codes, e.g. Nuts, bolts, bushes, pins, gas nozzles etc.
2. Setting of turret / caption for assigned jobs should be done by individual student.
3. Preparations of CNC programs for job on CNC machine should be done by groups of students for their jobs.
4. CNC maintenance should be done practically i.e. demonstrations regarding various components of both categories; electronics and mechanical.
5. Determination of cutting speeds, feeds, machining times and other parameters required for above job such as cost estimation etc. and should be compared with market rates.

Reference Books

1.Hajara Choudhary, Bose S. K., Element of Workshop Technology Volume II, Asia Publishing House.

2.P.N. Rao, Production Technology Volume I & II, Tata McGraw Hill Publication.

3.R.K. Jain, Production Technology, Khanna Publishers.

4.P.C. Sharma, Production Technology, Khanna Publishers.

5.Chaprnan W.A. J., Workshop Technology, Volume II, ELBS Publishers.

6.HMT, Production Technology, Tata McGraw Hill Publication.

Faculty of Engineering & Technology

NORTH MAHARASHTRA UNIVERSITY, JALGAON (M.S.)

THIRD YEAR ENGINEERING (T.E.)

(MECHANICAL ENGINEERING) TERM-I & II

W.E.F.: 2007-08

NORTH MAHARASHTRA UNIVERSITY, JALGAON
T.E. (MECHANICAL)
W.E.F.: 2007-08
TERM-I
Heat Transfer and Mass Transfer
(Common with Automobile Engineering)

Teaching Scheme	Examination Scheme
Lectures: 4 Hrs/ week.	Paper: 3 Hours
Practical: 2Hrs/week.	Paper: 100 Marks
	Practical: 25 Marks
	Term Work: 25 Marks

Unit-I **(10 Hours)**

Concepts and Mechanism of heat flow: Steady and unsteady state heat transfer, Modes of heat transfer, their physical mechanism, Laws of heat transfer, thermal conductivity, heat transfer coefficient, radiation heat transfer coefficient, isotropic and an-isotropic materials. Insulation materials. Thermal resistance and thermal conductance.

Steady state heat conduction without heat generation in plane and composite wall, hollow cylinder, hollow sphere, Thermal contact resistance, critical thickness of insulation on cylindrical bodies.

Generalized one dimensional heat conduction equation and reduction to Fourier, Poisson and Laplace equations. Boundary conditions. Steady state heat conduction with heat generation in plane wall, cylinder and sphere.

(20 Marks)

Unit –II **(10 Hours)**

Extended Surface: Types of fins, governing equation, Fin performance, fin efficiency, fin effectiveness, overall fin effectiveness, approximate solution of fins. Error in temperature measurement by thermometer.

Thermal radiation: Concept, Black body radiation, Spectral and total emissive power, Stefan Boltzmann law, Radiation laws, irradiation and radiosity, Surface absorption, reflection and transmission, emissivity, Radiation view factor, Properties of view factor, (*No numerical treatment on view factor*), radiation heat exchange between two diffuse gray surface, radiation shield. **(20 Marks)**

Unit-III **(10 Hours)**

Principle of heat convection: mechanism, natural and forced convection, convection boundary layers: laminar and turbulent, momentum and energy equation an, Laminar flow over bodies, turbulent flow inside circular and non-circular ducts, Reynolds Colburn analogy for flow over flat plate and flow inside tube, coefficient of friction and friction factor, Heat transfer in fully developed flow, Natural convection over vertical planes, use of empirical correlation for forced and natural convection. Dimensional analysis.

Principle of condensation and boiling (No numerical treatment)

(20 Marks)

Unit-IV **(10 Hours)**

Classification of heat exchangers, temperature distribution in parallel, counter flow arrangement, condenser and evaporator, overall heat transfer coefficient, fouling factor, Log-mean temperature difference method and NTU –effectiveness method of analysis for rating and sizing of heat exchangers. Requirement of good heat exchanger and heat exchanger and design and selection, practical applications, heat pipe. **(20 Marks)**

Unit-V **(10Hours)**

Mass Transfer

Introduction, Modes of Mass transfer, Concentrations, Velocities and fluxes, Concentrations, Velocities, Fluxes, Fick's Law, General Mass Diffusion Equation in Stationary Media, Steady State Diffusion Through a Plain Membrane, Steady-State Equimolar Counter Diffusion, Isothermal evaporation of Water into Air from a Surface, Mass Transfer Coefficient, Convective Mass Transfer, Correlations for Mass Transfer **(20 Marks)**

Note for paper setter:

Paper setter should provide the required data for numerical problems in question paper it self. No use of data book should allow.

Experiment must be set simultaneously and the no. of student in each group working on a setup shall not exceed 05 (five) student.

Any **Eight** Experiments from the following list:

1) Determination of thermal conductivity of metal rod.
2) Determination of thermal conductivity of insulating powder.
3) Determination of thermal conductivity of composite wall.
4) Determination of heat transfer coefficient in natural convection.
5) Determination of heat transfer coefficient in forced convection.
6) Determination of temperature distribution, fin efficiency in natural and forced convection.
7) Determination of emissivity of a test surface.
8) Determination of Stefan Boltzmann constant.
9) Study of pool boiling phenomenon and determination of critical heat flux.
10) Determination of log-mean temperature difference, overall heat transfer coefficient and effectiveness of heat exchanger in parallel and counter flow arrangement.
11) Determination of heat transfer from a heat pipe.
12) Calibration of thermocouple.

Instructions for practical Exam. :-

1. Five experiments shall be selected for Practical Examination.
2. The Number of Students for each Practical set up would not be more than 5 Students.

3. Oral will be based on the Practical Performed in the examination and the experiments included in the Journal.

Recommended Books :

1) J.P.Holman 1992 “Heat Transfer”Mc Graw Hill VII Edition.
2) P.Kothandaraman ,”Fundamentals Of Heat And Mass Transfer”.
3) R.K.Rajput,”Heat And Mass Transfer”, S.Chand & Company Ltd.,New Delhi.
4) D.S.Kumar “Heat And Mass Transfer” D.S.Kumar S.K.Kataria & Sons,Delhi.
5) P.K.Nag, “Heat Transfer” Tata Mcgraw Hill Publishing Company Ltd.,New Delhi.
6) Sachdeva R.C., “Fundamentals Of Heat And Mass Transfer” Wiley Eastern Limited, Third Edition.
7) Sukhatme S.P, “A Text Book On Heat Transfer” (1989) , IIIrd Edition, Orient Longmans Ltd., New Delhi.
8) Arora S.C. & Domkundwar S., “A Course In Heat And Mass Transfer” (1994) , Dhanpat Rai & Sons, IVth Edition.
9) Chapman A.J., “Heat Transfer” (1989), , IVth Edition.
10) Yunus A. Cengel, “Heat Transfer –A Practical Approach” (Tata McGraw Hill)
11) M. M. Rathore “Engineering Heat and Mass Transfer”, 2nd Edition, Laxmi Publications, New Delhi.
12) M. Thirumalseshwar,”Fundamentals Of Heat And Mass Transfer” Pearson Education.
13) R. Rudramoorthy, K. Mayilsomy, “ Heat Transfer”, Pearson Education.

NORTH MAHARASHTRA UNIVERSITY, JALGAON
T.E. (MECHANICAL)
W.E.F.: 2007-08
TERM-I
Machine Design I

Teaching Scheme	Examination Scheme
Lectures: 4 Hrs/ week.	Paper: 4 Hours
Practical: 2Hrs/week.	Paper: 100 Marks
	Oral: 25 Marks
	Term Work: 25 Marks

UNIT:- I Introduction and Design of Simple Machine Parts **(10 hours)**

a) Design Process

Machine Design, Traditional design methods, Basic procedure of Machine Design, Requisites of design engineer, Design of machine elements, Sources of design data, Use of standards in design, Selection of preferred sizes, Design synthesis, Creativity in design.

b) Stresses and Material Properties

Simple stresses- Tension, compression, bending and torsion, combined effect of different stresses, different material properties

c) Theories of Failures

Maximum principal Stress Theory, Maximum shear stress theory, Maximum principal strain Theory, Maximum strain energy Theory, Maximum Distortion energy Theory

d) Design of Simple Machine Parts

Factor of safety, Service factor, Design of simple machine parts-Cotter joint, Knuckle joint and Stresses in curved beams (for circular cross-section only).

(20 marks)

UNIT:-II Shafts, Keys and Couplings **(10 hours)**

a) Shafts

Design considerations in Transmission shafts, splined shafts, Shaft design on strength basis, Shaft design on torsional rigidity basis, A.S.M.E. code for shaft design,

b) Keys

Classification of keys, Design considerations in parallel and tapered sunk keys, Design of square, flat and Kennedy keys, Splines.

c) Couplings

Design considerations, Classification, Design of Rigid, Muff coupling, Flange coupling and Flexible bushed pin coupling. **(20 marks)**

UNIT:- III Threaded and Welded joints **(10 hours)**

a) Threaded Joints: Basic types of screw fastenings-cap screws and set screws, Bolts of uniform strength, Locking devices, I.S.O. metric screw threads, Bolts under tension, Eccentrically loaded bolted joint in shear, Eccentric load perpendicular to axis of bolt, Eccentric load on circular base, Torque requirement for bolt tightening, Dimensions of standard fasteners, Design of cylinder bolts and turn buckle.

b) Welded Joints

Advantages and limitations of welded joints, Butt and fillet welds, Stresses in butt and fillet welds, Strength of butt welds, parallel and transverse fillet welds, Axially loaded unsymmetrical welded joint, Eccentric load in plane of welds, Welded joint subjected to bending and torsional moments

(20 marks)

UNIT:-IV Power Screws and Mechanical Springs (10 hours)

a) Power Screws

Power screw thread forms, Multiple threaded screws, Torque analysis with square and trapezoidal threads, Self-locking screw, Collar friction torque, Stresses in power screws, Screw jack design.

b) Mechanical Springs

Types, Applications and materials of springs, Stress and deflection equations for helical springs, Style of ends, Design of helical compression and tension springs, Springs in series and parallel, Concentric helical springs, Helical torsion spring, Multi-leaf spring, Shot peening**.** **(20 marks)**

UNIT:- V Design for variable Loads and Statistical consideration in Design (10 hours)

a) Design for Fluctuating Loads

Stress concentration - causes and remedies, Fluctuating stresses, Fatigue failure, S-N curve, Endurance limit, Notch sensitivity, Endurance strength modifying factors, Reversed stresses, Design for finite and infinite life, Cumulative damage in fatigue failure, Solderberg and Goodman diagrams, Modified Goodman diagram, Fatigue design of components under combined stresses such as shafts, bolts and springs.

b) Statistical consideration in design

Frequency distribution – Histogram and frequency polygon – Normal distribution – Units of measurement of central tendency and dispersion – Standard variable – population combinations – Design and natural tolerances –Design for assembly- Statistical analysis of tolerances – Mechanical reliability and factor of safety. **(20 marks)**

Term Work:

1) Term work shall consist of **TWO** design projects. Each design project shall consist of two imperial size sheets –one involving assembly drawing with a part list and overall dimensions and other sheet involving drawings of individual components. Manufacturing tolerances, surface finish symbols and geometric tolerances should be specified so as to make it working drawing. A design report giving all necessary calculations of the design of components and assembly should be submitted in a separate file.

Design projects should be in the form of ‘Design of Mechanical System’ comprising of machine elements studied and topics covered in the syllabus. Design data book shall be used wherever necessary to achieve selection of standardized components.

2) Problem based assignment on each unit

Recommendation:

As far as possible, preference should be given to prepare drawing sheets using computer.

Recommended Books :

1) Shigley J.E. and Mischke C.R., "Mechanical Engineering Design", McGraw Hill Publication Co. Ltd.
2) Spotts M.F. and Shoup T.E. , "Design of Machine Elements" , Prentice Hall International.
3) Bhandari V.B., "Design of Machine Elements", Tata McGraw Hill Publication Co. Ltd.
4) Black P.H. and O. Eugene Adams, "Machine Design" , McGraw Hill Book Co. Inc.
5) Willium C. Orthwein, "Machine Components Design", West Publishing Co. and Jaico Publications House.
6) Design Data", P.S.G. College of Technology, Coimbatore.
7) Juvinal R.C., "Fundamentals of Machine Components Design", John Wiley and Sons.
8) Hall A.S., Holowenko A.R. and Laughlin H.G., "Theory and Problems of Machine Design", Schaum's Outline Series.
9) P. Kannaiah, "Machine Design", Scitech publication

NORTH MAHARASHTRA UNIVERSITY, JALGAON
T.E. (MECHANICAL)
W.E.F.: 2007-08
TERM-I

NUMERICAL ANALYSIS AND COMPUTATIONAL METHODS

Teaching Scheme	Examination Scheme
Lectures: 4 Hrs/ week.	Paper: 3 Hours
Practical: 2Hrs/week.	Paper: 100 Marks
	Term Work: 25 Marks

Unit-I **(10 Hours)**

A) Software development -

Software development principles mathematical modeling problem solving, Algorithm, Flowchart , Errors , Graphical method,

B) Solution of transcendental equation -

Bisection method, False position method, successive approximation method, Newton-Raphson method, Horner's method, rate of convergence.

(20 Marks)

Unit-II **(10 Hours)**

A) Numerical Integration

Trapezoidal rule, Simpson's $1\backslash 3^{rd}$ rule, Simpson's $3\backslash 8^{th}$ rule, Gauss quadrature technique,

B) Solution of ordinary Differential Equation

Taylor's series method, Euler's method, Improved & modified Euler's method, Fourth order Range- Kutta method. **(20 Marks**)

Unit-III **(10 Hours)**

A) Interpolation -

Linear and quadratic interpolation, Lagrange's interpolation, Newton's forward interpolation, Newton's backward interpolation, Newton's divided difference interpolation, Stirling interpolation,

B) Curve fitting

Linear & quadratic regression, Logarithmic curve fitting, Exponential curve fitting.

(20 Marks)

Unit-IV **(10 Hours)**

A) Solution of Linear Algebraic Equation -

Gauss elimination method , Gauss Jordan method LU- decomposition method ,

B) Iterative method -

Jacobi iteration method, gauss seidel interactive method, Cholesky method convergence analysis, choice of method. **(20 Marks**)

Unit-V **(10 Hours)**

A) Finite Difference Method

Solution of ordinary differential equation, solution of elliptical equation for various boundary condition, solution of parabolic equation by explicit , implicit and crank-Nicolson method ,

B) Finite Element Method

Finite element method introduction, comparison with finite difference method, general approach, interpolation function, finite element application on one dimensions

(20 Marks)

Term-Work:

Scope of programming should be restricted to practical class only.

<u>**Assignments:**</u> (Term work include only **EIGHT** assignments.)

1. Introduction to C – Language
   Simple input output, formatted various, if statement, loops, array
   functions & subroutine introduction algorithm development, flowchart.
2. General program like sorting, conditional interest etc.
3. Solution of quadratic equation.
4. Solution of transcendental (exponential or logarithmic) equation related with engineering application.
5. Calculation of work/heat transferred by using any integration method.
6. One exercise on numerical integration related to mechanical engineering application.
7. Solution of Poisson equation.
8. Solution of one dimensional parabolic equation by Crank-Nicolson method.
9. Curve fitting for the data related to mechanical engineering application.
10. Solution of one/two dimension problem by finite element method using any compatible software.
11. Interpolation for any tabulated data used in mechanical engineering.

Recommended Books:

1) Chapra, Canale,” Numerical Method for Engineer”,McGraw Hill Co.
2) Joh. H. Mathews,” Numerical Methods”, Pearson Education.
3) P. Kandaswamy,” Numerical Methods”,S. Chand & Co. New Delhi.
4) J. N. Reddy,” Finite Element Method”,McGraw Hill Co.
5) Jain, Jain & Iyangar,” Numerical Method for Scientist & Engineering Computation”,New Age International Pvt. Ltd.
6) S. S. Shastri,” Introductory Method of Numerical Analysis “,Prentice Hill India.
7) Belegundupatla,” Introduction to Finite Element Method”,Prentice Hill India.
8) Y. Kanitkar, “Let us C”, BPB Publications
9) Balgurusamy, “Programming in C”, TMH

NORTH MAHARASHTRA UNIVERSITY, JALGAON
T.E. (MECHANICAL)
W.E.F.: 2007-08
TERM-I
THEORY OF MACHINE – II
(Common with Automobile Engineering)

Teaching Scheme	Examination Scheme
Lectures: 4 Hrs/ week.	Paper: 3 Hours
Practical: 2Hrs/week.	Paper:100 Marks
	Oral: 25 Marks
	Term Work:25 Marks

UNIT:-I BRAKES AND DYNAMOMETERS (10 Hours)

A} BRAKES: - a) Types of brakes, b) Force analysis of brakes, external and internal expanding shoe brakes, block brakes, band brakes, block and band brakes, c) Breaking torque.
B} Dynamometer: - a) Absorption dynamometers: prony brakes, rope brake, band brake, transmission dynamometer- belt transmission type, b) Eddy current dynamometer: construction and working principle, c) Torque measurement, d) Fluid coupling. **(20 marks)**

UNIT:- II KINEMATICS OF CAM AND FLYWHEEL (10 Hours)

A} CAM: - a) Types of cams and followers, b) Analysis of motion of follower, c) Determination of cam profile for given follower motion, d) Analysis of cam with specified counters – circular arc cam, tangent cam, e) Cycloidal cam, polydyne cam, kinematics equivalent of cam.
B} FLYWHEEL: - a) Turning moment diagram and fluctuation of the crankshaft speed, D' Alemberts principle b) Equivalent offset inertia force, c) Determination of flywheel size for different types of engine and machine.

(20 marks)

UNIT- III MECHANISMS FOR CONTROL – GOVERNORS AND GYROSCOPES: (10 Hours)

A} GOVERNOR: a) Types of governors – Watts, Porter, Proel, Hartnell governor, b) Sensitiveness of governors, c) Hunting, Isochronisms, stability, d) Effect of governor, e) Power of governor, controlling force.
B) GYROSCOPE: a) Angular velocity and acceleration, b) Gyroscopic forces and couple, c) Gyroscopic effect on naval ships, d) Gyroscopic stabilization, stability of two wheel vehicle. **(20 marks)**

UNIT–IV GEAR AND GEAR TRAIN **(10 Hours)**

GEAR:

a) Spur Gears:- Terminology used in gears, conjugate action, in volute and cycloidal profile, path of contact, arc of contact, contact ratio, interference, undercutting, methods to avoid undercutting and interface, gear standardization, effect of center distance variation on the velocity ratio for involute profile tooth gears, friction between gear teeth.

b) Helical Gears: - Torque transmitted by helical gears on parallel shafts, normal and transverse module.

c) Spiral Gears: - Spiral angle, shaft angle, and efficiency of spiral gear.

d) Worm and Worm Gear: - Terminology and geometrical relationship, efficiency of worm gears.

GEAR TRAINS: - Types of gear trains, velocity ratio, tooth load, torque transmitted Holding torque **(20 Marks)**

UNIT: - V BALANCING: **(10 Hours)**

Balancing of rotating masses in one and several planes

Balancing of reciprocating masses in single and multi-cylinder engine, radial and V-types.

Primary and secondary balancing analysis,

Concept of direct and reverse cranks.

Balancing of locomotive engines and effect of partial balancing.

Static and dynamic balancing machine. **(20 marks)**

Term-Work:

Term work shall consist of any '**EIGHT**' experiments of the following: -

1) Study of various types of gearboxes such as industrial gearboxes, Synchromesh gearbox, Differential gearbox.
2) To draw the conjugate profile for any general shape of gear tooth.
3) To generate gear tooth profile and to study the effect of undercutting and rack shift using models.
4) To determine torque capacity of dynamometer.
5) To study epi-cyclic gear train and to measure torque transmitted and holding torque.
6) To draw cam profile for various types of follower motion.
7) To determine the characteristics curve of a centrifugal governor and to find its coefficient of insensitiveness and stability.
8) Verification of principle of gyroscopic couple.
9) Study of any two gyro controlled instruments.
10) To study the dynamic balancing machine and to balance a rotor.
11) Study of different types of brakes.
12) Study of gyroscopic effect on Naval ship and Four wheel vehicle.

ORAL:

Oral will be based on the prescribed term-work presented in the form of certified journal only.

Recommended Books:

1) Thomas and Bevan, “Theory of Machines” Tata Mc Graw Hill
2) P.L.Balany, “Theory of Machines and Mechanisms”, Khanna Publications.
3) Jagdishlal, ”Theory of Machines and Mechanisms” Metropolitan Book Company.
4) S.S.Ratan , “Theory of Machines and Mechanisms” Tata Mc Graw Hill
5) Shigley, “Theory of Machines and Mechanisms” Mc Graw Hill International
6) Sadhu Singh, “Theory of Machine” Pearson Education
7) J.S.Rao, ”Theory of Machines” New Age International Publishers.
8) J.S.Rao, “Theory of Machines”, New Age International Publishers.
9) J Srinivas, “ Mechanism and Dynamics of Machinery “, Scitech Publication.

NORTH MAHARASHTRA UNIVERSITY, JALGAON
T.E. (MECHANICAL)
W.E.F.: 2007-08
TERM-I
INTERNAL COMBUSTION ENGINE
(Common with Automobile Engineering)

Teaching Scheme	Examination Scheme
Lecture: 4 Hour/Week	Paper: 3 Hours
Practical: 2 Hours/Week	Paper: 100 Marks
	Term Work: 25 Marks

UNIT:- I BASIC CONCEPTS AND ENGINE CYCLES (10 hours)

Availability of energy (Elementary treatment only): Introduction to available and unavailable energy, availability of system with heat transfer. Entropy generation and second law efficiency. (No numerical treatment on above contents)

Introduction, Classification, engine components and their functions, Terminology, Work (indicated and brake), mean effective pressure, torque and power (brake and indicated), mechanical efficiency, thermal and volumetric efficiencies of engine, air fuel ratio, specific fuel consumption.

Air Standard Cycles: Assumptions, Otto, Diesel, Dual Combustion cycle, derivation of their efficiency equation, work done and mean effective pressure. Comparison on the basis of heat input, compression ratio, Maximum pressure and temperature, Actual cycle, deviation from theoretical cycles. Pumping losses, time losses, Stirling and Ericsson cycle.

(20 Marks)

UNIT:- II FUEL FEEDING SYSTEMS (10 hours)

Charge, intake valve and manifold, valve timing diagram, valve overlap, choked flow.

Carburetion: Requirement, types of carburetors according to fluid flow, simple carburetor, Air fuel ratio calculation, effect of altitude, disadvantages of simple carburetor, compensating devices for starting, economy range, acceleration, compensating jet etc. additional systems in modern carburetors, Solex carburetor. Disadvantages of carburetion and gasoline injection, MPFI.

Fuel feeding systems in CI engines: Requirement, classification, fuel feed pump, jerk type injection fuel pump, distributor type pump, injection pump governor, fuel injector and nozzles. **(20 Marks)**

UNIT:- III OPERATING SYSTEMS (10 hours)

Cooling systems: requirement, types of cooling systems, thermostat and additives.

Lubrication: Mechanism of lubrication, different methods, important properties of lubricating oils.

Governing of IC engines: requirement, quantity, quality, hit and miss type governing.
Ignition Systems: requirement, battery ignition, magneto ignition, electronic ignition system in two stroke engines, Ignition timing, spark timing advance.
Starting methods of engines. types of superchargers, Super charging, effect of super charging, limitations and advantages of supercharging, and turbo charging of engines.

(20 Marks)

UNIT:- IV COMBUSTION IN SI AND CI ENGINES (10 hours)

Homogeneous and heterogeneous mixtures, Combustion in SI engines: Stages in combustion, Ignition lag, velocity of flame propagation, factors influencing flame speed, rate of pressure rise, Detonation, factors affecting the detonation, pre-ignition. Rating of SI engines fuels, Dopes, combustion chamber of SI engines.
Combustion in CI engine; stages of combustion, factors affecting the delay period. Diesel knock, Effect of engine variables on Diesel knock , Rating of CI engine fuels: Cetane number, performance number, comparison of knock in SI and CI engines. Combustion chamber for CI engines.

(20 Marks)

UNIT:- V ENGINE TESTING AND PERFORMANCE (10 hours)

Measurement of indicated power, brake power, Morse test, energy balance and efficiency calculations, BIS specification. Recent trends in internal combustion engines.
Engine emission, air pollution due to engines, EURO I and EURO II norms, Unburnt hydrocarbon emission in two stroke and CI engines, CO and Nox emission, particulate traps, EGR, emission control methods catalytic converters (Introductory), crank blow by losses. **(20 Marks)**

List of Experiments

Minimum **EIGHT** experiment should be performed form the following lists:
1) Study of cooling systems.
2) Study of lubrication systems.
3) Study of simple and Solex carburetors.
4) Study of fuel pump and fuel injector.
5) Trial on a petrol engine and calculation of air/fuel ratio, volumetric, thermal and mechanical efficiencies.
6) Trial of a Diesel engine and calculation of air/fuel ratio, volumetric, thermal and mechanical efficiencies.
7) Morse test and determination of bsfc and isfc.
8) Study of combustion chambers of SI engines.
9) Study of combustion chambers of CI engines.
10) Study and demonstration of mechanical and Pneumatic governors.
11) Study and analysis of exhaust emission from the engine (PUC).

Recommended Books :

1) V. Ganeshan, “Internal Combustion Engines”, 2/e, Tata McGraw Hill, New Delhi.
2) R. K. Rajput , “Internal Combustion Engines”’, Laxmi Publications, New Delhi.
3) W. W. Pulkrabek , “Fundamentals of Internal Combustion Engines”, Prentice Hall of India (P) Ltd., New Delhi.
4) E. F. Obert , “Internal Combustion Engines and Air Pollution”, Harper and Row, New York.
5) Ferguson C. R , “Internal Combustion Engines”, Wiley Inc. New York.
6) Sharma R.P. and Mathur M.L., “Internal Combustion Engines”, Standard Publications, New Delhi.
7) Domkundwar, ., “Internal Combustion Engines”, Dhanpat Rai & Co. New Delhi.
8) Willard W Pulkrabek. “Internal Combustion Engines”, Pearson Education
9) Shyam K. Agrawal, “Internal Combustion Engines”, New Edge International Publication.
10) K.K. Ramalingam, “Internal Combustion Engines”, Scitech Publication.

NORTH MAHARASHTRA UNIVERSITY, JALGAON
T.E. (MECHANICAL)
W.E.F.: 2007-08
TERM-I

COMPUTER PROGRAMMING IN C / C++
(Common with Automobile Engineering)

Teaching scheme	Examination Scheme
Practical: 2hrs/week	Term work: 25 marks

a) One assignment on introduction to computer

b) To develop and Run "C/C++" programs for machine elements like

(Any two on C and two on C++)

   a) Design of knuckle joint or turnbuckle joint
   b) Design of power screw
   c) Design of helical spring
   d) Design of splines
   e) Design of muff coupling
   f) Theories of failure etc.

Recommended Books:

1) Balgurusamy, "Programming in C" Tata McGraw Hill Publication Co. Ltd.
2) Y. Kanitkar, "Let us C" BPB Publications.
3) M. P. Grover and Zimmer, "CAD/CAM" PHI Pvt. Ltd.
4) Shigley J.E. and Mischke C.R. "Mechanical Engineering Design" McGraw Hill Publication Co. Ltd.
5) Spotts M.F. and Shoup T.E. "Design of Machine Elements" Prentice Hall International.
6) Bhandari V.B. "Design of Machine Elements" Tata McGraw Hill Publication Co. Ltd.
7) Balgurusamy, "Object Oriented Programming with C++" Tata McGraw Hill, New Delhi
8) Ravi Chandran, "Programming in C++" Tata McGraw Hill Publication Co. Ltd.

NORTH MAHARASHTRA UNIVERSITY, JALGAON
T.E. (MECHANICAL)
W.E.F.: 2007-08
TERM-I
Entrepreneurship Development Skill/ Human Research Training
(Common with Automobile Engineering and Production Engineering)

Examination Scheme
Term Work: 25 Marks

Study the following topic from Entrepreneurship Development from the literature/ books and submit a report it.

1) Introduction
Entrepreneur
Entrepreneur-ship.
2) Information gathering for identification of opportunity.
Entrepreneurial process.
3) Information gathering techniques.
4) Product and Services
Theory
Product specifications.
Market research, survey.
Functions of marketing.
Research and Development activity.
5) Procedures for estimation of resources required for establishment enterprise or starting service business.
5.1 Space.
5.2 Human Resources.
5.3 Equipments.
5.4 Financial Resources
6) Establishing and running enterprise
Management of enterprise.
Team spirit.
Motivation.
Communication
7) Budgeting and accounting expenditures for running enterprises.
7.1 Concept of budgeting.
7.2 Budget preparation.
7.3 Different type of budgets
8) Procedure of accounting expenditures
8.1 Preparation of P&L account and Balance sheet.

9) Quality Control

10) Procedure of report writing for getting approval from financial agencies.

10.1 Financial Resources.

10.2 Financial Corporations

OR

Attend a course of Entrepreneurship Development conducted by college and submit a report on it.

OR

Attend a course of H. R. Training conducted by college and submit a report on it.

NORTH MAHARASHTRA UNIVERSITY, JALGAON
T.E. (MECHANICAL)
W.E.F.: 2007-08
TERM-II
ENGINEERING METALLURGY
(Common with Automobile Engineering and Production Engineering)

Teaching Scheme	Examination Scheme
Lectures: 4 hrs. /week	Paper: 3 Hours
Practical: 2 hrs. /week	Paper: 100 marks.
	Term-work: 25 marks.

UNIT I : (10 Hours)

Metallography, Introduction, Microscopy and macroscopy, Sample preparation, sampling or sectioning, mounting, Grinding, Polishing Etching, Mechanism of Etching for single phase and multiphase alloys, Etching Reagents, Electrolytic polishing, Metallurgical microscope working principal Properties of lenses such as magnifying power, numerical aperture, Resolving power etc, Macroscopy, sulphur printing Flow line observations, Examination of fractures.

Steels: - Plain carbon steels, Iron – carbon Equilibrium Diagram, various phases in the diagram, various phase reactions identified in the diagram, solubility of carbon in iron, Allotropy, critical temperature, Microstructure of slowly cooled steels, estimation of carbon from microstructure, Non – Equilibrium cooling of steels. Specification of some commonly used steels for engineering applications.

(20 Marks)

UNIT II : (10 Hours)

Heat Treatment, Introduction, and Principles of heat treatment of steel, Transformation. Products of Austenite, Equilibrium diagrams as Aids, Heat Treatments for steel-principles & processes such as annealing, normalizing, Heat treatment used to incrase strength of steel, Isothermal tranformation Diagram, Tempering of martensite, oter heat treatment methods such as austempering, patenting,isoforming, martemperig, Ausforming,etc., continious cooling Transformation, Jominey Test for Hardenability, Hardenability considerations, Quenching media, Techinques to reduce the cracking,

(20 Marks)

UNIT III: (10 Hours)

Surface Hardening Treatments of steel : selective Heating Techniques, Flame Hardening, Induction and laser beam hardening, Electron beam hardening, Techniques Involving Altered surface chemistry, carburising, pack, Gas and liquid Carburizing, Nitrding,

Heat Treatment furnaces & Atmospheres : Furnace types, Furnace controls, Heat Treatment and energy, controlled atmosphere. **(20 Marks)**

UNIT IV: **(10 Hours)**

Engineering Alloy steels :- Effect of alloying elements, types of alloy steels, stain less steel, types,and Applications and method of selection. Sensitization and weld decay of stainless steel.Heat-treatment of high speed steels, classification and types tool steels, such as water hardening, shock resistance, cold work and Hot work tool steels and their heat treatment.

Cast irons: - classification, Effect of controlling eutectic reaction on microstructure and properties of cast iron, carbon Equivalent,white cast iron, malleable cast iron, gray cast iron, S.G.iron, chilled and alloy cast iron, Properties, specifications and applications in machine tools, Automobile and pump Industry. **(20 Marks)**

UNIT V: **(10 Hours)**

Engineering Non- Ferrous metals and Alloys : Introduction, Copper and it's alloys, Brasses and Bronzes, Copper-Nickel alloys, Aluminum and it's alloys, Bearing Materials, Lead, Tin and it's alloys Heat Treatment of Non- Ferrous metals, Precipitation or Age Hardening.

Composite Materials: Classification, different types of composite material and it's applications **(20 Marks)**

List of Experiments:

Note: Minimum **EIGHT** experiments must be performed out of following ten experiments.

1) Micro Specimen Preparation and use of metallurgical microscope, objective (a) To provide the practice in the techniques of micro specimen selection, grinding, polishing and etching; (b) To provide initial training in the use of metallurgical microscope
2) Study and drawing microstructure of low carbon, medium carbon, eutectoid steel, hypereutectoid steel in annealed condition.
3) Study and drawing microstructure of Gray, White, Malleable and Spheroidal Graphite Cast Iron.
4) Furnace operations and spark testing, objectives (a) to determine the natural (empty furnace) heating and cooling rates of an available laboratory furnace. (b) to draw the spark diagrams of low , medium, high carbon steel, cast iron, stainless steel
5) Sulphur print test on steel specimen or flow lines examination on forged components
6) Study of change in microstructure of annealed and normalized medium carbon steel, Objective (a) To anneal and normalized the sample of medium carbon steel in to the laboratory furnace and to find out hardness and microstructure of steel
7) Jomney Harden ability test, Objective (a) To conduct the Jomney harden ability test on two types of steel specimen.
8) To study the effect of carbon on hardness of harden and tempered steel
9) Study and drawing microstructure of alpha brass, alpha-beta brass, Aluminum Bronze and bearing metal
10) To study the effect of temperature on hardness of tempered steel

Recommended books:

1) E Paul Degarmo, J.T. Black, Ronald A. Kosher, “Material and Process In Manufacturing”, 9th Edition, John Wiley Inc.
2) V.D.Kodgire, “Material Science and Metallurgy for Engineers”, Everest Publishing House. Pune
3) B. K. Agrawal, “Introduction to Engineering Materials”, Tata Mcgraw Hill, New Delhi.
4) S.H. Avner, “An Introduction to Physical Metallurgy”, Tata Mcgraw Hill, New Delhi.
5)Raymond A.Higgins,” Engineering Metallurgy (Part I&II)”,ELBS Publication,London
6) Clark D.S.,” Physical Metallurgy for Engineers”, Affiliated East-West Press pvt. Ltd., New Delhi
7) Rollason A.C.,” Metallurgy for Engineers”, ELBS publication,London
8) W Calister, Material Science and Engineering, Wiley-Students Edition.
9) A.S.T.M./A.S.M. Hand books on Metallography, Steels, Heat Treatment of Steels & Furnaces
10) Kenneth G. Budinski and Michael K. Budinski, “ Engineering Materials Properties and Selection”, Pearson Education.

NORTH MAHARASHTRA UNIVERSITY, JALGAON
T.E. (MECHANICAL)
W.E.F.: 2007-08
TERM-II
Machine Design II

Teaching Scheme	Examination Scheme
Lectures: 4 Hrs/ week.	Paper: 4 Hours
Practical: 2Hrs/week.	Paper: 100 Marks
	Oral: 25 Marks
	Term Work: 50 Marks

UNIT:- I Friction Clutches and Brakes **(10 Hours)**

a) Friction Clutches:

Classification and selection of friction clutches, Torque transmitting capacities and Design of single-plate, multi-plate, cone and centrifugal clutches, Types of friction materials - their advantages, limitations and selection criteria.

b) Brakes:

Energy absorbed by brake, Design considerations in pivoted block brake with long shoe, internal expanding shoe brake and disk brake, Temperature rise in brake operation. **(20 marks)**

UNIT:- II Belts and Chain Drives **(10 Hours)**

a) Belts

Materials and construction of flat and V-belts, Geometric relationships for length of belt, Power rating of belts, Maximum power condition, Selection of flat and V-belts from manufacturer's catalogue, Belt tensioning methods, Relative advantages and limitations of flat and V-belts, Construction and applications of timing belts.

b) Chain Drives

Construction and materials of roller chain, Length of chain and number of links, Polygonal effect, Power rating of roller chains, Construction of sprocket wheels, Silent chains, Relative advantages and limitations of chain drives.

c) Aesthetic and Ergonomic considerations in Design

Asthetic considerations- Basic types of product forms, design features like shape,colour, materials and finishes, quality etc. Ergonomic considerations- Man-Machine closed loop system, design of display panels, design of controls etc. **(20 marks)**

UNIT:-III Spur and Helical Gear Drives **(10 Hours)**

Classification of gears, Selection of types of gears, Standard systems of gear tooth.

a) Spur Gears:

Number of teeth and face width, Types of gear tooth failure, Desirable properties and selection of gear material, Constructional details of gear wheel, Force analysis, Beam strength (Lewis) equation, Velocity factor, Service factor, Load concentration factor, Effective load on gear, Wear strength (Buckingham's and spott’s) equation, Estimation of module based on beam and wear strength, Estimation of dynamic tooth load by velocity factor and Buckingham's equation, Methods of gear lubrication.

b) Helical Gears:

Transverse and normal module, Virtual number of teeth, Force analysis, Beam and wear strengths, Effective load on gear tooth, Estimation of dynamic load by velocity factor and Buckingham's equation, Design of helical gears.

(20 marks)

UNIT:- IV Bevel and Worm Gear Drives (10 Hours)

a) Bevel Gears:

Straight tooth bevel gear terminology and geometric relationship, Formative number of teeth, Force analysis, Design criteria of bevel gears, Beam and wear strengths, Dynamic tooth load by velocity factor and Buckingham's equation, Effective load, Design of straight tooth bevel gears, Selection of materials for bevel gears, comparison of spiral bevel gears and hypoid gears and straight tooth bevel gears.

b) Worm Gears:

Worm and worm gear terminology and geometrical relationship, Types of worm and worm gears, Standard dimensions, Force analysis of worm gear drives, Friction in Worm gears and its efficiency, Worm and worm-wheel material, Beam strength and wear strength of worm gears, Estimation of dynamic load by velocity factor and Buckingham's equation, Thermal consideration in worm gear drive, Methods of lubrication. **(20 marks)**

UNIT:- V Rolling contact Bearings and Pressure Vessels (10 Hours)

a) Rolling Contact Bearings

Types of rolling contact bearings, Static and dynamic load carrying capacities, Striback's equation, Equivalent bearing load, Load-life relationship, Selection of bearing life, Selection of rolling contact bearings from manufacturer's catalogue, Design for cyclic loads and speed, Bearing with probability of survival other than 90%, Lubrication and mounting of bearings, Types of failure in rolling contact bearings - causes and remedies.

b) Design of Cylinders and pressure vessels: Thick and thin cylinders – Thin cylindrical and spherical vessels – Lame’s equation – Clavarino’s and Birnie’s equations– Auto frettage and compound cylinders – Gasketed joints in cylindrical vessels. Unfired pressure vessels – Classification of pressure vessels as per I. S. 2825 – categories and types of welded joints – weld joint efficiency – Corrosion, erosion and protection vessels, stresses induced in pressure vessels, materials of construction. Thickness of cylindrical and spherical shells and design of end closures as per code – Nozzles and Openings in pressure vessels –Reinforcement of openings in shell and end closures. Area compensation method. **(20marks)**

Term Work

1.Term work shall consist of “ONE” design project. The design project shall consist of two imperial size sheets – one involving assembly drawing with a part list and overall dimensions and the other sheet involving drawing of individual components.

Manufacturing tolerances, surface finish symbols and geometric tolerances should be specified so as to make it working drawing. A design report giving all necessary calculations of the design of the components and assembly should be submitted in a separate file.

Design projects should include selection of prime mover and design of mechanical systems comprising of machine elements:

Spur gears and helical/bevel/worm gears OR Belt/chain/rope and clutch/brake etc.

Design data book shall be used extensively for the selection of the components.

2.Problem based assignment on each unit

Recommendation

As far as possible, preference should be given to prepare drawing sheets using computer.

Recommended Books :

1) Shigley J.E. and Mischke C.R., "Mechanical Engineering Design" McGraw Hill Pub. Co. Ltd.
2) Spott's M.F. and Shoup T.E., "Design of Machine elements", Prentice Hall International.
3) Bhandari V.B., "Design of machine elements", Tata McGraw Hill Public Co. Ltd.
4) Black P.H. and O. Eugene Adams, "Machine Design", McGraw Hill Book Co. Ltd.
5) Willium C. Orthwine, "Machine Components Design", West-Pub. Co. an Jaico Pub. House.
6) "Design Data", P.S.G. College of Technology, Coimbatore.
7) Juvinal R.C., "Fundamentals of Machine Components Design", John Wiely and Sons.
8) Hall A.S., Holowenko A.R. and Laughlin H.G., "Theory and Problems of Machine Design", Schaum's Outline Series.
9) P. Kannaiah , "Machine Design", Scitech Publication

NORTH MAHARASHTRA UNIVERSITY, JALGAON
T.E. (MECHANICAL)
W.E.F.: 2007-08
TERM-II
TURBO MACHINERY

Teaching Scheme	Examination Scheme
Lectures: 4 Hrs/ week.	Paper: 3 Hours
Practical: 2Hrs/week.	Paper: 100 Marks
	Oral: 25 Marks
	Term Work:25 Marks

Unit-I **(10 Hours)**

STEAM TURBINES : Types of turbines, constructional details impulse turbine, compounding of turbine, velocity diagrams, output efficiency, losses in turbines, reaction turbine, velocity, diagrams, degree of reaction, constructional features of blades.

Governing of turbines, application of turbines, types of seals, and packing to reduce leakage, losses in turbines. **(20 marks)**

Unit-II **(10 Hours)**

GAS TURBINE : Theory and fundamentals of gas turbines, principles, classification, Joule's cycles, assumptions for simple gas turbines, cycle analysis, work ratio, concept of maximum and optimum pressure ratio, actual cycle, effect of operating variable on thermal efficiency, regeneration, intercooling, reheating, their effects on performance, closed cycle and semiclosed cycles gas turbine plant, applications of gas turbines.

(20 marks)

Unit-III **(10 Hours)**

JET PROPULSION:- Introduction, theory of jet propulsion, types of jet engines, energy flow through jet engines, thrust, thrust power, and propulsive efficiency, turbo jet, turbo prop, turbo fan engines, pulse jet and ram jet engines, performance characteristics of these engines, thrust segmentation application of jet engines, concept of rocket propulsion.

ROTARY COMPRESSOR :-

Concepts of rotary compressors, root blower and vane type compressors, centrifugal compressors, velocity diagram and expression for work done, introduction to terms like slip factor, power input factor.

(20 marks)

Unit-IV **(10 Hours)**

HYDRAULIC TURBINES :

Impulse momentum principle, fixed and moving flat plate and curve vanes, series of plates & vanes, velocity triangles and their analysis, work done, efficiency etc. classification of hydraulic turbines, Heads & various efficiencies, Impulse turbine : Main components and constructional features of pelton wheel, velocity diagrams & work done, condition for max. hyd. Efficiency, number of buckets, jets, Non dimensional parameters (speed ratio, jet ratio).

(20 marks)

Unit-V **(10 Hours)**

HYDRAULIC TURBINES (REACTION TYPE)

Reaction turbine, main components & constructional features, types of reaction turbine (Francis, Kaplan), draft tube types, efficiency, cavitations, governing mechanisms for pelton wheel, Francis, Kaplan turbines, Types of characteristic curves, unit quantities, selection of turbine considering various factors, specific speed, Application of similarity as applied to turbines, scale effect.

(20 marks)

Any **Eight** Experiments based on the following list:

1) Study of steam turbine power plant.
2) Study of steam turbine systems.
    a) Methods of compounding
    b) Methods of governing
    c) Losses in steam turbine
    d) Lubrication system.
3) Trial on steam turbine.
4) Study of gas turbines.
5) Study of hydraulic turbines.
6) Trial on pelton wheel.
7) Trial on Francis turbine.
8) Trial on Kaplan turbine.
9) Trial on gas turbine plant.
10) Trial on centrifugal / rotary flow air compressor.
11) Study of various jet propulsion devices / engine.
12) Visit to hydraulic power plant.

Note : Oral will be based on the prescribed term-work presented in the form of certified journal.

Recommended Books :

1) Domkundwar, “Thermal Engineering”, Dhanpat Rai and Co Ltd. Delhi
2) P L Ballaney , “Thermal Engineering”. Khanna Publications, Delhi.
3) R K Rajput , “Thermal Engineering”, Laxmi Publication ltd. New Delhi.
4) Dr. R. K. Bansal, “Fluid Mechanics and Hydraulic M/c”, Laxmi publication Ltd. New Delhi.
5) Dr. Jagdish Lal, “Hydraulic Machine”. Metro politan book co. pvt Ltd. Delhi
6) Dr Modi seth, “Hydraulics & Fluid Machine”. Standard book house Delhi.

7) R. Yadav "Steam & Gas turbine", Central Publications, Allahbad.
8) J. K. Jain "Gas Turbine Theory & Jet Populsion", Khanna Publications, New Delhi.
9) Cohen, Roger "Gas Turbine theory", Longman Publications.
10) Gopalkrishnan "A Treatise on Turbomachines", Scitech Pub. (India)pvt.Ltd,Chennai
11) Kadambi V. & Prasrd M, "Turbo Machinery", New Age International Publication New Delhi.

NORTH MAHARASHTRA UNIVERSITY, JALGAON
T.E. (MECHANICAL)
W.E.F.: 2007-08
TERM-II
MECHANICAL MEASUREMENT AND METROLOGY
(Common with Automobile Engineering and Production Engineering)

Teaching Scheme	Examination Scheme
Lectures: 4 Hrs/ week.	Paper: 3 Hours
Practical: 2Hrs/week.	Paper: 100 Marks
	Oral: 25 Marks
	Term Work:25 Marks

Unit-I **(10 Hours)**

Fundamental of instrumentation, Block diagram of measuring instruments, Static and dynamic characteristics, Errors and source of error, Sensors and Transducers.

Signal transmission and processing:Intermediate Modifying devices-Mechanical, electrical & electronics,Terminating devices- Meter indicators, Mechanical Counters, CRO, XY plotters, oscillograph,

Data acquisition system: Introduction, Digital recording system,microprocessor based system **(20 Marks)**

Unit-II **(10 Hours)**

Measurement of force and torque: Introduction, Different type of load cells, dynamometers- Mechanical, electrical, hydraulic.

Pressure and flow measurement: Bourdon tube, diaphragm and bellows, vacuum measurement – McLeod gauge, thermal, conductivity gauge, Dead weight gauge tester, Electromagnetic flow meter, Ultrasonic flow meter, rotameter

Strain measurement: Types of strain gauge & their working, strain gauge circuits, Temperature compensation, Strain rosettes, Temperature measurement by electrical effects, RTD, Pyrometer. **(20 Marks)**

Unit-III **(10 Hours)**

Metrology Introduction: Definition and concept of metrology, standards of measurements. Classification of methods of measurement, precision and accuracy

Linear Measurement: Line standard and end standard, Wavelength standard, Slip gauges,

Measurement of geometric features, Machine tool metrology, Design and manufacture of gauges.

Comparators: Types, construction and working of different Mechanical, Optical, Electrical, Pneumatic comparators, Interferometry: Basic principles, Source of light, Optical flats, Fringe pattern and their interpolation.

(20 Marks)

Unit-IV **(10 Hours)**

Angular Measurement Angle standard, Sine bars, Sine centers, Angle gauges, autocollimator, angle Dekker, optical square, taper measurement, Universal bevel protractor,

Measurement of surface finish Surface texture, assessment of surface roughness as per IS, Tomlinson surface meter, and other surface measuring devices

Screw thread measurement: Terminology, errors in thread, Measurement of elements of external & internal threads,

Gear metrology: Gear terminology, measurement of element of gears

Toolmakers microscope, Profile projector. **(20 Marks)**

Unit-V **(10 Hours)**

Measuring Machines

UMM, CMM, Numerically controlled CMM, Fluidic system NC system, Recent trends in Engineering Metrology, Development in optical measurement, Precision instruments based on laser, Probes, telemetric system, Isometric viewing of surface defects, Nano technology

Quality control:

Introduction, Inspection, Sampling plans, Control charts. (X, R, C,P), Problems based on control charts, Recent trends in quality control (TQM,TQC,Six Sigma, Zero defect)

(20 Marks)

Any **Eight** Experiments based on the following list:

1) Determination of linear and angular dimension.
2) M/c tool alignment tests on any M/c tool like Lathe, Drilling m/c, Milling m/c
3) Measurement of surface finish and testing of surface flatness by optical flat
4) Study and measurement of parameter using tool makers microscope Use of comparator.
5) Measurement of screw parameter using floating carriage micrometer
6) Measurement by gear parameter- Gear tooth thickness, constant chord, pitch circle diameter
7) Measurement of temperature using thermocouple and pyrometer
8) Calibration of strain gauge meter
9) LVDT for displacement measurement
10) Flow measurement-using rotameter.

Recommended Books:

1) Beckwin Marrongoni and Lienhard , “Mechanical Measurement”, Pearson Educations
2) I.C.Gupta, “Engineering Metrology” , Dhanpat Rai & Sons
3) M.S.Mahajan, “Engineering Metrology”, Dhanpat Rai & Sons.

4) R.K.Jain, “Engineering Metrology”, Khanna Publications.
5) Doeblin, “Measurement System Application & Design”,McGraw Hill New Delhi.
6) D.S.Kumar, “Mechanical Measurement”,
7) A.K.Sawhaney, “ Mechanical Measurement and Instruments”, Dhanpat Rai and Sons
8) H.S.Kalsi, “ Electronic Instrumentation”, TMH
9) K.L.Narayanan, “Engineering Metrology”, Scitech Publication
10) R.S.Sirohi, H.S.Radhakrishnan, “Mechanical Measurement’’, New Age International

NORTH MAHARASHTRA UNIVERSITY, JALGAON
T.E. (MECHANICAL)
W.E.F.: 2007-08
TERM-II
PROJECT AND BUSINESS MANAGEMENT

Teaching Scheme	Examination Scheme
Lectures: 4 Hrs/ week.	Paper: 3 Hours
Practical: 2Hrs/week.	Paper:100 Marks
	Term Work:25 Marks

Unit-I **(10 Hours)**

Introduction, Basic concept of project management, Types of projects, Project identification & Formulation scheduling, Monitoring, Control benefits, Basic tool & techniques for project scheduling, Calendar schedule, Bar chart, Project life cycle curves, Line & balance, Problems on Line balancing.

(20 Marks)

Unit-II **10 Hours)**

Net Work Models: Introduction to PERT and CPM , Fundamental concept and network models and construction of network diagrams . PERT activity , time cstimatcs,critical and project time duration. Optimization of project time and cost in PERT network.

(20 Marks)

Unit-III **(10 Hours)**

Forms Of Business Organization: Concept of Ownership Organization , Types of ownership, Individual Ownership, Partnership organization ,Distinction between individual ownership & Partnership ,joint stock companies ,types of stock companies ,comparison between private & public Ltd. Co's.,distinction between partnership and joint stock, Co-operative Organisations,varuios types of co-operative societies, distinction between co-operative & joint stock companies ,distinction between private sector and public sector ,Public sector organization, State ownership, public co-operation, choice of form of organization ,comparative evaluation of different forms of business ownership. **(20 Marks)**

Unit-IV **(10 Hours)**

Financial Management: Introduction, Definition of financial management, functions of financial management , Sources of Funds, Capital, classification of capital, working capital, need for working capital, assessment of working capital ,Factors affecting working capital, Capitalization ,Sources of finance (Shares, debentures, difference between preference shares and equity shares, loans from banks, trade credit public deposits financial institutions)

Cost and cost control : Elements of cost, direct cost, indirect cost, variable and fixed cost, cost control technique, marginal costing, break even analysis.

(20 Marks)

Unit-V **(10 Hours)**

Material & Purchase Management: Scope, advantages of material management, function of material management, objectives of scientific purchasing ,functions of purchase department, classification of functions, 5R's Of Buying ,Methods of buying, Centralized versus decentralized buying, buying procedure, organization structure

Inventory management : Objective, types of inventory, selective inventory technique(ABC,VED,SDE,GOLF), Inventory model (Economic lot size with fixed price, EOQ with quantity discount) **(20 Marks)**

TERM WORK : Any **FIVE** assignments based on each unit.

Recommended Books:

1) Chase, Aquilano," Production and Operation Management",7th Edition-McGraw Hill Publishing Co. New Delhi., 1995.
2) Chary," Theory And Problems in Production and Operations Management",2nd Reprint, Tata McGraw Hill Publishing Co. New Delhi., 1996.
3) Nair,N.G.,"Production & Operations Management",Tata McGraw Hill Publishing Co. New Delhi.,1997.
4) Phillips,Don.T.,Ravindran,A.& James Solberg,"Operations Research Principle & Practice",John Wiley & Sons,1986.
5) Chadra Presanna ," Fundamentals of Financial Management" Tata McGraw Hill New Delhi.,1994.
6) Kolter Philip,"Marketing Management",Prentice-hall of India,1988.
7) Vyuptakesh Sharan.,"Fundamental of Financial Management", Pearson Education
8) L.C.Jhamb ,"Production(Operation)Management", Everest publishing house .
9) S.M.Inamdar, "Cost and Management Acounting"
10) M.K.Khan &P.K.Jain,"Financial Management", Tata McGraw Hill Publishing Co. New Delhi.
11) J.P.Bose, S.Talukdar, "Business Management", New Central Agencies (P) Ltd.

NORTH MAHARASHTRA UNIVERSITY, JALGAON
T.E. (MECHANICAL)
W.E.F.: 2007-08
TERM-II
Practical Training/ Mini Project/ Special study

Teaching Scheme	Examination Scheme
Practical: 2Hrs/week.	Term Work: 25 Marks

- Every student has to undergo industrial / practical training for a minimum period of two weeks during summer vacations between (S.E Second Term) fourth and (T.E First Term)fifth term or during winter vacation between fifth and sixth term(T.E. First Term and Second Term).

- The industry in which practical training is taken should be a medium or large scale industry

- The paper bound report on training must be submitted by every student in the beginning of (T.E. Second Term) sixth term along with a certificate from the company where the student took training .

- The report on training should be a detailed one.

- Maximum number of students allowed to take training in accompany should be five. Every student should write the report separately.

- In case if a student is not able to undergo practical training , then such student should be asked to

  Prepare special study report on a recent topic from reported literature.

  or

  A mini project related to mechanical branch of engineering.

1. A student must design the model for mini project.

2. The model should be simulated using any of the standard simulation software available.

3. Result verification for paper design an simulation should be carried out and discrepancies should be discussed.

4. Assemble the model. Prepare bill of materials.

5. Project report should be detail of work , carried out by student ,including layouts , models, bill of materials and relevant details.

- The practical training /special study / mini project shall carry a team work of 25 marks. Every student shall be required to present a seminar in the respective class in the presence of two teachers. These teachers (appointed by head of department in consultation with the principal) shall award marks based on the following.

(a)	Report	10 marks
(b)	Seminar presentation	10 marks
(c)	Viva – voca at the time of seminar presentation	05 marks

	Total	25 marks

Engineering & Technology Faculty
Equivalence Subject of TE Mechanical Engineering

Sr. No.	Old Subject	Sr. No	New Subject
1	Heat Transfer and Gas Dynamics	**1**	Heat Transfer and Mass Transfer
2	Engineering Metallurgy	**2**	Engineering Metallurgy
3	Machine Design-I	**3**	Machine Design-I
4	Industrial Engineering and Mgt.	**4**	Industrial Engineering of SE (Mech.) New
5	Numerical Analysis and Computational method	**5**	Numerical Analysis and Computational Method
6	Machine Design –II	**6**	Machine Design-II
7	Dynamics of Machinery –II	**7**	Theory of Machine-II
8	Metrology and Quality Control	**8**	Mechanical Measurement and Metrology
9	Manufacturing Technology	**9**	Manufacturing Engineering –II of SE (Mech.) New
10	Turbo Machinery	**10**	Turbo Machinery

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NORTH MAHARASHTRA UNIVERSITY, JALGAON (M.S.)

FINAL YEAR ENGINEERING (B.E.)

(MECHANICAL ENGINEERING)

TERM-I & II

W.E.F.: 2008-09

NORTH MAHARASHTRA UNIVERSITY, JALGAON
STRUCTURE OF TEACHING AND EVALUATION
B.E. (MECHANICAL ENGINEERING)

FIRST TERM **W.E.F. 2008-09**

Sr. No.	Subject	Teaching Scheme Hours/week			Examination Scheme				
		Lectures	Tutorial	Practical	Paper Duration Hours	Paper	TW	PR	OR
1	Refrigeration And Air Conditioning	4	--	2	3	100	25	--	25
2	CAD/CAM	4	--	2	4	100	25	--	25
3	***Mechatronics Systems	4	--	2	3	100	25	--	25
4	Operational Research	4	--	--	3	100	--	--	--
5	Elective – I	4	--	--	3	100	25	--	--
6	***Seminar	--	--	2	--	--	25	--	--
7	***Project	--	--	2	--	--	25	--	25
	Total	**20**	**--**	**10**	**--**	**500**	**150**	**--**	**100**
	Grand Total	**30**			**750**				

*** Common with Production Engineering and Automobile Engineering

SECOND TERM

Sr. No.	Subject	Teaching Scheme Hours/week			Examination Scheme				
		Lectures	Tutorial	Practical	Paper Duration Hours	Paper	TW	PR	OR
1	Finite Element Analysis and Simulation	4	--	4	4	100	25	--	25
2	Mechanical Vibration	4	--	2	3	100	25	--	25
3	Tribology	4	--	2	3	100	25	--	25
4	Elective – II	4	--	--	3	100	25	--	--
5	***Project	--	--	4	--	--	100	--	50
6	***Industrial Visit / Case Study	--	--	--	--	--	25	--	--
	Total	**16**	**--**	**12**		**400**	**225**	**--**	**125**
	Grand Total	**28**			**750**				

*** Common with Production Engineering and Automobile Engineering

Elective-I
1. Energy Conservation and Management
2. Advanced Machine Design
3. Machine Tool Design
4. Product Development And Rapid Prototyping
5. Automobile Engineering
6. Fluid Machinery

Elective-II
1. Power Plant Engineering
2. Process Equipment Design
3. Introduction To Robotics
4. Advanced Welding Technology
5. Energy Engineering
6. Industrial Fluid Power

B.E. (MECHANICAL ENGINEERING): FIRST TERM
REFRIGERATION AND AIR CONDITIONING

Teaching Scheme	**Examination Scheme**
Lectures : 4 Hours/week	Theory Paper : 100 Marks
Practical : 2 Hours/week	Term Work : 25 Marks
	Oral : 25 Marks
	Paper Duration : 3 Hours

UNIT - I **10 Hours (20 Marks)**

Introduction, standard rating of refrigerating machine, coefficient of performance of refrigerator and heat pump.
Reversed Carnot cycle and its limitations, reversed Brayton cycle, application to air craft refrigeration, Bootstrap refrigeration cycle, reduced ambient air cooling system, regenerative air cycle system. (Numerical treatment)
Designation of refrigerant, selection of refrigerant, chemical, physical and thermodynamic requirements of refrigerants, lubricant in refrigerating system, secondary refrigerant, azeotropes and its uses.

UNIT - II **10 Hours (20 Marks)**

Vapour compression refrigeration system study of theoretical and actual vapour compression cycle, use of p-h & T-s charts, effect of evaporator and condenser pressure and temperature on the performance of the refrigeration cycle, effect of sub cooling and super heating. (Numerical treatment)
Compound vapour compression system with inter cooling, flash chamber, multi compressor and multi evaporators systems. (Numerical treatment)
Cascade refrigeration system, production of dry ice, Joule Thomson coefficient, and inverse curve, liquefaction of air and gases. (no numerical treatment)

UNIT - III **10 Hours (20 Marks)**

Vapour absorption refrigeration simple & modified vapour absorption refrigeration systems, Electrolux refrigerator.
Desirable properties of solvent, absorbent & refrigerant combinations, aqua ammonia & lithium bromide refrigeration system use of enthalpy concentration charts. (Numerical treatment)

UNIT - IV **10 Hours (20 Marks)**

Psychometric- properties of moist air, psychrometric chart and process, mixing of air stream, bypass factor, sensible heat factor, room sensible heat factor, Gross sensible heat factor, humidifying efficiency, air washer. Study of various types of psychrometers, sling, aspirating, and industrial type. (Numerical treatment)

UNIT - V **10 Hours (20 Marks)**

Introduction to industrial and comfort air conditioning, human requirements of comfort, effective temperature and comfort chart.Air conditioning load calculations, inside and outside design conditions, Building cooling & heating load calculation, Effective sensible heat factor advanced psychrometry. (Numerical treatment)
Window and central air conditioning systems year round air conditioning, Direct and chilled water air conditioning.

TERM WORK

LIST OF PRACTICAL: Any eight out of the following to be performed with minimum three trials.
1) Trial on vapour compression refrigeration system.
2) Trial on ice plant/domestic refrigeration system.
3) Study and trial on vapour absorption refrigeration system.
4) Study and trial on window/central air conditioner.
5) Study and trial on heat pump test rig.
6) Study of construction of hermetically sealed compressor and actual viewing of a cut model of the same (reciprocating, rotary and car A/C compressor).
7) Study of evacuation and charging of refrigeration system.
8) Study and trial on cooling towers.
9) Study of expansion devices, solenoid valve and safety devices used in vapor compression system.
10) Study of thermostat and humidistat, dryer, oil separator.
11) Study of measuring instruments and various tools used in refrigeration and air-conditioning systems.

12) Visit to cold storage/ice plant/ central air conditioning system.
13) Cooling load calculation of any laboratory / class room in the institute & suggest the requirement of Air conditioner unit in terms of capacity.

Note: Oral will be based on the prescribed term work presented in the form of certified journal.

REFERENCE BOOKS

1) Arora C. P.," Refrigeration and air conditioning", TMH, New Delhi.
2) Monohar Prasad," Refrigeration and air conditioning", New Age Publishers New Delhi.
3) Ananthnarayanan," Basics of Refrigeration", TMH, and New Delhi.
4) Stocker W. F. and Jones," Refrigeration and air conditioning", McGraw Hill.
5) Dossat," Principles of Refrigeration", John Wiley Inc.
6) Arora and Domkundawar," Refrigeration and air conditioning", Dhanpatrai and sons, New Delhi.
t) Faye C McQuistom,"Heating Ventilatging nad Air conditioning",Wiley India Pvt.Ltd. New Delhi

B.E. (MECHANICAL ENGINEERING): FIRST TERM
CAD/CAM

Teaching Scheme
Lectures : 4 Hours/week
Practical : 2 Hours/week

Examination Scheme
Theory Paper : 100 Marks
Term Work : 25 Marks
Oral : 25 Marks
Paper Duration : 4 Hours

UNIT – I **10 Hours (20 Marks)**

INTRODUCTION TO CAD/CAM AND NETWORKING
Define CAD/CAM, Product Life Cycle & CAD/CAM, Application of Computers for Design Process, Selection of a CAD system, Desirable relationship of CAD/CAM database, Benefits & Application of CAD
Hardware in CAD, Introduction, The Design Work Station, The graphics terminal, Operator input/output devices,
Computer communication,Principle of networking, Classification of network, Transmission media & interface, LAN system.

UNIT – II **10 Hours (20 Marks)**

COMPUTER GRAPHICS
Introduction, Graphic Primitives, Point plotting, Drawing of lines, Co ordinate system used in graphic element, Transformation in graphics, D transformation, Homogeneous transformation, Concatenate co ordinate transformation, Translation, Rotation, Scaling, Mirror, Reflection, Inverse co ordinate transformation, clipping, 3D transformation, Projections, Scan conversion, Rendering, Shaving, View Port, Windowing, Standardization in graphics IGES files

UNIT – III **10 Hours (20 Marks)**

GEOMETRIC MODELING
Requirement of Geometric Modeling, Geometric Model, Geometric Model Construction Method,, Wire Frame Modeling, Surface Modeling, Solid Modeling, Representation of Curve & Surfaces, Design of curve shape, Cubic Spline, Bezier curve, B-spline curve, Nurbs B-spline, Representation of surfaces
AUTOMATION
Concept of Automation, Types of Automation, Advantages & limitations of Automation, Levels of Automation, Advanced Automation Function

UNIT – IV **10 Hours (20 Marks)**

INDUSTRIAL CONTROL SYSTEM
Continuous control system, Discrete control system, Computer process control, Forms of CPC, Computer process Monitoring, Direct Digital Control, Numerical Control & Robotics, Programmable logic controller, Supervisory control, Distributed Control & Personnel Computers
CNC PROGRAMMING
Axis of CNC Machines, Manual Part Programming using G codes, Use of Sub routines, Computer Aided Part Programming using APT or any other language/G- coding /M- coding.

UNIT – V **10 Hours (20 Marks)**

FMS, GT AND ROBOTICS
FMS – Introduction, Components of FMS, Types of FMS, Application & Benefits, Planning & implementation issue, Typical FMS layout.
GT – Part families, Part classification & coding, optic coding system, Multiclass coding system, Application of GT.
Robotics – Robot Anatomy, Robot Control System, End effectors, Sensors, Industrial Robot, Application and its selection.

TERM WORK

List of Practical-
1. Modeling of any three Machine Component *
2. Any Two Assembly of Mechanical Components*
3. Three assignments based on above syllabus

* Modeling & Assembly can be done by using any modeling software

Note: Oral will be based on the prescribed term-work presented in the form of certified journal.

REFERENCES

1) P. Radhkrishnan, S. Subramanyam, V. Raju ,"CAD/CAM/CIM" , New Age Publication
2) Grover, Automation, "Production System and Computer Integrated Manufacturing", Pearson Education.
3) Mikell P. Grover, Emory W. Zimmers ,"Computer Aided Design and Manufacturing", P.H.I
4) Rao, Tiwari, Kundra ,"Computer Aided Manufacturing" ,T.M.H
5) Zeid ,"CAD/CAM" ,T.M.H
6) James G. Keramas ,"Robot Technology Fundamentala", Vikas Publication House
7) B.S.Pabla, M.Adithan ,"CNC Machine ", New Age International(P) Ltd.
8) Rudra Pratap, "Getting Started with Matlab 7", OUP, New Delhi.

B.E. (MECHANICAL ENGINEERING): FIRST TERM
MECHATRONICS SYSTEMS
(Common with Production Engineering and Automobile Engineering)

Teaching Scheme
Lectures : 4 Hours/week
Practical : 2 Hours/week

Examination Scheme
Theory Paper : 100 Marks
Term Work : 25 Marks
Oral : 25 Marks
Paper Duration : 3 Hours

UNIT – I **10 Hours (20 Marks)**

INTRODUCTION TO MECHATRONICS
Scope and importance of mechatronics, Key issue, Systems, Measurement systems.
TRANSDUCERS AND SENSORS
Introduction, Difference between transducer and sensor, Transducer types, Transduction principle, Photoelectric transducers – photoemissive transducers, photoconductive transducers, photovoltaic transducers, Thermistors, Thermodevices, Thermocouple, Inductive transducers, Capacitive transducers, Pyroelectric transducers, Piezoelectric transducer, Half-effect transducer, Ionization transducers, Light Emitting diode, Optical encoder – incremental encoder, absolute optical encoder, Bimetallic strip, Bourdon tube, Strain gauge, Load cell, Diaphragms, Mechanical switches, Flow transducers, Fibre optic transducers.

UNIT – II **10 Hours (20 Marks)**

SIGNAL CONDITIONING
Introduction, Voltage divider, Rectification, Diode voltage stabilizer, Clipping and Clamping circuit, Amplifier – OPANP circuits, more about filter circuits, Isolator, Instrumentation amplifier, Bridge circuit, Comparator, Oscillator, 555 Timer, Sample and Hold, Clock, Analog to Digital conversion – digital to analog converter, counter based analog to digital converter, successive approximation, Galvanometer, Ammeter and Voltmeter, Cathode ray oscilloscope.
DATA PRESENTATION AND DATA LOGGING SYSTEMS
Introduction, Recorders – Graphic recorders, Strip chart recorders, X-Y recorders, Magnetic tape recorder.
Data loggers – block diagram description , Data acquisition system – generalized data acquisition system, computer based data acquisition system.

UNIT – III **10 Hours (20 Marks)**

ACTUATORS AND MECHANISMS
Introduction, Actuator types and application areas, Electromechanical actuators, DC Motors – brushed DC motor, brushless, coreless, AC Motors – induction motors, synchronous motors, stepper motor, Fluid power actuators – pneumatic actuators, valves actuators, hydraulic actuators, comparison, Piezoelectric actuators – an illustration, piezoelectric motor, Magnetostrictive actuators, Memory metal actuators, Ion-exchange polymer metal composites, Chemical actuator.
Mechanisms, Bearings – slide bearing, journal bearing, rolling element bearing, magnetic bearing, molecular bearing, Belt, Chain, Pulleys, Gears – gear ratio, Rack and pinion, Ratchet, Pawl and Crank, Slider and crank, Cam and Follower – shape of the cam, shape of the follower, Chain and Sprocket, Geneva wheel, Four bar linkages.

UNIT – IV **10 Hours (20 Marks)**

INTRODUCTION TO MICROPROCESSORS AND MICROCONTROLLERS
Microprocessor – Introduction, Basic element of control systems
Microcontrollers – Introduction, Difference between Microprocessors and Microcontrollers
Programmable logic controllers – Introduction.
CONTROL SYSTEMS AND CONTROLLERS
Introduction, Control system, Open-loop control systems, Closed-loop control systems – notations, reachability, transfer function.
The Controllers – on-off controller, proportional controller, integral controller, derivative controller, proportional plus integral controller, proportional plus derivative controller, proportional plus integral plus derivative controller, comparison, More about automatic control, Difing automatic control methods.

UNIT – V **10 Hours (20 Marks)**

INTEGRATION

Introduction, Background, Advanced actuators – advanced motorized actuators, pneumatic actuators, servo actuator systems, Consumer mechatronic products, Hydraulic fingers, Surgical equipment, Industrial robot – different parts of a robot, controller, drive, arm, end effector, sensor, functional requirements, robot based automation, Autonomous guided vehicle – AGV architecture, components based DCS view, man machine interface, design with fieldbus technology, Drilling machine, Conveyor based material handling systems – validation, design.

INDUSTRIAL DESIGN, AESTHETICS AND ERGONOMICS

Introduction, Element of product design – product physiogonomy aesthetics, product physiogonomy ergonomics, ergonomics in machine tool design, ergonomics in machine tool safety, product safety audit, Ergonomic factors for advanced manufacturing systems – machine oriented industrial design, factory without people, ergonomic problems in new technology.

TERM WORK

Term work shall consist of any five experiments and three assignments.

1) Study of Basic block diagram of mechatronics system components.
2) Study and demonstration of motion / force transducers.
3) Study and demonstration of temperature / pressure transducers.
4) Study and demonstration of AD / DA converter
5) Study and demonstration of hydraulic actuator / pneumatic actuator.
6) Study and demonstration of graphic / magnetic tape recorders.
7) Study of Microprocessors and Microcontrollers
8) Study of Robot / Autonomous guided vehicle

Note: Oral will be based on the prescribed term-work presented in the form of certified journal.

REFERENCE BOOKS

1)D.R. Appukuttan,"Introduction to Mechatronics", Oxford University Press, New Delhi
2)N.P.Mahalik,"Mehatronics", Tata McGraw-Hill Publishing Company Limited, New Delhi
3) W. Bolton," Mechatronics", Pearson Education, New Delhi
4) Dan Necsulescu , "Mehatronics", Pearson Education, New Delhi
5) R.P. Borole," Mehatronics", Nirali Prakashan, Jalgaon.
6) D. V. Alciatore, "Introduction to Mechatronic and Measurement Systems", Tata McGraw- Hill Publishing Company Limited, New Delhi
7) HMT Limited, "Mechatronics", Tata McGraw-Hill Publishing Company Limited, New Delhi
8) J.G. Joshi, "Mechatronics", Prentice Hall of India, New Delhi
9) A.Smaili, "Applied Mechatronics", Oxford University Press, New Delhi.

B.E. (MECHANICAL ENGINEERING): FIRST TERM
OPERATIONAL RESEARCH

Teaching Scheme
Lectures : 4 Hours/week

Examination Scheme
Theory Paper : 100 Marks
Paper Duration : 3 Hours

UNIT – I **10 Hours (20 Marks)**

Introduction to O.R., Models in O.R., Scope, Phases, O.R. in Decision Making, Linear Programming,-model formulation, Graphical Method, Simplex Method(ONLY THEORY) , Concept of Quality and its application, Sensitive Analysis.

UNIT – II **10 Hours (20 Marks)**

Linear Programming – Simplex Method, Standard Form of an L.P. Problem , Simplex algorithm (Maximization Case), Simplex Algorithm(Minimization Case) Two Phase Method, The Big- M Method.

UNIT – III **10 Hours (20 Marks)**

Dynamic Programming- Introduction, Basic Concepts and Application, Characteristic of D.P., Dynamic Programming Approach.
Special Techniques of L.P. such as Transportation Model, Assignments Model, Traveling Salesman, Transshipments Problem.

UNIT – IV **10 Hours (20 Marks)**

Decision Theory- Decision Trees, Classes of Decision Model, Utility, Decision under Certainty, Uncertainty and Risk.
Games Theory – Theory Concept, Characteristics, Maximum And Minimum Principles, Saddle Point, Dominance Basic Concept and Terminology of Two Person Zero Sum Games, MXZ and ZXN Games, Sub Games Method, Graphical Method.

UNIT – V **10 Hours (20 Marks)**

Job Sequencing – Introduction, Sequencing Algorithm, Processing N Jobs Through Two Machines, Three Machines and M – Machines, two Jobs and M-Machine Graphical Method.
Replacement Models – Introduction, Types of Failure, Replacement of Items whose efficiency deteriorates with time(Model I & II), Replacement of Item that fail suddenly.

RECOMMENDED BOOKS

1) L.C. Jhamb ,"Quantities Techniques" Vol I and II, Everest Publication
2) Hira , Gupta ,"Operation Research "
3) Taha ,"Operation Research"
4) S.D. Sharma, "Operation Research", Khanna Publication
5) Manohar Mahajan, "Operation Research"
6) J.K.Sharma ,"Operation Research, Problem and Solution" , Macmillan
7) N.D.Vohra ,"Quantitative Techniques in Management" ,TATA Mc Graw Hill
8) Ravindran," Operation Research Principles and Practice ",Wiley India Pvt.Ltd. New Delhi

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B.E. (MECHANICAL ENGINEERING): FIRST TERM
ENERGY CONVERSION AND MANAGEMENT
ELECTIVE - I

Teaching Scheme	**Examination Scheme**
Lectures : 4 Hours/week	Theory Paper : 100 Marks
	Term Work : 25 Marks
	Paper Duration : 3 Hours

UNIT - I **10 Hours (20 Marks)**

Global and linear market - Energy scenario in various sector and Indian economy. Need and importance of energy conservation and management pay back period. Return on investment (R.O.I.), life cycle cost, sanyes diagrams, specific energy consumption. Load management.

UNIT - II **10 Hours (20 Marks)**

Energy auditing - Methodology, analysis and reporting, portable and on-line instruments. Costing of utilities like steam, compressed air, electricity and water. Energy system modeling analysis general concepts, classification of models and use of digital computers in modeling and analysis.

UNIT - III **10 Hours (20 Marks)**

Steam and condensate systems boilers (including package boilers), efficiency testing, Demand control, power factor improvement its benefit and ways of improvement, load scheduling.
Electric motors, lowers, efficiency, energy efficient types of electrical motors for energy conservation, motor speed control variable speed drive.
Lighting: Illumination level, fixtures, timers, energy efficient illumination.

UNIT - IV **10 Hours (20 Marks)**

Energy conservation compressed air systems, refrigeration and air conditioning systems, and water systems. Elementary converge of energy conversation in pumps and fans co-generation concepts, options (steam/gas turbine/D C T based) selection criterion.

UNIT - V **10 Hours (20 Marks)**

Energy action planning : Key elements, force field analysis, energy policy purpose, perspective contents, formulation, ratification, organizing, location of energy management, top management support, managerial function, roles and responsibilities of energy manager, accountability, motivating – motivation of employees, information system designing barriers, strategies, marketing and communicating, training & planning.

TERM WORK

Term work shall consist minimum eight assignments based on above syllabus.

RECOMEMNDED BOOKS:

1) Prof. Henderson," India the energy sector", oxford university press.
2) L.J. Nagrath ," System modeling and analysis", Tata McGraw Hill Press.
3) D.A.Ray," Industial energy conservation pergamon press".
4) IGC Drydin editor," The efficient use of energy" (butter worths)
5) W.C.Turner editor,"Energy management handbook (Wiley)
6) Patrick Steven R, Patric Dake R, Fordo Stephen,"Energy conservation guidebook". Fairmont press Inc.
7) F. William Payne & Richard E. Thompsion ," Efficient Boiler" Operation Source Book.
8) W.C.Turner editor: energy management handbook (Wiley)

B.E. (MECHANICAL ENGINEERING): FIRST TERM
ADVANCED MACHINE DESIGN
ELECTIVE- I

Teaching Scheme	**Examination Scheme**
Lectures : 4 Hours/week	Theory Paper : 100 Marks
	Term Work : 25 Marks
	Paper Duration : 3 Hours

UNIT - I **10 Hours (20 Marks)**

OPTIMUM DESIGN

Introduction to optimum design, Adequate design, Johnson's method of optimum design, Case of normal specifications, Case of redundant specifications, Case of incompatible specifications.

UNIT - II **10 Hours (20 Marks)**

SYSTEM APPROACH

Introduction, System approach to design mathematical model, Dynamic response to a distributed system, Dynamic response to a lumped system, Modelling the elasticities, Modelling the masses, Modelling the inertia, Modelling friction and damping, Mathematical model for shock analysis, Cam system, Value engineering approach to design problem.

UNIT - III **10 Hours (20 Marks)**

CAM:

Introduction, Advance cam curves, Polynomical cam, 3-4-5 polynomoal cam, 4-5-6-7 polynomial cam, Jerk cycloidal cam, Sine acceleration cam, Forces on cam, Mathematical model with elasticity, Jump phenomenon, Ramp of the cam – Precam, Polydyne cam.

UNIT - IV **10 Hours (20 Marks)**

DESIGN OF I.C. ENGINE COMPONENTS

Introduction, Principal part of IC engine, Design of piston, piston rings and piston pin, Design of cylinder and cylinder head, Design of connecting rod, Design of crank shaft, Design of valve gear mechanism.

UNIT - V **10 Hours (20 Marks)**

DESIGN OF HOISTING MECHANISMS

Introduction, Design of hoisting chains and drums, Design of ropes, Design of wire ropes, Stress in curved beams, Design of crank hook.

TERM WORK

Term work shall consist minimum eight assignments based on above syllabus.

REFERENCE BOOKS

1) Dr. Rajendra Karwa ," A text book of Machine Design", Laxmi Publications (P) Ltd, New Delhi
2) J. Uicker,"Theory of Machines and Mechanism", 3ed., Oxford University Press, New Delhi.
3) Farazdak Haideri ," Machine Design", Nirali Prakashan, Jalgaon
4) M.F. Spotts," Design of Machine Elements", Pearson Education
5) N.C.Pandya ," Element of Machine Design", Charotar book stall, Anand
6) Norton ," Dynamics of Machinery", Tata Mc-Graw Hill, New Delhi
7) P.C.Sharma ,"Machine Design", S K Katuria & Sons
8) R. S. Khurmi ," A text book of Machine Design", Eurasis Publishing House Pvt. Ltd, Delhi
9) R.B.Patil ,"Design of Machine Elements", Tech- Max Publications, Pune

B.E. (MECHANICAL ENGINEERING): FIRST TERM
MACHINE TOOL DESIGN
ELECTIVE- I

Teaching Scheme
Lectures : 4 Hours/week

Examination Scheme
Theory Paper : 100 Marks
Term Work : 25 Marks
Paper Duration : 3 Hours

UNIT - I **10 Hours (20 Marks)**

DESIGN OF SPEED AND FEED RATES
Aim of speed and feed rate regulation, Stepped regulation of speed : Design of speed box, Design of feed box, Machine tool drives using multiple speed motors, Special cases of gear box design, General recommendations for developing the gearing diagram, Determining the number of teeth of gears, Classification of speed and feed boxes, Stepless regulation of speed and feed rates.

UNIT- II **10 Hours (20 Marks)**

DESIGN OF MACHINE TOOL STRUCTURES
Functions of Machine tool structures and their requirements, Design criteria for tool structures, Static and dynamic stiffness, Profiles of machine tool structures, Basic design procedure of machine tool structures, Design of beds, Design of columns, Design of housings, Design of bases and tables, Design of cross rails, arms, saddles and carriages, Design of rams.

UNIT - III **10 Hours (20 Marks)**

DESIGN OF GUIDEWAYS AND POWER SCREWS
Functions and types of guideways, Design of slideways, Design criteria and calculations for slideways, Guideways operating under liquid friction conditions, Design of aerostatic slideways, Design of anti-friction guideways, Combination guideways, Protecting devices for slideways, Design of Power screws.

UNIT - IV **10 Hours (20 Marks)**

DESIGN OF SPINDLES AND SPINDLE SUPPORTS
Functions of spindle unit and requirements, Material of spindles, Effect of machine tool compliance on machining accuracy, Design calculations of spindles, Antifriction bearings, Sliding bearings.
DYNAMICS OF MACHINE TOOLS : Machine tool elastic system cutting process closed loop system, General procedure for assessing dynamic stability of EES cutting process closed loop system, Dynamic characteristics of elements and systems, Dynamic characteristic of the equivalent elastic system, Dynamic characteristic of the cutting process, Stability analysis, Forced vibrations of machine tools.

UNIT - V **10 Hours (20 Marks)**

CONTROL SYSTEMS IN MACHINE TOOLS
Functions, Requirements and classification, Control systems for changing speeds and feeds, Control systems for executing forming and auxiliary motions, Manual control systems, Automatic control systems Adaptive control systems.
NUMERICAL CONTROL OF MACHINE TOOLS : Fundamental Concepts, Classification and structure of numerical control systems, Manual part programming, Computer aided part programming

TERM WORK

Term work shall consist minimum eight assignments based on above syllabus.

REFERENCE BOOKS

1) S.K. Basu," Design of Machine Tools"
2) Koenigs, "Berger Principles of Machine Tools "
3) Sen and Bhattacharya," Principles of Machine Tool"
4) N Acherkan, "Machine Tool Design", MIR Publication, Moscow 1973
5) Mehta Machine Tool Design

B.E. (MECHANICAL ENGINEERING): FIRST TERM
PRODUCT DEVELOPMENT AND RAPID PROTOTYPING
ELECTIVE- I

Teaching Scheme
Lectures : 4 Hours/week

Examination Scheme
heory Paper : 100 Marks
Term Work : 25 Marks
Paper Duration : 3 Hours

UNIT – I **10 Hours (20 Marks)**

Product Development history and product development process tool, product development verses design, modern product development theories and methodologist in design. Product development teams, product development planning, technical and business concerns. Understanding customer needs, Establishing product functions. Functionality, augmentation. Aggregation, common basis, functional functional modeling methods.

UNIT – II **10 Hours (20 Marks)**

Product tear down and experimentation, benchmarkting and establishing engineering specification. Product portfolios and portfolio architecture. Tear down process, tear down methods, post teardown reporting, benchmarking approach, support tools, setting specifications, portfolio architecture, types, platform, functional architecting, optimization selection, Product modularity, modular design.

UNIT – III **10 Hours (20 Marks)**

Concepts and Modeling - Generation of concepts, information gathering and brain storming, directed search, morphological analysis, combining solutions. Decision making, estimation of technical feasibility, concept selection process, selection charts, measurement theory, numerical concept scoring, design evaluation scheme, concept embodiment, geometry and layout, system modeling, modeling of product metrics, selection of model by performance specifications, physical prototyping, informal and formal models.

UNIT – IV **10 Hours (20 Marks)**

Rapid Product Development - Product Development: Classical steps of product development, Requirement of New Product development strategies, Critical factors affecting success, The Principle of simultaneous Engineering.
Model: Model classes, Influence of models to speed up product development.
Model making by Rapid prototyping: Definitions of rapid prototyping (RP), Rapid Tooling (RT), Rapid Manufacturing (RM). Relating Rapid prototyping models to product development phases.

UNIT – V **10 Hours (20 Marks)**

Generation of Layer information – description of the geometry by a 3D data record, Data flow, CAD model types.
Rapid prototyping Technologies –
Photo polymerization Stereo lithography (SL), Laser Sintering, Layer Laminate Manufacturing (LLM), Extrusion Processes.
Rapid Prototyping Materials-Photopolymers, SL Resins, Sintering Materials, FDM Materials, LOM Materials.
Rapid Prototyping Industrial Applications.

TERM WORK

Term work shall consist minimum eight assignments based on above syllabus.

REFERENCE

1) Roozenburg, J. Eekels, “Product Design : Fundamentals and Methods NFM”, John Wiley and Sons Ltd.,
2) D.Whitney, “Mechanical Assemblies”, Oxford University Press, New Delhi.
3)Geoftry Boothroyd, “Peter dew Product Design for manufacturing and Assembly”
4) Mike Baxter, “Product Design: A Practical guide to systematic methods of new product development”, Champman and Hall.
5) A. K. Chitale, R. C. Gupta,” Product Design and Manufacturing”, Prentice Hall India
6) John R. Lindbeck,”Product Design and Manufacturing”, Prentice Hall International Editime

7) Kevin Otto, Kristin wood, “Product Design : Techniques in Revenue Engineering and New Product Development”, Pearson Education Inc.
8) Andreas Gebharat, Hanser,” Rapid Prototyping” ,Gardner Publication Inc. Cincinnati.
9) Naber H., Macht M., “Fast Prototype Tools in : Rapid Protyping & Manufacturing”
10) Geuer A. Society of Manufacturing Engineers, Dearborn
11) D. Kochan, “Solid Free from Manufacturing ? Advanced Rapid Prototyipng “, Elsevier Science Publisher, B.V. New York.
12) Roozenburg, J. Eekels, Product Design : Fundamentals and Methods NFM, John Wiley and Sons Ltd.,

B.E. (MECHANICAL ENGINEERING): FIRST TERM
AUTOMOBILE ENGINEERING
ELECTIVE – I

Teaching Scheme
Lectures : 4 Hours/week

Examination Scheme
Theory Paper : 100 Marks
Term Work : 25 Marks
Paper Duration : 3 Hours

UNIT - I **10 Hours (20 Marks)**

Chassis & Breaking System
Classification of Automobile, Layout of Automobile Vehicle , Chassis and Frame , Sub- frame, Articulated Vehicle and Trailers, Breaking Systems- Necessity, requirement of good breaking system, classification, types of breaks- mechanical, hydraulic, pneumatic power break. Brake shoe & lining, brake testers. Brake effectiveness, factors controlling stop of an automobile

UNIT - II **10 Hours (20 Marks)**

Transmission Devices
Clutches:- Requirement of Clutches , Single Plate Clutch, Multiplate, Cone, Centrifugal ,Semi centrifugal ,and Fluid Coupling ,Troubleshooting of Clutches,Gear Box:- Sliding Mesh , Constant Mesh, Synchromesh, Epicyclic Gear Train, Torque Converter , Troubleshooting of Gear Box, Propeller Shaft , Differential Axle.

UNIT - III **10 Hours (20 Marks)**
Suspension and Steering System
Suspension System :- Spring, Types of Spring , Coil and helper spring ,Leaf, Transverse Leaf Spring , Independent suspension, Rubber suspension, Self Leveling suspension ,Pneumatic suspension, Troubleshooting of suspension System.
Steering System :- Function and Geometry, Types of Steering System ,Caster and Camber, Toe-in and Toe-out, Steering Linkage and Gear , Reversible Steering and Power Steering .

UNIT - IV **10 Hours (20 Marks)**

Wheel , Tyres and Tubes
Construction and Types of Wheel , Wheel Dimensions , Types of Tyres , Tyre Properties , Tyre Material , Specification of Tyre Size , Ply Rating , Class Ply, Radial Ply, Consideration in Tread Design , Wheel and Tyre Troubleshooting ,Retreading of Tyre Process, Precautions , Controls, Conventional and Procured retreading processes,Tubes ,Natural Rubber and Butyl Flops, Rims , types and Maintenance.

UNIT - V **10 Hours (20 Marks)**
Automobile Electrical System
Starting system - Introduction, battery, starting motors(self starters)
Charging system - Introduction, generator(dynamo),alternator-(A.C. generator)
Ignition system -Introduction, purpose, requirement, basic, ignition system-battery, magneto, and electronics ignition system, firing order, ignition timing, vacuum controlled distributor, spark plug

TERM WORK

Term work shall consist minimum eight assignments based on above syllabus.

RECOMMENDED BOOKS

1) W.L.Crouse, "Automotive Mechanics", MaGraw Hill International.
2) G.B.S.Narang ,"Automotive Engineering" , Khanna Publishers.
3) Kripal Singh ,"Automobile Engineering" I & II , Standard Publisher distributors.
4) Heitner ,"Automotive Mechanics" , CBS Publisher distributors.
5) Dr. K.M.Gupta,"Automobile Engineering", Umesh Publication.
6) R.K.Rajput," Automobile Engineering", Laxmi Publication, New Delhi

B.E. (MECHANICAL ENGINEERING): FIRST TERM
FLUID MACHINERY
ELECTIVE- I

Teaching Scheme	**Examination Scheme**
Lectures : 4 Hours/week	Theory Paper : 100 Marks
	Term Work : 25 Marks
	Paper Duration : 3 Hours

UNIT - I **10 Hours (20 Marks)**

MOMENTUM EQUATION AND ITS APPLICATION
Impulse momentum principle, fixed and moving flat plates and curved vanes ,series of plates and vanes, Velocity triangles and their analysis, work done, efficiency etc.
HYDRODYNAMIC MACHINES
Classification, General theory, Centrifugal head and fundamental equations, (Eulerean, Degree of reaction etc.) head on machines, various efficiencies, condition for max hyd. Efficiency.

UNIT - II **10 Hours (20 Marks)**

IMPULSE TURBINES
Main components and constructional features of a pelton wheel, velocity diagrams and analysis, Number of buckets, jets, non-dimensional parameters (speed ratio, jet ratio)
REACTION TURBINE
Main components and constructional features draft tube –types, efficiency, limitation to the use of draft tube, cavitations, types of reaction turbines (Francis, Kaplan,Deriaz, reversible.)
Governing mechanisms for Francis, Kaplan turbines, pelton wheels, safety devices of turbines (pressure regulator surge tanks, farebay.)
Types of characteristics curves and related terms (unit quantities.) specific speed and shape of runner. Selection of turbine considering various factors.

UNIT - III **10 Hours (20 Marks)**

HYDRODYNAMIC PUMPS
Components of centrifugal pumps. Its installations. Classifications, various terms associated with centrifugal pump (various head, velocity triangles and there analysis, effect of outlet blade angle.) cavitation, NPSH (Thomas cavitation factor), priming of pumps, installation, and specific speed and pump classification. Performance and characteristic of centrifugal pump. Axial thrust case and maintenance, troubles and remedies.

UNIT - IV **10 Hours (20 Marks)**

APPLICATION OF SIMILARITY AS APPLIED TO TURBINES AND PUMPS
Principals, scale effects.
SPECIAL PUMPS
Jet pump, lift pump, hyram pump, deep well pump, regenerative pump, accumulator, intensifier, screw pump.
FLUID COUPLING AND TORQUE CONVERTERS
Construction, working characteristic curves, applications.

UNIT - V **10 Hours (20 Marks)**

HYDRAULIC SYSTEMS
Study of elements such as pump valves packing, motors, Introduction to elements, hydraulic circuits, pertaining of machine tools, selection of fluids.
PNEUMATIC POWER
Basic principles study of elements used in circuits and control of pneumatic power. Applications in mechanical engineering practice. Comparison of pneumatic and hydraulic systems.

TERM WORK

Term work shall consist minimum eight assignments based on above syllabus.

REFERENCE BOOKS

1) S.Ananthswamy, “Fundamentals on hydraulic machinery” ,United book corporation , Pune.
2) V.P. Vasandani, “Theory of hydraulic machinery”Khanna publishers, Delhi.
3) Dr. J. Lal,” Hydraulic machines “ , Metropolitan Books co. pvt. Ltd. Delhi.
4) S.R.Majumda,r “Oil Hydraulic System”, Tata McGraw Hill.
5) S.R.Majumdar, “Pneumatic System”, Tata McGraw Hill.
6) Agrawal,” Fluid Mechanics and Machinery” , Tata McGraw Hill
7) Hicks,” Pump Operation and maintenance”, Tata McGraw Hill
8) E.D. Shaughnessy, “Introduction to Fluid Mechanics”, Oxford University Press, New Delhi.

B.E. (MECHANICAL ENGINEERING): FIRST TERM
PROJECT I
(Common with Production Engineering and Automobile Engineering)

Teaching scheme
Practical: 2 hrs / week

Examination scheme
Oral: 25 Marks
Term Work: 25 Marks

1. Every student individually or in a group (group size is of 4 students. However, if project complexity demands a maximum group size of 5 students, the committee should be convinced about such complexity and scope of the work.) Shall take a project in the beginning of the (B.E. first Term) seventh term in consultation with the guide and the project must be completed in the (B.E. Second Term) eighth term.

2. The project proposal must be submitted in the institute in the beginning of the (B.E. first Term) seventh term. While submitting project proposal care is to be taken that project will be completed within the available time of two term i.e. 2 Hrs per week for (B.E. first Term) seventh term and 4 Hrs per week for (B.E. Second Term) eighth semester (total time become 12*2 + 12*4 = 72 Hrs per project partner). The final title of the project work should be submitted at the beginning of the (B.E. Second Term) eighth semester.

3. Project title should be precise and clear. Selection and approval of topic:

Topic should be related to real life application in the field of MECHANICAL, AUTOMOBILE AND PRODUCTION ENGINEERING

OR

Investigation of the latest development in a specific field of MECHANICAL, AUTOMOBILE AND PRODUCTION ENGINEERING

OR

The investigation of practical problem in manufacture and / or testing of MECHANICAL, AUTOMOBILE AND PRODUCTION ENGINEERING equipments

OR

The MECHANICAL, AUTOMOBILE AND PRODUCTION ENGINEERING based applications project is preferable.

OR

Software development project related to MECHANICAL, AUTOMOBILE AND PRODUCTION ENGINEERING and Agriculture Engineering with the justification for techniques used / implemented is accepted.

OR

Interdisciplinary projects should be encouraged. The examination will be conducted independently in respective departments.

4. The group should maintain a logbook of activities. It should have entries related to the work done, problems faced, solution evolved etc., duly signed by guide.

5. The group is expected to complete details system design, layout etc. in (B.E. first Term) seventh term, as a part of term work in the form of a joint report. Project report must be submitted in the prescribed format only. No variation in the format will be accepted.

6. One guide will be assigned at the most three project groups.

7. The guides should regularly monitor the progress of the project work.

8. Assessment of the project for award of TW marks shall be done by the guide and a departmental committee (consisting of minimum two teachers with experience more than three years) as per the guidelines given in the following table.

A) ASSESSMENT OF PROJECT I TERMWORK B.E. FIRST TERM

NAME OF THE PROJECT ____

NAME OF THE GUIDE: ____

Sr No	Exam Seat No	Name Of Student	Assessment by guide (70%)					Assessment by Departmental committee (30%)			Grand Total	Out of 25 Marks
			Liter-ature survey	Topic Se le-tion	Docum-entation	Atten dance	To-tal	Evalua tion (10%)	Pres-ntaion (20%)	Total		
		Marks	10	05	15	05	35	05	10	15	50	25

Sign of Guide Sign. of Committee Members Sign. Of H. O. D.

9. The guide should be internal examiner for oral examination (If experience is greater than three years).

10. The external examiner should be from the related area of the concerned project. He should have minimum of five Years of experience at degree level / industry.

11 .The evaluations at final oral examination should be done jointly by the internal and external examiners.

B.E. (MECHANICAL ENGINEERING): FIRST TERM
SEMINAR
(Common with Production Engineering and Automobile Engineering)

Teaching scheme:
Practical: 2 hrs / week

Examination scheme:
Term Work : 25 Marks

1. **For seminar every student will individually study a topic assigned to him / her and submit a report and shall deliver a short lecture / Seminar on the topic at the end of term.**
2. **Selection of topic should be done by students in consultation with concerned guide**
    a. Topic should be related to branch but it should be extended part of the branch (latest and advance topic).
    b. The topic should be such that the student can gain latest knowledge. Student should preferably refer at least one research paper

3. **Seminar topic should not be repeated in the department and registration of the same should be done on first come first served basis**
4. **Seminar report should be submitted in paper bound copy prepared with computer typing**
    a. Size of report depends on advancement of topic.
    b. Student should preferably refer minimum 5 reference books / magazines.
    c. Format of content
        i. Introduction.
        ii. Literature survey.
        iii. Theory 1) Implementation 2) Methodology
        3) Application 4) Advantages, Disadvantages.
        iv. Future scope.
        v. Conclusion.

5 ASSESSMENT OF SEMINAR for TERM WORK
Title of seminar: ____
Name of guide: ____

Sr. No.	Exam Seat No.	Name of Student	Assessment by examiners					Grand Total
			Topic Selection 5	Literature Survey 5	Report Writing 5	Depth of understanding 5	Presentation 5	25

6. Assessment of Literature survey will be based on
    a. Collection of material regarding history of the topic.
    b. Implementation.
    c. Recent applications.

7. Assessment of Depth of understanding will be based on
    a. Questioning by examiners.
    b. Questioning by students.
    c. What the student understands i.e. conclusion regarding seminar.

8. Assessment of presentation will be based on;
    a. Presentation time (10 minutes)
    b. Presentation covered (full or partial)
    c. Way of presentation
    d. Questioning and answering (5 minutes)

9. Examiners should be a panel of two one of them must be guide. Examiner must have experience at least 3 years. Examiners will be appointed by HOD in consultation with Principal.

B.E. (MECHANICAL ENGINEERING): SECOND TERM
FINITE ELEMENT ANALYSIS AND SIMULATION

Teaching Scheme
Lectures : 4 Hours/week
Practical : 4 Hours/week

Examination Scheme
Theory Paper : 100 Marks
Term Work : 25 Marks
Oral : 25 Marks
Paper Duration : 4 Hours

UNIT - I **10 Hours (20 Marks)**

CONVENTIONAL NUMERICAL METHODS
Finite difference method ,method of least square, ritz method, boundary value problems, displacement methods, equilibrium method, mix method of solid mechanics, fe formulation, variational element,Introduction to FEM ,Discritization going from part to whole approach, Physical problem, mathematical models and finite element solution, FEA as a integral part of CAD.
FINITE ELEMENTS TYPES:One dimensional element such as two nodded & three nodded Spar or truss element. Two and three dimensional elements, triangular, rectangular quadrilateral, sector curved, iso parametric, sub parametric elements, etc.

UNIT - II **10 Hours (20 Marks)**

GENERAL PROCEDURE OF FEM
Discritation, element shape, interpolation function, shape function, element stiffness matrix, global stiffness matrix, application of boundary,FEM Softwares - Preprocessing, processing and post processing
Finite element analysis of 1D problem, bending of beams.Introduction, FEM direct approach elements stiffness, potential energy approach, treatment of boundary conditions, temperature effects.
Torsion of circular shaft, thin valve tubes steady state heat conduction, laminar pipe flow.
TRUSSES:Introduction plane trusses, space trusses.

UNIT - III **10 Hours (20 Marks)**

Finite element analysis for two dimensional problem, single variable problems, mesh generation and imposition, egine value and time dependent problems.
Application of heat transfer, fluid mechanics, solid mechanics, plane elasticity and analysis of structural vibration.
Finite element formation of beams.

UNIT - IV **10 Hours (20 Marks)**

Application of FEA to free vibration of thin plate cylindrical shell, transient heat conduction, shaft , motion of fluid in flexible container, flow of idle fluids, viscous fluids, shape structure.

UNIT - V **10 Hours (20 Marks)**

SIMULATION THEORY AND APPLICATION
System models and studies:- concepts of a system, system environment, stochastic activities, continuous and discrete systems, system modeling, types of models, principles used in modeling, types of system studies.
System simulation:-The techniques of simulation, Monte Carlo method, comparison of simulation and analytical methods, analog computers and methods, hybrid computer, simulators, continuous system simulation languages, system dynamics, growth models, logistic curves, multi segments models, probability concepts in simulation, system simulation, events, representation of time, arrival pattern.

TERM WORK

Any Five practical and three assignments based on above syllabus using analysis software.

Note: Oral will be based on the prescribed term-work presented in the form of certified journal.

RECOMMENDED BOOKS

1) J.N. Reddy, An Introduction to Nonlinear Finite Element Analysis, OUP.
2)C.S.Krishnamoorthy.,Finite element analysis TMH
3) J.N.Reddy, Finite element methods,Mc graw hill publition ltd.
4) Robert Cook ,Concept an application of Finite element analysis
5) Klaus-Jurgen Bhate, finite element analysis , PHI
6) C.S. Desai and J.F.Abel.,Introduction to finite element methods ,CBS
7) Tirapati R. Chandrupatla ,Finite element analysis by, PHI.
8) Geoffery Gordon ,System simulation
9) Narsingh Deo ,System simulation with digital computers
10) Kenneth Lt. Huebner, " The FEM for Engineers ",Wiley India Pvt.Ltd. New Delhi

B.E. (MECHANICAL ENGINEERING): SECOND TERM
MECHANICAL VIBRATION

Teaching Scheme
Lectures : 4 Hours/week
Practical : 2 Hours/week

Examination Scheme
Theory Paper : 100 Marks
Term Work : 25 Marks
Oral : 25 Marks
Paper Duration : 3 Hours

UNIT - I **10 Hours (20 Marks)**

FUNDAMENTAL OF VIBRATIONS
Introduction, Definitions, Vector method of representing harmonic motions, Addition of two simple harmonic motions of the same frequency, Beat phenomenon, Complex method of representing harmonic vibrations, Work done by a harmonic force on a harmonic motion, Fourier series and harmonic analysis.
UNDAMPED FREE VIBRATIONS OF SINGLE DEGREE OF FREEDOM SYSTEMS
Introduction, Derivation of differential equation, Solution of differential equation, Torsional vibrations, Equivalent stiffness of spring combinations, Energy method.

UNIT – II **10 Hours (20 Marks)**

DAMPED FREE VIBRATIONS OF SINGLE DEGREE OF FREEDOM SYSTEMS
Introduction, Different types of dampings, Free vibrations with viscous damping, Logarithmic decrement, Viscous dampers, Dry friction or coulomb damping, Solid or structural damping, Slip or interfacial damping.
FORCED VIBRATIONS OF SINGLE DEGREE OF FREEDOM SYSTEMS
Introduction, Forced vibrations with constant harmonic excitation, Forced vibrations with rotating and reciprocating unbalance, Forced vibrations due to excitation of support, Energy dissipated by damping, Forced vibrations with coulomb damping, Forced vibrations with structural damping, Determination of equivalent viscous damping from frequency response curve, Forced vibrations of a system having non-harmonic excitation, Vibration isolation and transmissibility, Vibration measuring instruments.

UNIT - III **10 Hours (20 Marks)**

TWO DEGREE OF FREEDOM SYSTEMS
Introduction, Principal modes of vibration, Other cases of simple two degree of freedom systems, Combined rectilinear and angular modes, System with damping, Undamped forced vibrations with harmonic excitation, Vibration absorbers.
CRITICAL SPEED OF SHAFT:
Introduction, Critical speed of a light shaft having a single disc without damping, Critical speed of a light shaft having a single disc with damping, Critical speed of a shaft having multiple discs, Secondary critical speed, Critical speed of a light cantilever shaft with a large heavy disc at its end.

UNIT - IV **10 Hours (20 Marks)**

MULTI DEGREE OF FREEDOM SYSTEMS EXACT ANALYSIS
Introduction, Free vibrations equations of motion, Influence coefficients, Generalized coordinates and coordinate coupling, Natural frequencies and mode shapes, Orthogonal properties of normal modes, Model analysis, Forced vibrations by matrix inversion, Torsion vibrations of multi-rotor systems.
MULTI DEGREE OF FREEDOM SYSTEMS NUMERICAL METHODS
Introduction, Rayleigh's method, Dunkerley's method, Stodola's method, Rayleigh-Ritz method, Method of matrix itrrations, Holzer's method.

UNIT - V **10 Hours (20 Marks)**

CONTINUOUS SYSTEMS
Vibrations of strings, Longitudinal vibrations of bars, Torsional vibrations of circular shafts, Lateral vibrations of beams.
TRANSIENT VIBRATIONS
Introduction, Laplace transformation, Response to an impulsive input, Response to a step input, Response to a pulse input, phase plane method, shock spectrum.
NON-LINEAR VIBRATIONS: Introduction, Examples of non-linear systems, Phase plane, Undamped free vibration with non-linear spring forces, Pertubation method, Forced vibration with non-linear spring forces, Self excited vibrations.

TERM WORK

Term work shall consist of any five experiments out of the following and three assignments based above syllabus.

1) To study the torsional vibrations of single rotor system.
2) To study the torsional vibrations of two rotor system.
3) To study damped torsional vibrations of single rotor system.
4) To study undamped free vibrations of a spring.
5) To study the natural vibrations of a spring mass system.
6) To study forced damped vibrations of a spring mass system.
7) To study the forced damped vibrations of simply supported beam.
8) To determine critical speed of a single rotor system.

Note: Oral will be based on the prescribed term-work presented in the form of certified journal.

REFERENCE BOOKS

1) Dilip Kumar Adhwarjee "Theory and Applications of Mechanical Vibrations"Laxmi Puyblications (p) Ltd., New Delhi
2) G.K.Grover "Mechanical Vibrations"New Chand & Bros Roorkee (U.P.)
3) Leonard Meirovitch " Element of Vibration Analysis" Tata McGraw-Hill Publishing Company Limited, New Delhi
4) Singiresu S. Rao " Mechanical Vibrations " Pearson Education Ptd. Ltd., Delhi
5) S. Graham Kelly " Schaum's Out lines Mechanical Vibrations " Tata McGraw-Hill Publishing Company Limited, New Delhi
6) Thompson," Theory of Vibration with Application", Pearson Education
7) V.P.Singh " Mechanical Vibrations " Dhanpat Rai & Co. (P) Ltd., Delhi
8)B.H.Tongue," Principles of Vibration", 2/ed. Oxford University Press, New Delhi.

B.E. (MECHANICAL ENGINEERING): SECOND TERM
TRIBOLOGY

Teaching Scheme
Lectures : 4 Hours/week
Practical : 2 Hours/week

Examination Scheme
Theory Paper : 100 Marks
Term Work : 25 Marks
Oral : 25 Marks
Paper Duration : 3 Hours

UNIT - I **10 Hours (20 Marks)**

Tribology: Introduction, Tribology in design, Tribology in Industry, Economic considerations.
Friction: Introduction, Laws of friction, Kinds of friction, Causes of friction, Friction measurement, stick slip oscillations & its elimination,Wear: Theory of wear, Types of wear, Various factors affecting wear, measurement of wear, wear between solids and flowing liquids, theory of wear.

UNIT - II **10 Hours (20 Marks)**

Lubricants and Lubrication: Lubricant properties – physical and chemical. Lubrication – introduction, basic modes of lubrication. Flow of viscous fluid through rectangular slot.
Hydrostatic bearings: Basic concept, operations, advantages and limitations. Hydrostatic conical and spherical bearings, load carrying capacity and flow of lubricants. Bearing power and film thickness, bearing temperature and power. Compensators and their action. Optimum design step bearing.

UNIT - III **10 Hours (20 Marks)**

Hydrodynamic bearing: Theory of hydrodynamic lubrication, Mechanism of pressure development in oil film. Two Dimensional Reynolds equation, Infinite tapered shoe slider bearings and infinite long journal bearing. Short bearing theory applied to journal bearing.

UNIT - IV **10 Hours (20 Marks)**

Hydrodynamic thrust bearing: Introduction, flat plate thrust bearing, step thrust bearing, tapered land thrust bearing, tilting pad thrust bearing, spring mounted thrust bearing, hydrodynamic pocket thrust bearing.
Friction and power losses in journal bearings: Evaluation of friction loss in concentric & eccentric journal bearing & quantity of oil flow with circumferential groove and hole.

UNIT - V **10 Hours (20 Marks)**

Hydrostatic squeeze film, circular & rectangular plates, impact conditions between lubricated solids, applications to journal bearing,Air lubricated bearings: Tilting pad bearings, magnetic recording disk with flying heads, hydrostatic & hydrodynamic thrust bearing with air lubrications. Lubrication practice, quality control & management – characteristics of lubricating methods, lubricating devices & systems, organizing application charts.

TERMWORK

Assignments Problems on -
Problem in hydrostatic bearing
Problem in hydrodynamic bearing
Reynolds equation
Derivation of squeeze film lubrication on rectangular plate and
Practical On (Any FOUR)
Journal Bearing apparatus.
Tilting pad thrust bearing apparatus
Friction in journal bearing
Break line friction test rig.
Coefficient of friction using pin on disc test rig.

Note: Oral will be based on the prescribed term-work presented in the form of certified journal.

REFERENCE BOOKS

1) B. C. Majumdar "Introduction Tribology and Bearings", H. Wheeler and Company Pvt. Ltd.
2) Cameron A. "Basic Lubrication Theory , Wiley Eastern Ltd.
3) Fuller D. D., "Theory and Practice of Lubrication for Engineers". John Wiley and Sons.
4) Halling J. "Principles of Tribology", McMillan Press Ltd.
5) Hrassan & Powel , "Gas Bearing".
6) Neale M. J. "Tribology Hand Book", Butterworths.

B.E. (MECHANICAL ENGINEERING): SECOND TERM
POWER PLANT ENGINEERING
ELECTIVE - II

Teaching Scheme	**Examination Scheme**
Lectures : 4 Hours/week	Theory Paper : 100 Marks
	Term Work : 25 Marks
	Paper Duration : 3 Hours

UNIT - I **10 Hours (20 Marks)**

THERMAL POWER PLANT
Introduction, general layout of modern thermal power plant, working of thermal power plant, coal classification, coal handling, coal blending, coal desulphanization, Indian coals, selection of coal for TPP., coal handling, storage, preparation and feeding, ash handling and dust collection, fluidized bed combustion systems, steam turbines, condensers, cooling pond and cooling tower, necessity of feed water treatment, high pressure boilers and importance of water purity, thermodynamic cycles.

UNIT - II **10 Hours (20 Marks)**

HYDROELECTRIC POWER PLANT
Hydrograph, flow duration curve, site selection, classification of HPP, and their field of use, capacity calculation for hydro power, dam, head water control, penstock, water turbines, specific speeds, governors, hydro electric plant auxiliaries, plant layout, automatic and pumped storage , project coasty of hydroelectric plant. advantages of HPP

UNIT - III **10 Hours (20 Marks)**

NUCLEAR AND DIESEL POWER PLANT
Elements of nuclear power plant, nuclear reactor and its types, fuels moderators , coolants, control rod, classification of nuclear power plants, waste disposal, diesel power plant diesel engine performance and operation , plant layout, log sheet, application, selection of engine size

UNIT - IV **10 Hours (20 Marks)**

GAS TURBINE PLANT
Plant layout, method of improving output and performance, fuel and fuel systems, method of testing open and closed cycle plants, operating characteristics, applications, free piston engine plant, limitation and application , combined cycle plants, advantages , need of generation power plant in power systems based load station and peak load station.

UNIT - V **10 Hours (20 Marks)**

MAJOR ELECTRICAL EQUIPMENT IN POWER STATION
Generator and exciters, earthling of power system, power and unit transformer, circuit breakers, protective equipments, control board equipment, elements of instrumentation, plant layout, switch gear for power station auxiliaries, recent developments in methods of power generation, introduction to magneto hydrodynamic, fuel cells , geothermal, solar power, tidal power.

TERM WORK

Term work shall consist minimum eight assignments based on above syllabus.

REFERENCE BOOKS

1) Domkundwar and Arora " Power Plant Engineering", Dhanpat Rai & Sons, New Delhi
2) E.I. Wakil, "Power Plant Engineering", Publications, New Delhi
3) P.K.Nag,"Power Plant Engineering", Tata McGraw Hill, New Delhi
4) R.K.Rajput," Power Plant Engineering", Laxmi Publications, New Delhi

B.E. (MECHANICAL ENGINEERING): SECOND TERM
PROCESS EQUIPMENT DESIGN
ELECTIVE - II

Teaching Scheme
Lectures : 4 Hours/week

Examination Scheme
Theory Paper : 100 Marks
Term Work : 25 Marks
Paper Duration : 3 Hours

UNIT - I **10 Hours (20 Marks)**

PRESSURE VESSELS : Introduction, Operating conditions, Pressure vessel code, Selection of material, Vessel opening at low temperatures, Vessel opening at elevated temperatures, Design conditions and stresses, Design of shell and its components, Supports for vessels, Bracket supports, Leg supports, Skirt supports, Saddle supports, Stress from local loads and thermal gradient, Thermal stresses in cylindrical shell, Fabrication, Inspection and tests.

UNIT - II **10 Hours (20 Marks)**

HIGH PRESSURE VESSELS : Introduction, Constructional features, Material for high pressure vessels, Solid walled vessel, Multi-shell construction, vessel closures, jacket for vessels, STORAGE VESSELS: Introduction, Storage of Fluids, Storage of non-volatile liquids, Storage of volatile liquids, Storage of gases, Design of rectangular tanks, Design of tanks, Nozzles and mountings, Large capacity storage tanks.

UNIT - III **10 Hours (20 Marks)**

REACTION VESSELS : Introduction, Material of construction, Agitators, Types of agitators, Baffling, Power requirements for agitation, Design of agitators system components, Drive for agitators, Classification of reaction vessels, Heating systems, Design considerations,Heat Exchangers: Introduction, Types of heat exchangers, Design of shell and tube heat exchangers.

UNIT - IV **10 Hours (20 Marks)**

EVAPORATORS AND CRYSTALLISERS : Evaporators, Types of evaporators, Entrainment separators, Material of construction, Design considerations, Crystallisers,Distillation And Absorption Towers / Columns:Introduction, Basic features of Towers / Columns, Process engineering data, Towers / columns internals, stresses in columns shell, Determination of shell thickness, Elastic stability under compressive stresses, Allowable deflection, Design and construction features of column internals, Supports for column.

UNIT - V **10 Hours (20 Marks)**

AUXILIARY PROCESS VESSELS
Introduction, Reflux drum, Compressors knock-out drum, Liquid-liquid separators, Vapour/gas liquid separators, Wire mesh mist eliminators, Process Hazard And Safety Measures in Equipment Design:Introduction, Hazards in process industries, Analysis of hazards, Safety measures, Safety measures in equipment design, Pressure relief devices.

TERM WORK

Term work shall consist minimum eight assignments based on above syllabus.

REFERENCE BOOKS

1) B.C. Bhattacharyya ," Chemical Equipment Design", CBS Publishers and Distributors, Delhi
2) E.E. Ludwig"Applied Process Design for Chemical and petrochemical Plants", Gulf Publishing Co.
3) E.E. Ludwig "Applied Process Design for Chemical Plants", Gulf Publishing Co.
4) J.H. Perry ,"Chemical Engineering Handbook"
5) L.E. Brownell ," Process Equipment Design", John Wiley and Sons
6) M.V. Joshi ," Process Equipment Design", Macmillan India Ltd, New Delhi
7) S. D. Dawande ,"Process Equipment Design", Central Techno Publication
8) Babu," Process Plant Simulation", Oxford University Press, New Delhi.

B.E. (MECHANICAL ENGINEERING): SECOND TERM
INTRODUCTION TO ROBOTICS
ELECTIVE - II

Teaching Scheme
Lectures : 4 Hours/week

Examination Scheme
Theory Paper : 100 Marks
Term Work : 25 Marks
Paper Duration : 3 Hours

UNIT - I **10 Hours (20 Marks)**

PLANNER MECHANICS: Advanced synthesis of planner mechanics for ISP and FSP burmester theories and analytical techniques, applications.
MECHANICS DYNAMICS: Newtonian lagrangian techniques, energy methods, spatial mechanisms, axodes, and kinematics of open and closed loop mechanism.

UNIT - II **10 Hours (20 Marks)**

BASIC CONCEPT IN ROBOTICS: automation and robotics, robot anatomy, basic structure of robotics, resolution, accuracy and repeatability, classification and structure of robotics system, point to point and continuous past system, control loop of robotics system.

UNIT - III **10 Hours (20 Marks)**

DRIVES AND CONTROL SYSTEM: Hydraulic, DC servomotors, basic control system, concept and models, control system analysis, robot activation and feedback component, positional and velocity sensors, actuators, power transmission system, robot joint control design. Application of robot in manufacturing.

UNIT - IV **10 Hours (20 Marks)**

END EFFECTORS, SENSORS AND VISION SYSTEMS:
End Effectors Types of end effectors, mechanical grippers, vacuum / magnetic / adhesive grippers, tools as end effectors, Gripper selection and design.
Introduction to Sensors: Need of sensors in a robotic system, selection of sensors, photo sensors, limit switches. Range sensors, proximity sensors, touch / sensors.
VISION SYSTEMS: concept of low level and high-level vision in a robotic system.

UNIT - V **10 Hours (20 Marks)**

ROBOT PROGRAMMING: Methods of robot programming, lead through programming methods, a robot program as a path in space, motion interpolation WAIT, SIGNAL, AND DELAY commands.
ROBOT LANGUAGES: The textural robot languages, generation of robot programming languages, robot language structure, constant, variables and other data objects, motion commands, end effector and sensor commands.

TERM WORK

Term work shall consist minimum eight assignments based on above syllabus.

RECOMMENDED BOOKS

1) Groover," Industrial Robotics", McGraw Hill Publication Co.Ltd..
2) John J. Craig, "Introduction to Robotics Mechanics and Control", Pearson Education Inc.,
3) M.P.Groover,"Industrial Robotics - Technology, Programming and Applications"
4) Niku,"Introduction to Robotics : Analysis System and Application", Pearson Education
5) POVOV , Robotics", Mir Publication Co.Ltd.
6) Robot J.Schilling, " Fundamental of Robotics", Pearson Education
7)Mark W Sping," Robot Modelling And Control ",Wiley India Pvt.Ltd. New Delhi

B.E. (MECHANICAL ENGINEERING): SECOND TERM
ADVANCED WELDING TECHNOLOGY
ELECTIVE-II

Teaching Scheme
Lectures : 4 Hours/week

Examination Scheme
Theory Paper : 100 Marks
Term Work : 25 Marks
Paper Duration : 3 Hours

UNIT - I **10 Hours (20 Marks)**

SOLDERING AND BRAZING
Welding characteristics capillary attraction bond formation, metallurgy of solders, foreign materials in the solders alloy. Designing solder joint. Soldering iron, special soldering technique, thermal free solder, low temperature soldering, high temperature soldering, expanding type solders.
Metallurgical aspects of brazing, Design of joint, brazing fluxes, Method of heating – touch brazing, furnace brazing, induction brazing, Resistance brazing, disphasing, Salt bath brazing, brazing solders, silver solders.

UNIT - II **10 Hours (20 Marks)**

SPECIAL WELDING PROCESSES:
Electron beam welding, plasma arc welding, laser welding, bronze welding, under water welding. Ultrasonic, Diffusion welding, Friction and inertia welding, Forge welding, Expolsive welding, Thermit welding, Atomic hydrogen welding

UNIT - III **10 Hours (20 Marks)**

WELDABILITY OF STEELS:
Plain carbon steels-mild steel, medium carbon steel, high carbon steel, tool steels, low alloy and high alloy steels, stainless steels, Austenitic manganese steels.
WELDABILITY OF ALUMINIUM AND ITS ALLOY:
metallurgical behavior during welding, choice of methods, welding rods, fixtures, methods of welding.
WELDABILITY OF CAST IRON AND CASTING:
Gray cast iron, malleable cast iron spheriodal graphite cast iron, selection of cast iron, electrodes and welding rods-methods of welding.
WELDABILITY OF COPPER AND COPPER ALLOY:
Copper brasses, bronzes, Phospher bronze, aluminium bronze, welding of dissimilar metal joints on copper and copper alloys, methods of welding.

UNIT - IV **10 Hours (20 Marks)**

METULLURGICAL CONCEPT OF WELDABILITY:
Temperature changes in welding concepts of weldability carbon equivalent, cracking of welds, weldability testing, welding metallurgical of dissimilar metals, heat treatments of welds.
HARD FACING:
Types of wear, hard facing metallurgy, preparing hard facing, basic hard facing procedure, spray hard facing, basic treatment weld.

UNIT - V **10 Hours (20 Marks)**

DESIGN AND FABRICATION:
Designing for welding types of joints welds and stress distribution, layer sequences, deposition rates, expansion, contraction and residual stresses in weld structure.
Indian standards for welding electrodes, fluxes and properties, electrode selection.

TERM WORK

Term work shall consist minimum eight assignments based on above syllabus.

REFERENCE BOOKS

1) M. Lal , “Fabrication Technology”
2) O. P. Khanna , “Welding Technology”, Dhanpat Rai Publications
3) P.C. Sharma ,” Production Engineering”
4) P. N. Rao , “Manufacturing Tech”. Vol I & II
5) R. K. Jain , “Production Technology”

B.E. (MECHANICAL ENGINEERING): SECOND TERM
ENERGY ENGINEERING
ELECTIVE- II

Teaching Scheme
Lectures : 4 Hours/week

Examination Scheme
Theory Paper : 100 Marks
Term Work : 25 Marks
Paper Duration : 3 Hours

UNIT – I **10 Hours (20 Marks)**

INTRODUCTION:Global primary energy reserves, energy needs of growing economy, Indian energy scenario, energy pricing in India, energy conservation and its importance, energy conservation act-2001 and its features, energy management strategy, energy audit: types and methodology, energy audit reporting format

UNIT - II **10 Hours (20 Marks)**

SOLAR ENERGYsolar radiation, measurement of solar radiation, energy potential of sun, simple flat plate collector, design of liquid flat plate collector, application of liquid flat plate collector, performance analysis, testing procedure of liquid, air, water, FPC.Concentrating Collectors: types, material of construction parameters characterizing, the concentrators, thermodynamic limits on concentration, tracking, performance analysis of cylindrical parabolic & dish collector. Comparison with FPC.

UNIT - III **10 Hours (20 Marks)**

APPLICATION OF SOLAR SYSTEMS AND ECONOMICS ANALYSIS:
Solar ponds, solar distillatory, solar satellite power system, solar cooker, solar air & water heaters, solar dryers, photovoltaic direct energy conversion, solar cells, solar thermal power system, Solar passive heating, solar air-conditioning, solar energy storage's. Economics analysis of solar systems, net present value concept, calculation of pay back periods for solar system.

UNIT - IV **10 Hours (20 Marks)**

WIND ENERGY:Nature of wind, wind machines, classification & description, wind data and its representation, energy in wind, wind mill site characteristic , performance calculations, recent development.
BIOMASS ENERGY:Various forms of biomass energy as a potential energy source, various species of plants suitable for India, bio-fuel production processes, bio-gas plants gasifiers principle, bio-gas & plants, types of gober gas plants.

UNIT - V **10 Hours (20 Marks)**

OCEAN ENERGY:Types of ocean energy sources, ocean temperature difference, OTEC cycle (open and closed) comparison with normal vapor cycle.Ocean Waves: Wave motion energy, power from wave, wave energy conversion devices.Geothermal Energy:History, Future origin, types of geothermal energy, dry rock & hot aquifer analysis, vapour dominated geothermal systems, operational & environmental problems.

TERM WORK
Term work shall consist minimum eight assignments based on above syllabus.

RECOMMENDED BOOKS

1) B.S.Magal, "Solar Power Engineering"
2) G.D. Rai.,Non Conventional Energy Sources
3) Garg H.P.,Treatise on solar Energy Vol. I, II, III
4) John W. Twidell and Anthony D. Weir ,Renewable Energy Resources, ELBS Publication
5) J.A. Duffy, W.A. Beckman- John Willy, Solar Energy of Thermal Processes-
6) Krieth, Krieder ,Principles of solar Engineering ,Mc Graw Hill Pub. Co.
7) S.Rao & B.B.Parulekar, Energy Technology, TMT, New Delhi
8) S.P. Sukhatme ,Solar Energy, Principles of collection and storages , Tata McHill Publication, New Delhi
9) W.C. Turner.,Energy Management Hand Book
10) S.N. Bhadra, Wind Electrical Systems, Oxford University Press, New Delhi.

B.E. (MECHANICAL ENGINEERING): SECOND TERM
INDUSTRIAL FLUID POWER
ELECTIVE- II

Teaching Scheme
Lectures : 4 Hours/week

Examination Scheme
Theory Paper : 100 Marks
Term Work : 25 Marks
Paper Duration : 3 Hours

UNIT - I **10 Hours (20 Marks)**

Fluid power system: Component advantages, application in the field of machine tool, material handling. Hydraulic pressing, mobile and stationary machine clamping, devices etc. Transmission of power at static and dynamic states.
Laws of fluid flow, type of flow,Types of hydraulic fluids, petroleum base, synthetic, and water based. Properties of fluid, selection of fluids, additives, effect of temperature and pressure on hydraulic fluid.

UNIT - II **10 Hours (20 Marks)**

Seals, seating material, compatibility of seal with fluid, Types of pipes, hoses, material, quick acting couplings, presser drop in hosses/pipes, Fluid conditioning through filters, strainers, source of contamination, and contamination control, heat exchangers,Pumps - Types, classification, principal of working, power calculations, efficiency calculation, characteristic curves, selection of pump for hydraulic power transmission form vane pump, gear pump, redial and axial plunger pumps, screw pumps.

UNIT - III **10 Hours (20 Marks)**

Manually operated, solenoid operated, pilot operated. Directional control valve , check valve, Modular construction of valve.
Control of fluid power,Necessity of fluid control through pressure control, direction, control, flow control valves,Principle of pressure control valves, direct operated, pitol operated, relief valves, pressure reducing valve, sequence valve, quick exhaust valve,Principle of flow control valve- Pressure compensated, temperature compensated flow control valve, meter in circuit, meter out circuit, flow through restrictor, Types of direction control valves: Two way two position, four way three position, four way two piston valves, Open center, close center, Tandem center, position of valve

UNIT - IV **10 Hours (20 Marks)**

Actuators - linear and rotary, Symbols of hydraulic circuits, Hydraulic motors gear type vane type piston type radial piston type methods of control of acceleration and deceleration, Types of cylinder mountings, Calculation of piston velocity and thrust under static and dynamic application considering friction inertia loads, Design consideration for cylinders, Selection of components and design of hydraulic circuits for linear circuits regeneration circuits sequencing circuits with the use of electrical control, Laden diagram, Maintenance trouble shooting safety precaution of hydraulic circuits

UNIT – V **10 Hours (20 Marks)**

JIC symbols/ISO pneumatic symbol, Principle of pneumatic, Laws of compression , types of compression, selection of compression, Comparison of pneumatic with hydraulic power transmission, Types of filters regulators , lubrication, mufflers, driers, Pressure regulating valve, Direction control valve two-way three way four way valve solenoid operated valve push button level control valve,Speed regulating methods in pneumatic, Pneumatic actuators, rotary and reciprocating,Air motors radial piston vane type axial piston type,Basic pneumatic circuits, Selection of components for linear circuits sequencing circuits

TERM WORK

Term work shall consist minimum eight assignments based on above syllabus.

RECOMMENDED BOOKS

1) A.Esposito"Fluid Power with Application" Prencice Hall.
2) B. Lall ,"Oil Hydraulics"International Literature Association
3) D.A. Pease ," Basic fluid power " Prentice Hall
4) Godwin ," Power Hydraulics " Cleaver Hume.

5) H.L. Stewart ," Hydraulics and Pneumatics" Industrial Press
6) J.J. Pippenger ,"Industrial Hydraulics "McGraw Hill Co.
7) Vickers' manual on Industrial Hydraulics.
8) Yeaple ,"Fluid Power Design Handbook."
9)E.J.Shaughnessy, "Introduction to Fluid Mechanics" (SI Adoption),OUP, New Delhi.

B.E. (MECHANICAL ENGINEERING): FIRST TERM
PROJECT II
(Common with Production Engineering and Automobile Engineering)

Teaching scheme:
Practical : 4 hrs / week

Examination scheme:
Oral : 50 Marks
Term Work : 100 Marks

1. The Project group in (B.E. first Term) seventh term will continue the project work in (B.E. Second Term) eighth term and complete project in all respect (assembly, testing, fabrication, tabulation, test result etc.)
2. The group should maintain a logbook of activities. It should have entries related to the work done, problems faced, solution evolved etc., duly signed by guide.
3. The guides should regularly monitor the progress of the project work.
4. The project work along with project report should be submitted as part of term work in (B.E. Second Term) eighth term on or before the last day of the (B.E. Second Term) eighth term
5. Project report must be submitted in the prescribed format only. No variation in the format will be accepted.
6. Assessment of the project for award of TW marks shall be done by the guide and a departmental committee (consisting of minimum two teachers with experience more than three years) as per the guidelines given in the following table.

B) ASSESSMENT OF PROJECT II TERMWORK (B.E. SECOND TERM)

NAME OF THE PROJECT: ____

NAME OF THE GUIDE: ____

Sr. No	Exam. Seat No	Name Of Students	Assessment by guide (70%)						Assessment by department (30%)			Grand Total
			Fabrication /software / actual work	Execution of project	Project report	Scope/ Cost / Utility	Attende-nece	Total	Evalu ation (10%)	Prese-ntaion (20%)	Total	
		Marks	20	10	20	10	10	70	10	20	30	100

Sign of Guide Sign. of Committee Members Sign. of H. O. D.

7. The guide should be internal examiner for oral examination (If experience is greater than three years).
8. The external examiner should be from the related area of the concerned project. He should have minimum of five years of experience at degree level / industry.
9. The evaluation at final oral examination should be done jointly by the internal and external examiners.

NORTH MAHARASHTRA UNIVERSITY JALGAON
B.E. (Common Automobile Engineering and Production Engineering)
W.E.F : 2008- 09
TERM - II
INDUSTRIAL VISIT / CASE STUDY

Teaching scheme: **Examination scheme:**
NIL **Term Work : 25 Marks**

EDUCATION TOUR / TECHNICAL VISITS / CASE STUDY AND ITS EVALUATION

1. During (B.E. First Term / Second Term) seventh and / or eighth terms or during vacation between (B.E. First Term / Second Term) seventh and eighth terms, every student; shall visit minimum two industries, factories arranged by colleges and accompanied by teachers. There shall be at least one teacher for a group of 20 students and at least one non-teaching staff accompanied with the students.

2. The colleges should obtain appropriate certificates of visit from the concerned organizations just after the visits.

3. Students should submit written report about the visits individually at the end of (B.E. Second Term) eighth term.

4. The report should contain information about the following points:

   (a) The organization - activities of organization and administrative setup technical personnel and their main duties.
   (b) The project / industry brief description with sketches and salient technical information.
   (c) The work / processes observed with specification of materials, products, equipments etc. and role of engineers in that organization.
   (d) Suggestions (if any) for improvement in the working of those organizations.

5. The evaluation of the report of technical visits will be made by panel of two teachers appointed by principal based on following points:

   (a) Coverage aspect: All above points should be covered.
   (b) Detailed observations: System / Process / Product explained with data, diagram specifications.
   (c) Quality of presentation: Report should be very objective and should consist of clear and systematic organization of topics and information.
   (d) Viva - voce: A viva -voce shall be conducted on the technical visit report by the teachers to assess the specific knowledge gained by the students for technical applications.

6. The case study should include the study problem in Mechanical Engineering, Automobile Engineering and Production branch.

NORTH MAHARASHTRA UNIVERSITY, JALGAON
ENGINEERING AND TECHNOLOGY FACULTY
Equivalent Subjects of B.E. Mechanical Engineering

FIRST TERM

S.N.	Old Subjects	S.N.	Equivalent Subjects	Year
1	Machine Design –III	1	--	--
2	Refrigeration And Air Conditioning	2	Refrigeration And Air Conditioning	B.E.Mech (New)
3	Project and Financial Management	3	--	--
4	Elective – I	4	Elective – I	
	1. Non-conventional Energy Sources		1. --	--
	2. Machine Tool Design		2. Machine Tool Design	B.E.Mech – Elective-I (New)
	3. Operation Research		3. --	--
	4. Robotics		4. --	--
	5. Automobile Engineering-I		5. --	--
	6. Mechanical Estimation and Costing		6. --	--
	7. Reliability Engineering		7. --	--

SECOND TERM

S.N.	Old Subjects	S.N.	Equivalent Subjects	Year
1	CAD/CAM	1	--	--
2	Tribology	2	Tribology	B.E.Mech (New)
3	Mechanical Vibration	3	Mechanical Vibration	B.E.Mech (New)
4	Elective - II	4	Elective - II	
	1. Power Plant Engineering		1. Power Plant Engineering	B.E.Mech – Elective-II (New)
	2. Management Information system		2. --	--
	3. Materials Management		3. --	--
	4. Energy Conservation and Management		4. --	--
	5. Automobile Engineering-II		5. --	--
	6. Production Planning and Control		6. --	--
	7. Analysis and Synthesis of Mechanism		7. --	--

Faculty of Engineering & Technology

NORTH MAHARASHTRA UNIVERSITY,

JALGAON (M.S.)

THIRD ENGINEERING (T.E.)

CHEMICAL ENGINEERING
TERM – I & II

W.E.F. 2007-2008

NORTH MAHARASHTRA UNIVERSITY, JALGAON
STRUCTURE OF TEACHING & EVALUATION
T.E. (CHEMICAL ENGINEERING)
W.E.F.2007-2008

First Term

Sr. No.	Subject	Teaching Scheme Hours/ Week		Examination Scheme				
		Lectures	Practical	Paper Duration Hours	Paper	TW	PR	OR
1	Chemical Processes-II	04	02	03	100	25	50	--
2	Process Heat Transfer	04	02	03	100	25	--	25
3	Mass Transfer-I	04	04	03	100	25	50	--
4	Process Equipment Design and Drawing -I	04	04	04	100	50	--	--
5	Chemical Engineering Thermodynamics	04	--	03	100	--	--	--
		20	12		500	125	100	25
	Grand Total	**32**			**750**			

Second Term

Sr. No.	Subject	Teaching Scheme Hours/ Week		Examination Scheme				
		Lectures	Practical	Paper Duration Hours	Paper	TW	PR	OR
1	Instrumentation and Instrumental Analysis	04	02	03	100	25	--	25
2	Chemical Reaction Engineering-I	04	02	03	100	25	--	25
3	Mass Transfer-II	04	04	03	100	25	50	--
4	Process Equipment Design and Drawing -II	04	04	04	100	50	--	--
5	Mathematical Methods in Chemical Engineering	04	--	03	100	--	--	--
6	Practical Training/Mini Project/Special Study	--	--	--	--	25	--	--
		20	12		500	150	50	50
	Grand Total	**32**			**750**			

T.E. (CHEMICAL ENGINEERING)
1. CHEMICAL PROCESSES-II

Teaching Scheme:
Lectures: 4 Hrs./ Week
Practical: 2 Hrs./ Week

Examination Scheme:
Paper: 100 Marks (3 Hrs)
Practical: 50 Marks
Term Work : 25 Marks

UNIT- I:

Food Industries: Types of food processing, preservation method, Food Products.
Sugar and Starch Industries: sugar and starches.
Fermentation Industries: Absolute alcohol, Beer, Wines and liquors, vinegar, citric acid lactic acid. (10 Hrs, 20 Marks)

UNIT- II:

Oil, Fat and Waxes: Vegetable oils, animal Fats and oils, Waxes.
Soaps and detergents.
Pulp and paper industries: Manufacturing of pulp, manufacturing of paper, and structural boards. (10 Hrs, 20 Marks)

UNIT- III:

Agrochemical Industries: Insecticides, pesticides, Herbicides, plant growth , Nutrients and regulators, compound fertilizers, Bio fertilizers, complex fertilizers, various grades of N.P.K. fertilizer.
Pharmaceuticals Industries: Classification of Pharmaceuticals products.
Manufacture of Antibiotics, Isolates from plant and animal, vitamins. (10 Hrs, 20 Marks)

UNIT- IV:

Explosives: Types of Explosives, Explosive characteristics, Industrial explosives, propellants, rockets, missiles, pyrotechnics, matches, toxic chemical weapons.
Plastic industries: Raw Materials, general polymerization processes, manufacturing processes, compounding and Moulding operation. (10 Hrs, 20 Marks)

UNIT- V:

Dyes: Classification and manufacturing of dyes.
Petroleum and Petrochemicals : Petroleum production and Refining , Manufacturing of Methanol , Formaldehyde , Ethylene and Acetylene , Ethylene dioxide, Isopropanol, Acetone , Isopropyl , Benzene ,Butadiene, Phenol styrene . (10 Hrs, 20 Marks)

REFERENCES

1) George T. Austin, "Shreeve's Chemical Process Industries", 5th Edition , Mc Graw Hill Book Company.
2) C.E. Dryden, Outline of Chemical Technology, Affiliated East WestPress.1973.
3) S.D.Shukla, G.N.Pandey, A text book of Chemical technology, 3rd Edition.

PRACTICAL and TERM WORK :

Practical and Term Work Shall be based on any 08 experiments mentioned below.

1) Estimation of sugar / glucose
2) Determination of saponification value of an oil
3) Determination of acid value of an oil
4) Determination of iodine value of an oil
5) Preparation of azo dye
6) Preparation of soap
7) Preparation of green pigment
8) Preparation of yellow pigment
9) Preparation of blue pigment
10) Preparation of drug aspirin

2. PROCESS HEAT TRANSFER

Teaching Scheme:	Examination Scheme:
Lectures: 4 Hrs. / Week	Paper: 100 Marks (3 Hrs)
Practical: 2 Hrs. / Week	Oral: 25 Marks
	Term Work: 25 Marks

UNIT- I:

Heat transfer by conduction in solids;

Fourier's law of heat conduction ,steady state heat conduction through walls (single and multilayer), heat flow through cylinder ,unsteady state heat conduction ,Derivation of Fourier's heat conduction equation in three dimensions , equation for one dimensional conduction , heat conduction through a semi infinite slab , lumped capacity method of unsteady state conduction . Principles of heat flow in fluids. (10 Hrs, 20 Marks)

UNIT-II:

Typical heat exchange equipment ,counter current and parallel flows, energy balances, overall heat transfer coefficient , log mean temperature difference, individual heat transfer coefficient, calculation of overall coefficient from individual coefficients , transfer units in heat exchangers. Heat transfer to fluids without phase change.
(10 Hrs, 20 Marks)

UNIT- III:

Regimes of heat transfer in fluids, heat transfer by forced convection in laminar and turbulent flow, dimensional analysis method, use of imperials equations heat transfer by forced convection outside tubes, natural convection.

Heat transfer to fluids with phase change.

Dropwise and film type condensation, coefficient for film type condensation, practical use of Nusselt's equations, application to petroleum industries (10 Hrs, 20 Marks)

UNIT- IV:

Heat transfer to boiling liquids:

Boiling of saturated liquids maximum flux and critical temperature drop, maximum Flux and film boiling.

Radiation heat transfer:

Fundamental of radiation, black body radiation, Kirchoff's law, radiant heat exchange between non black surfaces. Combined heat transfer by conduction, convection, radiation. (10 Hrs, 20 Marks)

UNIT- V:

Heat exchange equipments:

Heat exchanger single pass 1-1 exchanger, 1-2 shell and tube heat exchanger, correction for LMTD for cross flow, design calculation (Kern Method) in heat exchanger.

Evaporation:

Liquid characteristics and types of evaporator, single effect evaporator calculation, pattern of liquor flow in multiple effect evaporators. (10 Hrs, 20 Marks)

REFERENCES

1) W.L.McCabe and J.C.Smith , Unit operations in chemical engg. McGraw Hill/Kogakusha Ltd.
2) Coulson & Richardson , Chemical engg. – Volume. I , Pergamon Press
3) Kern D.Q. Process Heat Transfer, McGraw Hill Book 1NC New York, 1950
4) D.S.Kumar, Process Heat Transfer, S.K.Kataria and Sons Publisher, New Delhi

PRACTICALS

Term Work Shall be based on any 08 experiments mentioned below.

1) Conductivity of metals and / or insulator.
2) Experiment on Pin fins.
3) Experiment on forced convection apparatus.
4) Experiment on natural convection apparatus.
5) Determination of emmisivity of test plate.
6) Stefan Boltzman apparatus .
7) Parallel / counter flow heat exchanger.
8) Study of pool boiling phenomenon and critical heat flux.
9) Study of heat transfer in evaporator .
10) Temperature profile in a rod .
11) Study of evaporators .
12) Dropwise and filmwise condensation .

3. MASS TRANSFER-I

Teaching Scheme:
Lectures: 4 Hrs. / Week
Practical: 4 Hrs. / Week

Examination Scheme:
Paper: 100 Marks (3 Hrs)
Practical: 50 Marks
Term Work: 25 Marks

UNIT- I:
Introduction to mass transfer operations, Steady state molecular diffusion in fluid at rest, Multicomponent mixture diffusion, Maxwell's law of diffusion
Diffusion in solids, Unsteady state diffusion (10 Hrs, 20 Marks)

UNIT- II:
Eddy (turbulent) diffusion: Relation between mass transfer coefficients.
Mass transfer coefficient in laminar and turbulent flow
Theories of mass transfer
Equipments for gas liquid operation (10 Hrs, 20 Marks)

UNIT- III:
Equilibrium for mass transfer process.: Local two phase mass transfer
Local overall mass transfer coefficient, Use of local overall coefficient.
Material balances for steady state co current, countercurrent, cross flow cascade, counter flow cascade.
Application of mass transfer processes (10 Hrs, 20 Marks)

UNIT- IV:
Introduction to Gas Absorption Operation: Equilibrium solubility of gases in liquids
Material balance for one component transferred in countercurrent flow and co current flow
Countercurrent multistage operation, one component transferred
Continuous contact equipment
Introduction to multi component system
Absorption with chemical reaction
Different absorption operation equipments (plate tower, packed tower, venturiscrubber)
Operational difficulties like coning weeping, dumping, priming ,flooding in plate and packed tower. (10 Hrs, 20 Marks)

UNIT- V:
Introduction to Humidification: Vapour liquid equilibrium, Humidification terms
Determination of humidity, Humidification and dehumidification
Water cooling operation equipment
Introduction to Drying operation: Rate of drying, Mechanism of moisture movement during drying, Drying equipments, Different methods of drying (10 Hrs, 20 Marks)

PRACTICALS

Term Work Shall be based on experiments mentioned below.

1) Diffusion In Still Air: To estimate mass transfer coefficient for given system at room temperature.
2) Liquid – Liquid Diffusion: To determine diffusion coefficient for given system as function of concentration.
3) Solid – Liquid Diffusion: To determine mass transfer coefficient for dissolution of benzoic acid without chemical reaction.
4) Wetted Wall Column: To determine mass transfer coefficient for air – water system.
5) Absorption in Packed Column: To find mass transfer coefficient of given system.
6) Cooling Tower: To determine volumetric mass transfer coefficient for air – water system.
7) Natural Drying (Batch): To obtain drying curve for batch drying operation.
8) Fluidized Bed Dryer: To determine the rate of drying and to obtain mass transfer coefficient for the given material.

REFERENCES

1) R.E.Treybal , Mass transfer operation ,McGraw Hill Publication
2) Coulson & Richardson Chemical Engineering (Vol. I and II), Pergamon Press
3) Christie J.Geankoplis ,Transport Processes & Unit Operations ,Prentice Hall inc
4) P. Chattopadhayay ,Unit operation in Chemical Engg. (Vol. I and II), Khanna Publications Delhi

4. PROCESS EQUIPMENT DESIGN & DRAWING –I

Teaching Scheme:
Lectures: 4 Hrs./ Week
Term Work: 4 Hrs./ Week

Examination Scheme:
Paper: 100 Marks (3 Hrs)
Term Work: 50 Marks

UNIT- I:

Design Considerations: Design codes, Maximum working pressure, Design pressure, Design Temperature, Design stress, Factors of safety, Selection of factor of safety, Design wall thickness, Corrosion ratio, Poisson ratio, Criteria of failure, Elastic stability.
Materials of construction : Mechanical properties, Materials, Corrosion, Protective coating, Corrosion prevention, Choice of materials (10 Hrs, 20 Marks)

UNIT- II:

Keys: Introduction, Types of keys, Strength of sunk key, Effect of key ways, Design of keys
Design of Heads: Introduction, Analysis and design of conical head, Flat cover head, Standard dished heads.
Gaskets & Flanges: Introduction, Types of Gaskets & Flanges. (10 Hrs, 20 Marks)

UNIT- III:

Pipe joints: Standard pipe flanges for steam, Hydraulic pipe joints for high pressure, Introduction to gaskets and flanges, Design of circular flange pipe joints.
Welded Joints
Riveted joints
Storage vessels: Introduction, Design fixed conical roof cylindrical tank, Storage of gases in Spherical vessels
Supports for vessels: Introduction, Bracket or Lug supports, Leg Supports, Skirt Supports
(10 Hrs, 20 Marks)

UNIT- IV:

Design of Cylindrical Vessels under internal Pressure: Introduction, Thin wall vessels, Design Equations.
Design of process vessels and pipes under external pressure: Introduction, Determination of safe pressure against elastic failure, Determination safe external pressure against plastic deformation, Circumferential stiffness, Pipes and tubes under external pressure.
(10 Hrs, 20 Marks)

UNIT- V:

Process Hazards and Safety Measures in Equipment Design: Introduction, Hazards in Process Industries, Hazards Analysis, Safety Measures, Safety Measures in Equipment Design, Pressure relief Devices
Design of packed absorption tower: Introduction, Design of circular & diameter of Packed Absorption Tower (10 Hrs, 20 Marks)

TERM WORK:

The term work shall consist of drawing of at least 8 half imperial size sheets from the following

1) Standard equipment symbols

2) Standard instrumentation symbols

3) Pipe fittings

4) Heads and closures

5) Keys and couplings

6) Pressure relief devices

7) Supports for vessels-Bracket Support

8) Supports for vessels-Leg Support

9) Supports for vessels-Skirt Support

10) Design and drawing of packed absorption tower

11) Riveted joints

12) Welded joints

REFERENCES:

1 B.C. Bhattacharya, Introduction to Chemical Equipment Design (Mechanical Aspects), CBS Publisher and Distributors, New Delhi.

2 M.V.Joshi, V.V. Mahajan, Process Equipment Design, 3rd Edition, Macmillan India Ltd.

3 Coulson & Richardson, Chemical Engineering (Vol. VI), Pergamon Press

4 R. S. Khurmi, J.M. Gupta, A Text Book of Machine Design, S. Chand & Company Ltd, New Delhi.

5 S.D. Dawande, Process Design of Equipments (Vol. I),Central Techno Publications, Nagpur.

5. CHEMICAL ENGINEERING THERMODYNAMICS

Teaching Scheme: Examination Scheme:
Lectures: 4 Hrs./ Week Paper: 100 Marks (3 Hrs)

UNIT- I :
Fundamental Concepts : Introduction to the subject, The laws of Thermodynamics, Cyclic rule, Coefficient of Thermal Expansion, Compressibility Coefficient
First Law of Thermodynamics : Basic Laws, Law of corresponding state, Heat Capacities, Variation of energy with Temperature and Volume, Enthalpy as a function of Temperature & Pressure, Joule-Thomson Coefficient Relation between Cp and Cv, Thermodynamic relations, Generalized Equation of State, Redlich-kwong equation of state, Soave-Redlich-Kwong equation of state. (10 Hrs, 20 Marks)

UNIT- II :
The Second Law of Thermodynamics: Introduction, Mathematical Treatment of Entropy Concept, Combined form of First and Second Law of Thermodynamics, Thermodynamic Relations based on Second Law of Thermodynamics, Calculations of Entropy Changes, Third Law of Thermodynamics. (10 Hrs, 20 Marks)

UNIT- III :
Multicomponent Mixture: Partial Molar Quantities: General Aspects, Determination of Partial Molar Volume, Determination of Partial Molar Enthalpy, Fugacity and Fugacity Coefficient, Fugacity coefficient through equation of state, Fugacity coefficient through virial coefficient correlation.
Properties of Solutions: Ideal solution: General Aspects, Phase equilibrium: General Aspects, Gibbs-Duhem Equation, Gibbs-Duhem-Margules Equation, Application of Gibbs-Duhem Equation, Application of Gibbs-Duhem-Margules Equation. (10 Hrs, 20 Marks)

UNIT- IV :
Vapour-Liquid Equilibria (VLE) : Basic equations for VLE, Reduction of VLE data, VLE at low to moderate pressure, Excess Gibbs free energy Model, Margules Equation & Van Laar Equation, Thermodynamic consistency test of VLE data
Phase Equilibria for Single Component System: Gibbs-Helmholtz Equation, The Clapeyron Equation, Clausious-Clapeyron Equation, Application of Clapeyron Equation.
(10 Hrs, 20 Marks)

UNIT- V:
Chemical Reaction Equilibria: The criteria for chemical equilibrium, Equilibrium constant, Law of chemical equilibrium, Thermodynamic treatment of the law of mass action, Van't Hoff reaction isotherm, Relations between equilibrium constant, Homogeneous gaseous equilibria, Temperature dependence of the equilibrium constant (The Van't Hoff Equation), Integrated form of the Van't Hoff equation, Pressure dependence of the equilibrium constant.
Applications of Phase Equilibrium in Ideal Solutions: To construct pressure-composition and boiling point diagrams. (10 Hrs, 20 Marks)

REFERENCES:

1 Y.V.C. Rao, Chemical Engineering Thermodynamics, University Press (INDIA) Ltd., Orient Longman Ltd., Hyderabad.
2 K.V. Narayanan, A Text book of Chemical Engineering Thermodynamic, Prentice Hall India Pvt. Ltd., New Delhi.
3 R.R.Rastogi and R.R.Mishra, An Introduction to Chemical Thermodynamics, Vikas Publishing House Pvt.Ltd, New Delhi.
4 D.Shrinivasan, Chemical Engineering Thermodynamics, New Age International Publisher New Delhi.
5 G.N. Pandey and J.C.Chaudhari, Chemical Engineering Thermodynamics, Khanna Publishers, Delhi.
6 J.M.Smith, H.C.Vanness, M.M.Abbott Introduction to Chemical Engineering Thermodynamics, 5th edition, McGraw Hill International Editions.
6 B.G.Kyle, Chemical and Process Thermodynamics, Prentice Hall India Pvt. Ltd., New Delhi.

1. INSTRUMENTATION & INSTRUMENTAL ANALYSIS

Teaching Scheme:
Lectures: 4 Hrs. / Week
Practical: 2 Hrs. / Week

Examination Scheme:
Paper: 100 Marks (3 Hrs)
Oral: 25 Marks
Term Work: 25 Marks

UNIT- I :
Qualities of Measurement: The meaning of measurement, The elements of instruments, Static Characteristics, Dynamic characteristic.
Expansion Thermometers: Introduction, Temperature scales, Constant volume gas Thermometer, Bimetallic Thermometer, Industrial pressure spring thermometer, Response of Thermometer. (10 Hrs, 20 Marks)

UNIT- II :
Thermoelectric Temperature Measurement: Introduction, Simple thermocouple circuit, Industrial thermocouples, Thermocouple lead wires, thermal wells, response of thermocouples.
Resistance Thermometer : Introduction, Industrial resistance-thermometer bulbs, Resistance thermometer element, Resistance thermometer circuit, RTD. (10 Hrs, 20 Marks)

UNIT- III:
Radiation Temperature Measurement: Introduction, Black body conditions, Black body devices, Radiation receiving elements, Thermopile, Vacuum thermocouples, Radiation pyrometers , Lens type thermal radiation receiver , Photoelectric pyrometers, Photoelectric radiation receiver, Optical pyrometer.
Pressure and Vacuum Measurement: Introduction, Indicating pressure gage, Bellows pressure element, Useful ranges of absolute pressure measuring gages, Mclead vacuum gage.
Measurement of Pressure’s in Corrosion Fluids: The steam gage siphon, Diaphragm seal in Pressure measurement, Liquid seal in pressure measurement, Response of mechanical pressure gages. (10 Hrs, 20 Marks)

UNIT- IV:
Measurement of Level: Float and tape liquid level gage, Float & shaft liquid level unit, Level measurement in pressure vessels, Gamma ray method, Ultrasonic method & resistive method.
Introduction, Theory, Instrumentation, advantages, and Application of: pH measurement, Refractrometry, Potentiometry, colourometry and Flame photometry.(10 Hrs, 20 Marks)

UNIT- V:
Introduction, Theory, Instrumentation, Advantages and Application of: Gas chromatography, Thin layer chromatography, Amerometric titration, Infrared spectrography, Atomic absorption spectrography.
Introduction to turbidimetry, Karl-Fischer titrimetry, Conductometric titrations and HPLC.
(10 Hrs, 20 Marks)

PRACTICAL and TERM WORK:

Practical and Term work shall consist of minimum eight experiments given below.
1) To study the response of bimetallic thermometer.
2) Calibration of thermocouple.
3) To measure the PH of given solution.
4) To measure the conductance of given solution.
5) To determine concentration of given solution by colorimeter
6) Flame photometry
7) Thin layer chromatography
8) Paper chromatography
9) Abbey's refractometer

REFERENCE:

1. D.P.Eckman, Industrial Instrumentation, Willey Eastern Ltd., New Delhi.
2. Fatranabis D. Industrial Instrumentation, Tata – Mcgraw Hill Publications, New Delhi.
3. Gurdeep Chatwal and sham Anand, Instrumental methods of Chemical analysis, Himalaya publication House, Mumbai.
4. V.P. Kudesia and S.S. Sawhaney, Instrumental methods of chemical analysis Pragati Prakashan, P.O.Box No. 62, Begum Bridge,Meerut250001,U.P.
5. Nakra B.C. and K.K. Chaudhary, Instrumentation Measurement & Analysis, Tata – McGraw Hill, New Delhi.
6. Dr. B.K.sharma.Goel, Instrumentation methods of chemical analysis, Publishing House,11,Shivaji Road, Meerut-250001,U.P.

2. CHEMICAL REACTION ENGINEERING-I

Teaching Scheme:
Lectures: 4 Hrs./ Week
Practical: 2 Hrs./ Week

Examination Scheme:
Paper: 100 Marks (3 Hrs)
Oral: 25 Marks
Term Work : 25 Marks

UNIT-I :
Introduction to chemical reaction engineering: Review of chemical reaction equilibrium, Classification of chemical reaction, rate of reaction, order and molecularity of reaction, rate constant, Temperature dependent term of rate equation, comparison of theories, Activation energy and temperature dependency, rate of reaction predicted by theories, Reaction mechanism. **(10 Hrs, 20 Marks)**

UNIT- II :
Collection & interpretation of kinetic data, Constant volume batch reactor, integral and differential method of analysis of data, Variable volume batch reactor , integral and differential method of analysis of data, The search for rate equation. **(10 Hrs, 20 Marks)**

UNIT- III :
Ideal batch reactor ,mixed flow reactor ,plug flow reactor, space time and space velocity, holding time and space time for batch , mixed and plug flow reactors, comparison in mixed and plug flow reactors, Combined flow system, Recycle reactor, Autocatalytic reaction.
(10 Hrs, 20 Marks)

UNIT- IV :
Introduction to multiple reactions: Reaction in parallel, Reaction in series, Series parallel reaction. Optimum temperature progression for single reaction, Isothermal, adiabatic, non adiabatic operation. Product distribution and temperature for multiple reactions.
(10 Hrs, 20 Marks)

UNIT- V :
Residence time distribution of fluid in vessel, Conversion directly from tracer information, Models for non-ideal flow, Dispersion models, Tank in series model, Concept of micro and macro mixing. **(10 Hrs, 20 Marks)**

PRACTICAL and TERM WORK:
Practical and Term work shall consist of minimum eight experiments from list given below.

1) To determine the reaction rate constant {k} for given reaction.(CSTR / BATCH / SEMIBATCH / PFR)
2) To determine the effect of temperature on reaction rate constant. .(CSTR / BATCH / SEMIBATCH / PFR)
3) To determine the activation energy {E} for the given reaction. .(CSTR / BATCH / SEMIBATCH / PFR)

4) To draw C [t], E [t] & F [t] curve and to calculate the mean residence time {tm} variance { σ^2} and skew ness { S^3} for plug flow reactor.
5) To draw C [t], E [t] and F [t] curve and to calculate the mean residence time {tm} variance { σ^2} and skew ness { S^3} for packed Bed reactor.
6) To study the cascaded CSTR
7) To draw C [t], E [t] and F [t] curve and to calculate the mean residence time {tm} variance { σ^2} and skew ness {S^3} for Annular reactor.
8) To study the kinetic in tubular flow reactor [coiled tube] for the given reaction.

REFERENCE:

1. Octave Levenspiel, Chemical reaction engineering, John Wiley and sons.
2. J.M. Smith, Chemical engineering kinetics, McGraw Hill
3. S.D. Dawande, Principles of reaction engineering, Central Techno publication, Nagpur.
4. H.Scott Fogler, Elements of chemical reaction engineering, Prentice Hall New Jersy
5. Lanny D. Schimdt , Chemical reaction engineering, Oxford University Press.

3. MASS TRANSFER-II

Teaching Scheme:
Lectures: 4 Hrs. / Week
Practical: 4 Hrs. / Week

Examination Scheme:
Paper: 100 Marks (3 Hrs)
Practical: 50 Marks
Term Work: 25 Marks

UNIT- I :
Introduction to distillation process, Vapor liquid equilibrium, The methods of distillation (Binary mixture), The fractionating column, Condition for varying overflow in non- ideal system(Binary), Batch distillation, Multi component mixture, Azeotropic, extractive and steam distillation, Introduction to distillation equipments. (10 Hrs, 20 Marks)

UNIT- II :
Introduction to extraction process, Liquid equilibria, Material balances for stage wise contact methods, Extraction with reflux, Fractional extraction, Stage contact and continuous contact type extractors. (10 Hrs, 20 Marks)

UNIT- III:
Introduction to crystallization, Growth and properties of crystals, Effect of impurities in crystallization, Effect of temp. on solubility, Fractional crystallization, Caking & yield of crystals, Different type of crystallizes. (10 Hrs, 20 Marks)

UNIT- IV:
Introduction to adsorption operation, Type of adsorption operation, Nature of adsorbents, Adsorption equilibria, Adsorption of vapor, gas mixture and liquids, Material balances for stage wise for operation, Continues contact process for adsorption, Unsteady state fixed bed adsorbed, Principle of ion exchange operation, Equilibria for ion exchange operation, Rate of ion exchange operation, Application of ion exchange operation. (10 Hrs, 20 Marks)

UNIT- V:
Introduction to leaching operation, Mass Transfer in leaching operation, Calculation of of stages for diff. Processes, Graphical method for calculation of no. of stages counter current washing process, Equipments for leaching operation, Introduction to membrane separation process, Different Types of membrane separation process, (Ultrafiltreation , Reverse Osmosis, Dialysis, Electro Dialysis, Pervaporation), General membrane equation, Liquid membrane (10 Hrs, 20 Marks)

TERM WORK:
Any eight experiments based on the above syllabus.

1. Simple Distillation: To verify Rayleigh’s equation for simple distillation
2. Ternary Diagram: To construct ternary diagram for acetic acid –water – benzene
3. Tie Lines
4. Liquid – Liquid Extraction: To study and determine the efficiency of cross current liquid- liquid extraction.

5. Leaching
6. Crystallization
7. Adsorption: To study adsorption of acidic acid on activated charcoal
8. Determination of HTU, HETP and NTU
9. Spray Column
10. Ion Exchange
11. Bubble Cap Distillation
12. Study Of Mass Transfer Equipments

REFERENCES:

1) Coulson and Richardson, Chemical Engineering (Vol. II), Pergamon Press
2) RE. Tryebal, Mass Transfer Operation, McGraw hill.
3) Christie J. Geankoplis ,Transport Processes and Unit Operations ,Prentice Hall inc
4) P. Chattopadhyay, Unit operations in Chemical Engg. Vol. I and II, Khanna Publication, New Delhi.

4. PROCESS EQUIPMENT DESIGN & DRAWING –II

Teaching Scheme:	Examination Scheme:
Lectures: 4 Hrs./ Week	Paper: 100 Marks (3 Hrs)
Term Work : 4 Hrs./ Week	Term Work: 50 Marks

UNIT- I:

Process Design of Heat Exchanger: Introduction, Types Of Heat Exchanger, Process Design of Shell and Tube Heat Exchanger.

Process Design of Evaporator: Introduction, Types of Evaporators, Methods of Feeding of Evaporators, Design of Evaporator **(10 Hrs, 20 Marks)**

UNIT- II:

Process Design of Reaction Vessels: Introduction, Materials of Construction, Agitation, Classification of Reaction Vessels, Heating Systems, Design of Reaction Vessels.

Crystallizer Design: Introduction, Types of Crystallizers, Design of crystallizers.

(10 Hrs, 20 Marks)

UNIT- III:

Process Design of Rotary Dryer: Introduction, Types Dryers, Design of Rotary Dryer.

Design of Tall Vessels :Introduction, The Axial Stresses Due To Dead Loads, The Axial Stresses Due To Pressure, Longitudinal Bending Stresses due to Dynamic Loads, Design Of Distillation (Tall) Column (Tower). **(10 Hrs, 20 Marks)**

UNIT- IV:

Design of Sieve Tray for Distillation Column

Design of Thick Walled High Pressure Vessel **(10 Hrs, 20 Marks)**

UNIT- V:

Design of Bubble Cap Tray For Distillation Operation

Agitators : Introduction, Types Of Agitators, Baffling, Power Requirements, Design Of Turbine Agitator. **(10 Hrs, 20 Marks)**

TERM WORK:

The Term Work shall consist of process design and drawing of equipments on at least five half imperial sized sheets. Based on the above syllabus.

REFERENCES:

1) B. C. Bhattacharya, Introduction to Chemical Equipment Design (Mechanical Aspects) CBS Publisher & Distributors, New Delhi.
2) M.V.Joshi, V.V. Mahajan, Process Equipment Design, 3rd Edition, Macmillan India Ltd.
3) Coulson & Richardson, Chemical Engineering (Vol VI), Pergamon Press.
4) R.E.Treybal, Mass Transfer Operations, McGraw Hill, New Delhi.
5) S.D. Dawande, Process Design of Equipments (Vol. 1& 2) Central Techno Publications, Nagpur.
6) G.K.Roy, Solved Problems In Chemical Engg., Khanna Publications, NewDelhi.
7) J.H.Perry, Chemical Engineer's Hand Book, McGrawhill, New Delhi.

5. MATHEMATICAL METHODS IN CHEMICAL ENGINEERING

Teaching Scheme: Examination Scheme:
Lectures: 4 Hrs./ Week Paper: 100 Marks (3 Hrs)

UNIT- I:
Root Finding Methods : Bisection Method, Regula-falsi Method, Newton-Raphson Method, Direct Integration Method, Muller's Method.
Solution Of Simultaneous Linear Equation: Gauss Elimination Method, Matrix Inversion Method, Gauss Jordan Method, Jacobi's Iteration Method, Gauss Seidal Method
(10 Hrs, 20 Marks)

UNIT- II:
Interpolation & Extrapolation: Newtons-Gregory Forward Interpolation Formula, Newtons-Gregory Backward Interpolation Formula, Stirling's Formula, Central Difference Interpolation Formula, Choice of an Interpolation Formula.
Linear Programming (L.P.) : Introduction To L.P., Formulation Of L.P. Problems (L.P.P)/L.P. Models. Solution Of L.P.P. by Analytical Method (containing two variables), Solution Of L.P.P. By Graphical Method (10 Hrs, 20 Marks)

UNIT- III :
Chemical Engineering Optimization-I : The Optimum Diameter To height ratio for Large Oil Storage Vessel for Cost Minimization, Optimization of diameter and length of heat exchanger, Optimization of dimensions of an open rectangular Tank, Optimum thickness of insulation, Optimization of outlet temperature for counter-current arrangement in heat exchanger (10 Hrs, 20 Marks)

UNIT- IV:
Solution of L.P.P. with application of simplex technique.
Chemical engineering optimization-II : Optimum (economical) pumping temperature for pumping of oil, Optimization of dimension of rotary dryer, Optimum dimensions and optimum outlet temperature of air preheater, Optimization of kinetics of consecutive reactions (10 Hrs, 20 Marks)

UNIT- V:
Chemical engineering optimization-III : Optimum residence time for maximum yield in ideal isothermal batch reactor, optimization in refinery blending operation, optimization to get max. yield with respect to reactor volume, optimization of dimensions of straight rectangular Fin, optimization of performance of batch reactor with two consecutive reactions (by considering optimum Steam flow rate), optimum temperature approach and optimum Velocity (by considering process heat transfer approach), optimum proportions of a pressure vessel, optimum size of pressure vessels. (10 Hrs, 20 Marks)

REFERENCE:
1. T.F.Edgar and B.M.Himellblau optimization of chemical processes, International Edn.1989 McGraw hill
2. B.S.Grewal, Higher engineering mathematic, Khanna Publisher,Newdelhi
3. P.K.Gupta and D.S.Hira, Operation research 1st edition reprint 1997, S.Chand& com. NewDelhi.
4. S.S.Sastry; Introduction To methods Of Numerical Analysis, Prentice Hall.
5. B.S. Grewal Numerical Methods In Engg. & Science, Khanna Publications; Delhi
6. G.K.Roy, Solved Problems In Chemical Engg., Khanna Publications, NewDelhi.

6. PRACTICAL TRAINING / MINI PROJECT / SPECIAL STUDY

Examination Scheme:
Term Work: 25 Marks

- Every student has to undergo industrial/practical training for a minimum period of two weeks during summer vacation between (S.E Second Term) fourth and (T.E. First Term) fifth term or during winter vacation between fifth and sixth term (T.E. First Term and Second Term).
- The industry in which practical training is taken should be a medium or large scale industry.
- The paper bound report on training must be submitted by every student in the beginning of (T.E. Second Term) sixth term along with a certificate from the company where the student took training.
- The report on training should be detailed one.
- Maximum number of students allowed to take training in company should be five. Every student should write the report separately.
- In case if a student is not able to undergo practical training , then such students should be asked to prepare special study report on a recent topic from reported literature

  Or

  a mini project related to the Chemical Engineering.

  1. Preparation of Chemical Compound and study of its properties.
  2. Kinetics of different types of reactions.
  3. Analysis of Natural Products, Chemical Products etc.

  Project report should be detail be detail of work, carried out by student.
- The practical training/special study/ mini project shall carry a term work of 25 marks. Every student shall be required to present a seminar in the respective class in the presence of two teachers. These teachers (fixed by the head of department in consultation with the Principal) shall award marks based on the following :

(a)	Report	10 marks
(b)	Seminar presentation	10 marks
(c)	Viva-voce at the time of Seminar presentation	05 marks

	Total	25 marks

============XXXXX==========

NORTH MAHARASHTRA UNIVERSITY,

JALGAON (M.S.)

FINAL YEAR ENGINEERING (B.E.)

CHEMICAL ENGINEERING

TERM – I & II

W.E.F. 2008-2009

NORTH MAHARASHTRA UNIVERSITY, JALGAON

STRUCTURE OF TEACHING & EVALUATION

B.E. (CHEMICAL ENGINEERING) W.E.F.2008-2009

First Term

Sr. No.	Subject	Teaching Scheme Hours/Week		Examination Scheme				
		Lectures	Practical	Paper Duration Hours	Paper	TW	PR	OR
1	Process Dynamics & Control	04	02	03	100	25	--	25
2	Transport Phenomenon	04	--	03	100	--	--	--
3	Chemical Reaction Engineering-II	04	04	03	100	50	--	25
4	Elective –I	04	--	03	100	--	--	--
5	Energy Engineering	04	02	03	100	25	--	25
6	Project –I	--	02	--	--	25	--	25
7	Seminar	--	02	--	--	25	--	--
		20	12		500	150	--	100
	Grand Total	32			750			

Second Term

Sr. No.	Subject	Teaching Scheme Hours/Week		Examination Scheme				
		Lectures	Practical	Paper Duration Hours	Paper	TW	PR	OR
1	Computer Aided Process Equipment Design Modeling & Simulation	04	04	03	100	50	25	--
2	Process Engineering Economics & Costing	04	02	03	100	25	--	25
3	Chemical Plant Design & Project Engineering	04	04	03	100	25	--	25
4	Elective –II	04	--	03	100	--	--	--
6	Project –II	--	04	--	--	100	--	50
7	Industrial Visit / Case Study	--	--	--	--	25	--	--
		16	14		400	225	25	100
	Grand Total	30			750			

Subjects:

Elective-I
1. Biochemical Engineering
2. Polymer Engineering
3. Advance Catalysis

Elective-II
1. Industrial Pollution & Control
2. Advance Separation Techniques
3. Petrochemicals

1. PROCESS DYNAMICS & CONTROL

Teaching Scheme:
Lectures: 4 Hrs./ Week
Practical: 2 Hrs./ Week

Examination Scheme:
Paper: 100 Marks (3 Hrs)
Oral : 25 Marks
Term Work: 25 Marks

UNIT- I
Characteristics of Chemical Process Control, Mathematical Modeling of Chemical Processes, State Variables and State Equation for Chemical Processes.
Input –Output Model, Linearization of non linear systems, Solution of Linear differential equation using Laplace Transform.
First order system and their transfer functions.
(10 Hrs, 20 Marks)

UNIT- II
Dynamic behavior of first order system , Pure capacity process, First order system with variable time constant and gain, Response of first order system in series :Interacting and Non-interacting.
Second order system and their transfer function.
(10 Hrs, 20 Marks)

UNIT- III
Dynamic behavior of second order system: under damped and over damped and critically damped systems, Transportation lag.
Higher order systems.
Introduction to feedback control, Controllers and final control elements.
Control action block diagram of chemical reactant control systems.
(10 Hrs, 20 Marks)

UNIT- IV
Dynamic behavior of feedback control processes: P, PD, PI, and PID.
Design of feedback controller: Performance criteria, selection of type of controller, Tuning of feedback controller.
Stability analysis by Routh criteria, Root Locus Diagram
(10 Hrs, 20 Marks)

UNIT-V
Frequency response analysis of linear processes: Bode's diagram, Nyquist plots.
Design of feedback control system using frequency response technique: Bode's stability criteria, gain and phase margin.
Ziegler – Nichols tuning technique. Nyquist stability criteria,
Control Systems with Multiple Loops: Feed forward control, Cascade control, Ratio control, selective control, split range control, Adaptive and Inferential control. Multi Variable Control
(10 Hrs, 20 Marks)

PRACTICAL and TERM WORK:
Practical and Term work shall consist of minimum eight experiments from list given below.
Dynamic behavior of first order system
1. Mercury Thermometer
2. Single tank system.
3. C.S.T.R.

Dynamic behavior of first order system in series
4. Two tank non-interacting system.

5. Two tank interacting system.

Dynamic behavior of second order system

6. Mercury Manometer

Dynamic behavior of final control Element

7. Pneumatic control valve.

Study of Pneumatic controllers.

8. Proportional Controller
9. Proportional Derivative Controller
10. Proportional Integral Controller
11. Proportional Integral Derivative Controller

Control Systems

12. Study of closed loop control system.

REFERENCES

1. George Stephanpolous, Chemical Process Control, Prentice Hall of India.
2. D.R. Coughnour, Process System Analysis and Control, McGraw-Hill.
3. R.P.Vyas, Process Control & Instrumentation {2nd edition}. Central Techno publication, Nagpur.
4. K. Krishnaswamy, Process Control, New age International.

2. TRANSPORT PHENOMENON

Teaching Scheme: Examination Scheme:

Lectures: 4 Hrs./ Week Paper: 100 Marks (3 Hrs)

UNIT-I

Introduction. Transport phenomenon and Unit Operation.

Equilibrium and Rate Processes. Fundamental variables and Unit The role of Intermolecular forces.

Simple Balance: Material and Energy.

Molecular transport Mechanism:

The Analogy. The Case of Heat Transfer. The Case of Mass Transfer. The Case of Momentum Transfer. The Analogues forms. Heat, Mass, Momentum Diffusivities. Thermal Conductivity. Diffusion Coefficient. Viscosity.

(10 Hrs, 20 Marks)

UNIT-II

Viscosity and Mechanism of Momentum Transport.

Velocity Distribution in Laminar Flow.

(10 Hrs, 20 Marks)

UNIT-III

Thermal Conductivity and The Mechanism of Energy Transport.

Temperature Distribution in Solids and in laminar Flow.

(10 Hrs, 20 Marks)

UNIT-IV

Diffusivity and Mechanism of mass Transport.

Concentration Distribution in Solids and in Laminar Flow.

(10 Hrs, 20 Marks)

UNIT-V

The Equation of Change for Isothermal System.

The Equation of Change for Non-Isothermal System.

(10 Hrs, 20 Marks)

REFERENCES

1. R.B.Bird; W.E.stewart; E.N.Lightfoot, Transport Phenomenon, John Wiley & Sons1994; Singapore
2. R.S.Brodsky & H.C.Hershey, Transport Phenomenon ,McGraw-Hill{International edition}
3. C.O.Bennett & J.E.yers; Momentum, Heat & Mass Transfer; McGraw-Hill1982.
4. James R. Welly, Charles E. Wicks & Robert E.Wilson; Fundamentals of Momentum, Heat & Mass Transfer{3rd edition}. John Wiley & Sons; Singapore

3. CHEMICAL REACTION ENGINEERING – II

Teaching Scheme:	Examination Scheme:
Lectures: 4 Hrs. / Week	Paper: 100 Marks (3 Hrs)
Practical: 4 Hrs. / Week	Oral : 25 Marks
	Term Work: 50 Marks

UNIT-I

Introduction – Rate equations for heterogeneous systems , Contacting patterns in Two –Phase system ,Introduction to fluid particle reaction non-catalytic reactions, unreacted core model for Spherical particle of unchanging size, Rate of reaction for shrinking spherical particles , Determination of rate controlling step , Various contacting patterns in fluid solid reactors for fluid-particle non-catalytic reactions

(10 Hrs, 20 Marks)

UNIT-II

Introduction to fluid-fluid system (without catalyst), Rate equation for Instantaneous, Fast, Intermediate and slow reaction, Slurry Reaction kinetics, Rate equation for infinitely slow reaction Film conversion parameter , Reactors for gas-liquid reactions and their comparative evaluations on the basis of holdups .

Gas liquid reaction modeling on the basis of simultaneous absorption reaction model.

Aerobic fermentation, Tower for fast and slow reaction, Mixer settler and semi-batch contacting pattern .

Reactive distillation and extractive reaction.

(10 Hrs, 20 Marks)

UNIT-III

Introduction , Classification , Characteristics , Preparation and Deactivation of catalyst , Promoters and inhibitors , Determination of surface area and Pore volume of catalyst , Adsorption process and its classification , Types of adsorption isotherm .

(10 Hrs, 20 Marks)

UNIT-IV

Introduction to solid catalyzed reactor , Rate equation for adsorption , desorption and surface reaction, Diffusion and reaction in spherical catalyst pellets , Internal effectiveness factor, Over all effectiveness factor, Estimation of diffusion and reaction limited regimes, Mass transfer and reaction in a packed bed, The determination of limiting situation from reaction data, chemical vapor deposition reactors.

(10 Hrs, 20 Marks)

UNIT-V

Introduction to heterogeneous catalytic reactors,

Design, Mechanical construction and applications of: Moving bed reactors, Fluidized bed Reactors, Slurry bed reactors, Trickle bed reactors, Isothermal and Adiabatic fixed bed reactor.

(10 Hrs, 20 Marks)

REFERENCES

1. Octave Levenspiel , Chemical Reaction Engg" 3rd edition (1999)
2. H Scott Fogler, Elements of Chemical Reaction Engineering, Prentice Hall of India , 2nd edition (1997)
3. J M Smith, Chemical Engg Kinetics 3rd edition , New York , McGraw Hill (1981)
4. Lanny D Schmidt , The Engineering of Chemical Reactions ,Oxford University Press (1998)
5. Froment and Bischoff , Chemical Reactor Analysis and Design, Wiley Publications , New York (1979)
6. Hiroo Tominaga and Masakazu Tamaki, Chemical reactions & reactor design Ed Wiley and Maruzene Publications(1997)

PRACTICAL and TERM WORK:

Practical and Term work shall consist of eight experiments from list given below.

1. To study the reaction of solid liquid system for an instantaneous reaction for benzoic acid NaOH and calculate the enhancement factor.
2. To study the isothermal decomposition of ethyl alcohol in tubular reactor packed with activated alumina catalyst.
3. To improve the % purity of commercially used ethanol using reactive distillation.
4. To improve the % purity of commercially used ethanol using extractive distillation.
5. To carry out the catalytic reaction to convert the nitrobenzene to aniline in presence of iron filling/HCl catalyst in the reactor.
6. To study the reaction of liquid liquid system for butyl acetate NaOH and to calculate the enhancement factor.
7. Absorption – to study the reaction of liquid gas system for NaOH – CO_2 to determine rate of absorption.
8. Adsorption- to study the adsorption of Acetic acid on charcoal
9. Preparation of Butyl Acetate by Reactive Esterification

4. ELECTIVE – I
1. BIOCHEMICAL ENGINEERING

Teaching Scheme:	Examination Scheme:
Lectures: 4 Hrs./ Week	Paper: 100 Marks (3 Hrs)

UNIT-I:

Characteristics of Biological material. Types of microorganisms; general physical properties of cells and chemical composition of cells; requirement for growth of cells and formulation of media; reproduction cycles in microorganisms; changes in composition of cells with age and with growth rate; effect of substrate limiting growth on the composition of cells; strain breeding; Maintenance of pure cultures.

Material Balances in bioprocesses, Application of material balances to bioprocesses; material balance with recycle, by-pass and purge streams. Stoichiometry of growth and product formation. Thermodynamics of microbial growth. Energy balances in bioprocesses, Heat of reaction for processes with biomass production. Unsteady state energy and material balances in bioprocesses.

(10 Hrs, 20 Marks)

UNIT-II:

Enzymes. History. Enzyme nomenclature and classification. Properties of enzymes. Applications of enzymes. Enzyme substrate complex and enzyme action. Effect of Temperature and pH on enzyme activity.

Kinetics of enzyme catalyzed reaction; simple enzyme kinetics with one and two substrates; Michaelis Menten kinetics. Evaluation of parameters of Michaelis Menten equation. Kinetics of reversible enzyme catalyzed reaction. Enzyme inhibition. Types of enzyme inhibition. Kinetics of competitive, uncompetitive and noncompetitive enzyme inhibition. Substrate activation and inhibition. Multiple substrates reacting on a single enzyme. Immobilization of enzymes and their applications. Kinetics of immobilized enzyme system.

(10 Hrs, 20 Marks)

UNIT-III:

Microbial Kinetics: Monod's growth kinetics. Environmental effects on growth kinetics. Balanced growth kinetics, Transient growth kinetics, Unstructured batch growth model, Growth of filamentous organisms, Structured kinetic model, Product formation kinetics. Unstructured model. Chemically structured kinetic model, Product formation kinetics by filamentous organisms.

Reactor Cofigurations: Enzyme reactors, Batch growth of microorganisms, Continuous culture of microorganisms, Stirred tank reactor with recycle of biomass, Continuous stirred tank fermenters in series, plug flow fermenter, fed batch fermenter, CSTR cell reactors with recycle and wall growth, multiphase reactors such as packed bed reactors, bubble column reactors, fluidized bed reactors and trickle bed reactors.

(10 Hrs, 20 Marks)

UNIT-IV:

Sterilization: Importance of Sterilization. Batch Sterilization of liquids, continuous sterilization of liquids, filter sterilization of liquids, sterilization of air, thermal death kinetics of cells and sports.

Aeration and Agitation: Mass transfer and Microbial respiration, bubble aeration and mechanical agitation, correlation between oxygen transfer coefficient and operating variables, effect of temperature, organic substances, surface active agents, mycelium and types of sparger on oxygen transfer coefficient. Measurement of oxygen transfer coefficient, Scale up.

(10 Hrs, 20 Marks)

UNIT-V:

Recovery of fermentation products, principle of mechanical separation; hindered settling in gravitation and centrifugal fields, filtration, pretreatment of cells to alleviated filtration resistance; Disruption of cells, mechanical methods, ultrasonic vibrations, grinding and mechanical shear, shearing by pressure, induction by lysis(physical methods, lytic agents, dessication, increasing the fragility of cells, Extraction preliminary fractionation procedures(removal of nucleic acids precipitation),high resolution techniques(ultra filtration, Chromatography, counter current distribution methods and other means).

Instrumentation and Control: Introduction, methods of measuring process variables; temperature measurement and control, pressure measurement and control ,foam sensing and control, weight of fermenter and estimation of microbial biomass, dissolved oxygen measurement and control, inlet and exit gas analysis, pH measurement and control, online analysis of other chemical factors and computer applications in fermentation technology, bioprocess economics.

(10 Hrs, 20 Marks)

REFERENCES

1. Shuichi Aiba, Arthur E.H. & Nancy F.M.,Biochemical Engineering; University of Tokyo Press.

2. James E.Bailey & David F.Ollis, Biochemical Engineering. Fundamentals; McGraw Hill Publication.
3. P.F.Stanbury, A.Whitaker & S,J.Hall, Principles of Fermentation Technology; Aditya Books Ltd; New Delhi.
4. Doran Pauline M. Bioprocess Engineering Principles, Academic Press. An Imprint of Elsevier.
5. Shular Michael L.and Kargi Fikret. Bioprocess Engineering Basic Concepts, Prentice Hall of India.
6. Editors: J.F. Richardson, D.G. Peacock, Coulson's & Richardson's Chemical Engineering, (Vol-III) Asian Books Pvt. Ltd. New Delhi
7. J.H. Backhurst& J.H.Harker, Coulson's & Richardson's Chemical Engineering(Vol-V) Asian Books Pvt. Ltd. New Delhi

4. ELECTIVE – I
2. POLYMER ENGINEERING

Teaching Scheme:	Examination Scheme:
Lectures: 4 Hrs./ Week	Paper: 100 Marks (3 Hrs)

UNIT-I:

Introduction to polymer and their classification. Types of polymerization. Addition Polymerization and Condensation Polymerization. Mechanism of polymerization.

Bulk, solution, suspension and emulsion polymerization techniques; merits, demerits and applications of these techniques.

(10 Hrs, 20 Marks)

UNIT-II:

Kinetics of polymerization: Kinetics of free-radical chain polymerization via initiation; propagation and Termination. Degree of polymerization and chain transfer reactions. Kinetics of catalyzed and uncatalyzed polycondensation reactions. Molecular Weight distribution; extent of reaction and degree of polymerization of polycondensation reactions.

(10 Hrs, 20 Marks)

UNIT-III:

Introduction to average molecular weight and Molecular Weight distribution in polymers, measurements of number, average by cryoscopy; Ebwiometry ; membrane osmometry ; vapor pressure osmometry and end group analysis. Measurement of viscosity, average molecular weight by viscometry.

(10 Hrs, 20 Marks)

UNIT-IV:

Thermal analysis of polymer by differential scattering calorimeter; TGA, TMA and HDT. Mechanical properties like tensile strength, Young's Modulus, hardness, etc.

(10 Hrs, 20 Marks)

UNIT-V:

Properties, applications and manufacturing techniques of polyethylene, PVC, Phenol formaldehyde, Urea formaldehyde resins, styrene-butadiene rubber (SBR), Nylon6, cellulose fiber (Rayon Yarn), PET.

(10 Hrs, 20 Marks)

REFERENCES

1. V. R. Gowarikar, N. V. Vishwanathan, Polymer science; Wiley Eastern Publication, Delhi
2. B. K. Sharma, Polymer Science, Goel Publishing House; Meerut
3. Fried W. Billmeyar, Text book of polymer science, John Willey and Sons
4. M. Gopalarao, Dryden's Outlines of Chemical Technology; 3rd edn; East West Press.

4. ELECTIVE – I
3. ADVANCE CATALYSIS

Teaching Scheme:	Examination Scheme:
Lectures: 4 Hrs./ Week	Paper: 100 Marks (3 Hrs)

UNIT-I:

Catalysis: Introduction, History.

Homogeneous Catalysis: Introduction, Characterization of solution Processes, Examples of solution catalysis: Acid – base catalysis, Organometallic Catalysis.

Heterogeneous Catalysis: Introduction, Characterization of Surface Processes, Properties of Solid Catalysts, Influence of Mass Transport on Catalyst Performance.

Catalyst Components: Catalytically active species, Supports, Binders, Promoters.

Catalyst treatment: Activation, Deactivation, Regeneration, Redispersion, Reclamation, Disposal and Toxicity

Catalysis by Metals, Metal Oxides and zeolites, Metal Sulphides.

(10 Hrs, 20 Marks)

UNIT-II:

Supported Catalysts: Introduction, Definition of Supported Catalysts.

Advantages of Supported Catalysts: Separability, Cost, Catalyst activity, Catalyst Selectivity.

Support Materials for the Catalyst, Composition, Size and Shape, Surface Area., Porosity and Pore size. Attrition Loss, Density, Cost and quality.

Design and Development of Supported Catalysts: Preparation and Manufacture, Catalyst Preparation Methods, Catalysts from Physical Mixtures, Impregnated Catalysts, Ion exchange Catalysts. Testing and evaluation of Supported Catalysts, Application of Supported Catalysts.

(10 Hrs, 20 Marks)

UNIT-III:

Regeneration of Catalysts

Fluid Catalytic Cracking Unit: Process Description, Heat Balance, Coke formation, Coke burning, CO Combustion, Environmental aspects. Regenerator Operating Parameters. Influence of Regenerator design on Catalyst Fluidization, Equipment/Unit Operation in Cracking Units.

Noble and Base Metal Catalysis: Noble Metal Catalysis, Deactivation, Regeneration, Regeneration Processes such as continuous Catalyst Regeneration, Fixed Bed Semi Regenerative Process, Cyclic or swing, Reactor regeneration.

Base Metal Catalysis: Process and Catalyst Description.

(10 Hrs, 20 Marks)

UNIT-IV:

Catalysis in Petroleum and Petrochemical Industries:

Applications of zeolites in Petrochemical Refining. Improving quality of Petroleum fuels through Catalysis. O-xylene isomerization over Nickel containg SAPO-5 molecular sieves. Pd-sulfonated Polysiloxane catalyst for etherification of FCC light gasoline. Oxidation of Ethylbenzene catalyzed by Soluble Cobalt (III) complexes. Comparative evaluation of various catalysts used for removal of NOx from air streams.

(10 Hrs, 20 Marks)

UNIT-V:

Biocatalysts: Introduction and importance of biocatalysts. Type of biocatalysts.

Enzymes: Definition, Sources of Enzymes, production of Enzymes. Formation of enzyme substrate complex. Applications.

Simple enzyme kinetics. Derivation of Michaelis Menten equation. Evaluation of parameters of Michaelis Menten equation. Effect of Temperature and pH on enzyme Kinetics.

Microbial Cell: Classification of cells. Requirement for the growth of cells and growth Media. Microbial Kinetics. Monods Equation. Parameters affecting the growth kinetics of cells. Immobilization of enzymes and cells. Methods and Techniques of immobilization. Application of immobilized enzymes and cells.

(10 Hrs, 20 Marks)

REFERENCES

1. Kirk Othmer, Encyclopedia of Chemical Technology, 4^{th} edition, Volume-V. John wiley and sons New York.
2. Editors: Bhattacharya KG and Talukdar A K, Catalysis in Petroleum and Petrochemical Industries. Narosa Publishing House, New Delhi.
3. Editors: Richardson J.F. and Peacock D.G.Richardson and Coulson's , Chemical Engineering , Volume-III, Asian Books Pvt. Ltd., New Delhi.
4. James E. Bailey and David F.Ollis, Biochemical Engineering. Fundamentals; McGraw Hill Publication.

5. ENERGY ENGINEERING

Teaching Scheme:
Lectures: 4 Hrs./ Week
Practical: 2 Hrs./ Week

Examination Scheme:
Paper: 100 Marks (3 Hrs)
Oral : 25 Marks
Term Work: 25 Marks

UNIT-I:

Introduction to energy engineering. Energy resources and forms of energy. Energy demand. Changing energy consumption trends. National energy strategies. National energy plan. Energy power management and Energy planning in India. Energy Audit. Energy Conservation and recycling.

(10 Hrs, 20 Marks)

UNIT-II:

Conventional Energy Sources

Coal : Type of coal, classification of Indian coal. Important Properties of coal. Exploration, Storage and Transportation of coal. Coal gasification, coal liquefication. Carbonization of coal, Production of coke and coal gas, By-products.

Petroleum, Natural gas and Refinery Products: Introduction to Petroleum and Natural gas and Naphtha. Energy routs of petroleum. Exploration of petroleum. Production of crude oil and Natural gas. Transportation of crude oil and Natural gas. Refining of crude oil and Natural gas. Liquefaction of Natural gas. Petroleum and Natural gas in India.

(10 Hrs, 20 Marks)

UNIT-III:

Chemical Energy Sources:

Fuel cells: Introduction, Design and operation of a Fuel cell. Classification of fuel cells, Types of fuel cells, Advantages and disadvantages of fuel cells, Conversion efficiency of fuel cells, Work out put and EMF of fuel cell, Applications of fuel cells.

Hydrogen: Introduction, Applications of Hydrogen, Production of Hydrogen, Storage and transportation safety and management, Hydrogen technology development in India.

Methanol: Production of methanol, Applications of methanol as fuel.

Nuclear Energy: Nuclear energy and application compared with coal, Fuels for Nuclear Fission Reactor. Nuclear fuel cycle, Storage and Transportation. Energy from nuclear fission reaction. Uranium Enrichment Process. Nuclear Waste management.

(10 Hrs, 20 Marks)

UNIT-IV:

Solar Energy: Solar radiation and its measurement. Solar energy collectors, solar energy storage, Applications of Solar energy.

Wind energy: Basic Principles of wind energy conversion. Site Selection Considerations Classification of wind energy conversion system, Advantages and disadvantages of wind energy conversion systems, Storage and Applications of wind energy.

Geothermal Energy: Geothermal energy resources, utilization of geothermal energy, Applications of geothermal energy.

Tidal Energy: Tidal energy conversation, Tidal power, Tidal energy resources in India.

Bioenergy: Biomass energy resources, Biomass conversion processes, direct combustion of biomass, Thermo chemical conversion of biomass, Biochemical conversion, Ethanol from biomass, Applications.

(10 Hrs, 20 Marks)

UNIT-V:

Energy conversion technologies and Electrical power plants: Energy conversion processes and devices, Power plants with conventional energy sources, Coal fired steam thermal power plants, Hydro electric power plants, Nuclear fission reaction power plants, Gas-turbine power plants, Combined cycle power plants, Integrated coal gasification combined cycle power plants, Diesel electric power plants, Geothermal electrical power plants. Plant factors and reserves.

(10 Hrs, 20 Marks)

REFERENCES

1. S. Rao and Dr. B.B. Parulekar, “Energy Technology” Non Conventional, Renewable and Conventional, Khanna Publishers, Delhi.
2. G.D. Rai “Non conventional Energy Sources”, Khanna Publishers Delhi
3. S.B. Pandya, “Conventional Energy Technology” Fuels and Chemical Energy Tata McGraw-Hill Publishing Company Ltd, New Delhi
4. S.P. Sukhatme, “Solar Energy”, Principals of thermal collection and Storage. Tata McGraw-Hill Publishing Company Ltd, New Delhi

TERM WORK:

Term Work shall consist of any eight assignments given below.

1. Energy power management and Energy planning in India
2. Energy Audit, Energy Conservation and recycling.

3. Conventional Energy Sources: Coal
4. Petroleum, Natural gas and Refinery Products
5. Chemical Energy Sources
6. Nuclear Energy and Power plant
7. Solar Energy
8. Wind Energy, Geothermal Energy, Tidal Energy and Bioenergy
9. Energy conversion technologies and power plants

6. PROJECT-I

Teaching Scheme:
Practical: 2 Hrs./ Week

Examination Scheme:
Oral : 25 Marks
Term Work: 25 Marks

The project topic shall consists of either some investigation work or design problem or experimental set up of some development work or prototype equipment or dissertation related to field of chemical engineering.

Project shall be taken in the beginning of the seventh term in consultation with concerned guide and must be completed in eighth term. The project proposal must be submitted in the beginning of the seventh term by every student or a group of students (not more than five students in a group).

The students shall submit the report to the corresponding guide, present their work in due time based on following points,

- Introduction.
- Literature survey.
- Physical / chemical properties etc.
- Experimental setup and procedure.
- Extent of project completed.

Presentation can be performed with OHP slides / LCD.

The progress of the project shall be evaluated by a committee of internal teachers which shall include concerned guide also and shall award the term work marks.

The oral examination of the project shall be conducted by concerned guide and external examiner jointly.

7. SEMINAR

Teaching Scheme:
Practical: 2 Hrs./ Week

Examination Scheme:
Term Work: 25 Marks

During seventh term, every student individually will study a topic assigned to him and submit a report in a typed form and shall deliver a short lecture / seminar on the topic at the time of seminar oral examination .The topic assigned will be related to the field of chemical engineering.

The students shall deliver the seminar (10 to 15 minutes) and submit the seminar report to the staff member on different technical subjects during the semester. The assessment of the term-work shall be based on the: -

1. Attendance to the seminar
2. Performance of the seminar delivery
3. Seminar reports and
4. Viva voce during the seminar.

The staff member/members shall guide the students in:

1. Selecting the seminar topic.

2. Information retrieval (literature survey)
    a) Source of Information i.e. names of the journals, reports, books etc.
    b) Searching for the information i.e. referring to chemical abstracts etc.
3. Preparing the seminar report
4. Delivering the seminar

The oral examination shall be conducted by a committee of teachers internally which shall include the concerned guide also and shall award the oral marks (in the seventh term / at the end of seventh term).

1. COMPUTER AIDED PROCESS EQUIPMENT DESIGN MODELING & SIMULATION

Teaching Scheme:
Lectures: 4 Hrs. / Week
Practical: 4 Hrs. / Week

Examination Scheme:
Paper: 100 Marks (3 Hrs)
Practical: 25 Marks
Term Work: 50 Marks

UNIT-I:
Computer Aided Design:
Shell and Tube Heat Exchanger.
Reactor

(10 Hrs, 20 Marks)

UNIT-II:
Computer Aided Design:
Single Effect Evaporator.
Distillation Column.

(10 Hrs, 20 Marks)

UNIT-III:
Computer Aided Design:
Absorption Column.
Rotary Dryer.

(10 Hrs, 20 Marks)

UNIT-IV:
Introduction to Lumped Parameter Model.
Comparison of Model with Real Situation.
Modeling of An Activated Sludge Process as a continuous Operation by Recycling Biological Sludge
Modeling Difficulties in C.S.T.R.
Modeling of Constant Hold up Three CSTR's in Series.
Modeling of Batch Reactor With First Order Consecutive Reaction Takes Place as Time Proceed for Study of Optimal Batch Time.
Modeling for Maximizing the Yield of the Intermediate (Desirable) Product.
Modeling for Evaluation of the Adiabatic Equilibrium Temperature.
Modeling for Catalyst Decay in a CSTR.
Modeling for Evaluation of Conversion with Catalyst Decay in Batch Reactor.

(10 Hrs, 20 Marks)

UNIT-V:
Introduction of the Chemical Engineering Simulation.
Simulation Language.
When to Use Simulation?
Steps of Simulation Process.
Chemical Engineering Application of Simulation Techniques.
Advantage and Limitation of Simulation Technique.
Simulation of Ammonia Production System.
Simulation of Catalyst Temperature by Newton-Raphson Method.
Simulation of CSTR By Euler's Method.

Simulation of CSTR with Second Order Irreversible Exothermic Reaction Using Runga-Kutta Method.

(10 Hrs, 20 Marks)

Practical and Term Work shall consist of following experiments.

1. Computer aided design of shell & tube heat exchanger.
2. Computer aided design of single effect evaporator.
3. Computer aided design of rotary dryer.
4. Simulation of ammonia production system.
5. Simulation of catalyst temperature by Newton Raphson method.
6. Simulation of Reactor Design.
7. Computer control heat exchanger.
8. Computer Aided Design of absorber.

REFERENCES

1. W. L. Luyben , Process Modeling Simulation and Control for Chemical Engineers; 1988 McGraw Hill.
2. B.C. Bhattacharya & C. M. Narayan, Computer Aided Design of Chemical Process Equipment : 1st Edition, 1992, NCBA, Calcutta

Note: Students Can Utilize FORTRAN -77 And / Or C And/Or C++ Programming Language for the Above Syllabus.

2. PROCESS ENGINEERING ECONOMICS & COSTING

Teaching Scheme:	Examination Scheme:
Lectures: 4 Hrs./ Week	Paper: 100 Marks (3 Hrs)
Practical: 2 Hrs./ Week	Oral : 25 Marks
	Term Work : 25 Marks

UNIT-I:

Scales of Production, Selection of Plant Capacity, Plant Location. Availability of Raw Materials, Energy Gestation Period. Expansion, Diversification and Obsolescence. Scope for Standardization in Design and Production .Economics of Research and Development .Indian Chemical Industry , Current Status and Trends .

(10 Hrs, 20 Marks)

UNIT-II:

Cost Estimation: Factors Affecting Investment and Production Cost .Capital Investment , Fixed Investment and Working Capital .Estimating Equipment Cost By 6 /10 Factor Rule .Method of Estimating Capital Investment .Different Costs Involved in Total Product Cost .Computer Automization in Costing.

(10 Hrs, 20 Marks)

UNIT-III:

Interest and Investment Cost , Simple and Compound Interest , Nominal and Effective Rates of Interest , Continuous Interest , Ordinary Annuity ,Perpetuities and Capital Costs . Taxes and Insurances: Types of Taxes and Tax Returns. Types of Insurance and Legal Responsibility.

(10 Hrs, 20 Marks)

UNIT-IV:
Depreciation: Types of Depreciation, Service Life, Salvage Value, Present Value. Methods of Determining Depreciation, Single Unit and Group Depreciation .Causes of Obsolescence and Inadequacy.

(10 Hrs, 20 Marks)

UNIT-V:
Profitability, Alternative Investment and Replacement, Mathematical Methods of Profitability Evaluation, Cash Flow Diagram. Break Even Analyses, Balance Sheet, Pricing Issue Method and Income Statement.

(10 Hrs, 20 Marks)

TERM WORK:
Term Work shall be based on the following.
1. Location of a chemical plant
2. Indian Chemical industry
3. Cost Estimation
4. Interest and Investment costs
5. Taxes and Insurance
6. Depreciation
7. Profitability and Replacement
8. Break Even Analysis

REFERENCES

1. Peter M.S. Timmerhaus K.D. Plant Design and Economics for Chemical Engineers. McGraw Hill.
2. Vilbrandt F.C. and C.E. Dryden , Chemical Plant Design. McGraw Hill
3. T.R. Banga and S.C.Sharma, Industrial Organization & Engineering Economics, Khanna Publications, New Delhi.
4. O.P.Khanna Industrial Engineering & Management, Dhanpat Rai Publications Pvt. Ltd. New Delhi.
5. Dewett & Varma, Elementary Economic Theory : S Chand & Company Ltd New Delhi

3. CHEMICAL PLANT DESIGN & PROJECT ENGINEERING

Teaching Scheme:	Examination Scheme:
Lectures: 4 Hrs./ Week	Paper: 100 Marks (3 Hrs)
Practical: 4 Hrs./ Week	Oral : 25 Marks
	Term Work: 25 Marks

UNIT-I:
Introduction to Chemical Engineering Plant Design and Project Engineering.
The role of Chemical Engineer in Chemical Plant Design. Chemical Engineering Design, need for Plant Design, Process Design.
Development of the project: Evaluation of a process, process research, research evaluation, process development, preliminary engineering studies, pilot plant, semi-commercial plant, commercial plant and commercial plant design factors.
Technical factors, economic factor, safety considerations, legal phases, sources of information.

(10 Hrs, 20 Marks)

UNIT-II:
Process Design: Choice of process continuous Vs. Batch processing.
Process Equipments and Materials: Selection of Materials, Plan for Selection of Materials. Selection of Process Equipments, Equipment selection procedures, standard Vs. special equipment. Scale up method, types of flow sheet, development of process flow sheet from process information.

(10 Hrs, 20 Marks)

UNIT-III:
Plant Layout : Introduction planning-layout, factors in planning-layout methods of layout planning area concept, two dimensional layouts, scale models, principles of plant layout, safety, utilities & material handling equipments , railroads and roads, etc.Plant layout for Benzene Hexachloride process.
Locating the Chemical Plant: Introduction, summary of factors in plant location.
Economics location, plant location factors, raw material supply, market and transportation, power and fuel, water supply , temperature, plant measures for conservation of water, legal restriction, federal pollution act, climate, labour, community and site characteristics and waste disposal.

(10 Hrs, 20 Marks)

UNIT-IV:
Site preparations and Structures : Introduction, Site Preparation, Surface Evaluation, Foundation and Shape of Foundation, Machinery and Equipment Foundations, Supports, Outdoor Plants, Selection Building types, Building design principles, Flooring , walls, Roof, safety and higher protection conditioning , heating and ventilation. Cost Consideration for Plant Sites and Structures New Development in Management techniques. (PERT & CPM).

(10 Hrs, 20 Marks)

UNIT-V:
Process Auxiliaries : Introduction, Piping, Explanation of CODES, Selection of Piping, Pipe strength, Wall thickness, Nominal Pipe Size (NPS), Criteria for Selection of Materials, Pipe sizing by ID, Choosing the final pipe size, Process steam piping, piping layout, piping insulation, methods of providing flexibility for piping.

(10 Hrs, 20 Marks)

TERM WORK:
Term Work shall consist of minimum 5 (five) half imperial size sheets based on above syllabus.
1. Process flow diagram of Manufacturing of Benzene Hexa Chloride (BHC)
2. Process flow diagram of Manufacturing of Nitric Acid
3. Plant Layout for Manufacturing of Benzene Hexa Chloride (BHC)
4. Plant Layout for Manufacturing of Nitric Acid
5. Piping diagram for Manufacturing of Nitric Acid
6. Piping diagram for Manufacturing of Benzene Hexa Chloride (BHC)
7. Network Analysis Numerical : PERT & CPM

REFERENCES

1. F.C. Vilbrandt and C.E. Dryden, Chemical Engineering Plant Design McGraw Hill, New Delhi.
2. Peter M. S. and K.D. Timmerhaus, Plant Design and Economics for Chemical Engineers. McGraw Hill.
3. Modes J. and Philips, Rheinhold, Project Engineering with CPM and PERT :
4. Perry’s Chemical Engineer’s handbook.

4. ELECTIVE – II
1. INDUSTRIAL POLLUTION & CONTROL

Teaching Scheme: Examination Scheme:
Lectures: 4 Hrs./ Week Paper: 100 Marks (3 Hrs)

UNIT-I:
Introduction: Types of Pollution. Introduction: Pollution control aspects. Environmental Legislation: Water (Prevention and Control of Pollution) Act,197, Air (Prevention and control of Pollution) Act, 1981. Industrial Waste Water Analysis. Industrial Gaseous Effluent Analysis. General Instrument for Gaseous Pollutants.

(10 Hrs, 20 Marks)

UNIT-II:
Removal of BOD. Introduction to removal of BOD Biological oxidation units: Activated Sludge Process; Trickling /Biological Filters; Waste Stabilisation Ponds. Anaerobic Treatment. Numerical Examples based on removal of BOD.
Removal of Chromium. Introduction to removal of Chromium. Control Methods, Reduction precipitation, Ion Exchange, Reverse Osmosis, Lime coagulation and adsorption.

(10 Hrs, 20 Marks)

UNIT-III:
Removal of Mercury: Introduction of removal of mercury, Measurement of Mercury, Ventron mercury removal process.
Removal of ammonia/urea: Introduction to removal of ammonia/urea, Methods for removal of nitrogen, Physico-chemical processes, Biological methods.

(10 Hrs, 20 Marks)

UNIT-IV:
Treatment of Phenolic Effluents: Introduction to Treatments of Phenolic Effluents, Sources of phenols.
Treatments/Removal Methods: Steam Gas Stripping. Adsorption/Ion Exchange; Extraction of phenols using Phenosolvants Biological Methods of Treatment.
Removal of particulate matter: Introduction to removal of particulate matter, Gravity settling chamber, solid traps, cyclone separators, fibre filters, fabric filters, liquid scrubbers and ESP.
Numerical Examples based on settling chamber, cyclone separators, fiber filter, liquids scrubber and ESP.

(10 Hrs, 20 Marks)

UNIT-V:
Pollution control in process industries:
Introduction to pollution control,
Pollution control aspects of fertilizer industry: Introduction to pollution control in fertilizer industry.
Removal of carbon in ammonia plant effluents by scrubbing with liquids using vacuum filtration,
Removal of oil in ammonia plant effluents, Removal of hydrogen sulphide in ammonia plant effluents
Pollution control in petroleum and petrochemical units: Introduction
Refinery Liquid based treatment methods: Oxidation pond treatment, disposal of sludges.
Treatment of liquid effluents from petrochemical industries, Removal of hydrogen sulphide gas from sour gas by stripping, Removal of ammonia from gases.
Alcohol industry: Treatment method by recovery of potash from distillery spent-wash.

(10 Hrs, 20 Marks)

REFERENCES

1. S. P. Mahajan, Pollution control in process industries, Tata McGraw-Hill Publication
2. M. N. Rao & A K. Datta, Waste Water Treatment: IBH Pub., Delhi

4. ELECTIVE – II
2. ADVANCE SEPARATION TECHNIQUES

Teaching Scheme: Examination Scheme:
Lectures: 4 Hrs./ Week Paper: 100 Marks (3 Hrs)

UNIT-I:

Separation Processes: Industrial Chemical Processes, Mechanism of Separation
Separation by phase addition or creation. Separation by barrier. Separation by solid agent. Separation by external field or gradient. Component Recoveries and product purities. Separation power. Selection of feasible separation processes.
Crystallization from the melt: Introduction.
Progressive freezing: component Separation by progressive freezing, Pertient variables in progressive freezing. Applications.
Zone melting: component separation by zone melting, pertient variables in zone melting, Application.
Melt crystallization from the bulk: Investigations, commercial equipment and application.
Falling-film crystallization: Principles of operation, commercial equipment and applications.

(10 Hrs, 20 Marks)

UNIT-II:

Enhanced distillation: Introduction. Azeotropism.
Azeotropic distillation: Introduction, exploitation of homogeneous azeotropes, exploitation of pressure sensitivity, exploitation of boundary curvature, Exploitation of azeotropy and liquid Extractive distillation: Introduction, solevent effect in extractive distillation, extractive distillation design and optimization, solvent screening and selection extractive distillation by salt effects. Reactive distillation: Introduction, simulation, modeling and design feasibility, Mechanical design and implementation issues, process applications.

(10 Hrs, 20 Marks)

UNIT-III:

Supercritical fluid separation processes: Introduction. Physical properties of pure supercritical fluids; thermodynamic properties and transport properties. Process concept in super critical fluid extraction. Phase equilibria: Liquid- Fluid equilibria, Solid- Fluid equilibria, Polymer- Fluid equilibria and the Glass Transition, Cosolvents and surfactants, phase equilibria models. Mass Transfer.
Applications: Food and Pharmaceutical applications, Temperature controlled residuum Oil super critical extraction [ROSE], Extraction from aqueous solution, Adsorption and desorption, Polymer de volatilization and fractionation, Drying and Aerogel formation, Clearing, Crystallization, Reactive separations.

(10 Hrs, 20 Marks)

UNIT-IV:

Membrane separation processes: Introduction. Advantages of membrane separations, Basic equations, Basic concept, Membrane types, Economics.

Electro dialysis: Process description, examples, membranes, membrane efficiency, process description and configuration, Energy requirements, Equipment and economics.

Reverse osmosis and Nano filterization: Processes description, examples Basic principles of operations, RO and NF membranes, process limitations and configuration. Economics.

Ultra filtration: Process description, UF membranes, membrane characterization, process limitations, process configurations, Energy requirements, Design and economics.

Microfiltrations: process description, Examples, MF membranes, membrane characterization , process limitations, Equipments configurations, process Applications and Economics.

Gas- Separations membranes: Process descriptions, examples, Basic principles of operations, selectivity and permeability, Gas- Separation membranes, membrane system design features, energy requirements and economics.

Pervaporization: Process description, definition, operational factors, vapor feed, examples, pervaporation membranes, modules.

(10 Hrs, 20 Marks)

UNIT-V:

Biochemical separation processes: Introduction.

Initial product harvest and concentration: centrifugation, Filtration, Selection of cell separation Unit operation, Cell disruption, protein refolding.

Initial purification: Precipitation, Extraction, Adsorption, Membrane processes.

Final Purification and product formulation.: Chromatography, Lyophilization and drying. Integration of fermentation and downstream processing operations.

(10 Hrs, 20 Marks)

REFERENCES

1. Perry Robert H. and Green Don W. Perry's chemical Engineers Handbook 7th edition. McGraw Hill Publication, New York.
2. Seader J. D. and Henley Ernest J, Separation Process Principles. John Wiley and Sons, Inc, New York
3. Ladisch Michael R., Bioseparations Engineering, Principles, Practice and Economics, Wiley Interscience, John Wiley and Sons, Inc. Publications New York
4. Long Robert B. Separation Process in Waste Minimization .Marcel Dekker, Inc, New York

4. ELECTIVE – II
3. PETROCHEMICALS

Teaching Scheme:	Examination Scheme:
Lectures: 4 Hrs./ Week	Paper: 100 Marks (3 Hrs)

UNIT-I

Petrochemical Industry in India. Feed stocks for petrochemicals, separation of aromatics

Chemicals from methane: Manufacture of methanol, formaldehyde, acetic acid, ethylene glycol, CS_2, liquid fuels from methanol, manufacture of ethanol.

(10 Hrs, 20 Marks)

UNIT-II

Chemicals from ethane- ethylene-Acetylene.

Ethane: Occurrence, halides of ethane, Nitroethane and oxidation of ethane.

Ethylene production, production of ethylene derivatives like vinyl acetate monomer, ethylene oxide, ethylene diamine, ethanol and acetaldehyde.
Chemicals from acetylene: acrylic acid, vinyl chloride, vinyl acetate and Acetonitrile.

(10 Hrs, 20 Marks)

UNIT-III

Chemicals from C_3, C_4 and higher carbon atoms:
Products from propane. Dehydrogenation of propane and higher paraffins.
Chemicals from propylene: Isopropyl alcohol, acetone, propylene glycol, acrylic acid and ester, Phenol.
Dehydrogenation of butanes. Production of Iso and n- butanol. Production of methyl –tert-butyl ether [MTBE], Adipic acid. Derivatives from hydrocarbons higher than butane.

(10 Hrs, 20 Marks)

UNIT-IV

Synthesis gas and chemicals:
Synthesis gas. Steam reforming of hydrocarbons. Production of synthesis gas. Chemicals from synthesis gas. Oxo synthesis, vinyl acetate, acetic acid.
Fischor- Tropsch synthesis: catalysts and the products.
LPG: sources, properties grades of LPG. Supply of LPG to consumers, the storage and use of LPG, LPG piping system, safety consideration and emerging action. Emergency controls and action.

(10 Hrs, 20 Marks)

UNIT-V

Petroleum aromatics: Production of BTX.
Benzene derivatives like Aniline, phenol, alkylation of benzene.
Products from toluene: Chloro toluenes, O- Cresols, Dinitro toluenes, Benzaldehyde, caprolactum, Terephthalic acid.
Chemicals from xylene: o-xylene, m-xylene, p-xylene, Naphthalene

(10 Hrs, 20 Marks)

REFERENCES

1. Bhaskararao B.K. “A Text on petrochemicals”, Khanna Publishers, New Delhi
2. Sarkar G.N. “Advanced Petrochemicals” Khanna Publishers, New Delhi
3. Maiti Sukumar [editor],”Introduction to Petrochemicals”, Oxford and IBH Publishing co. Pvt. Ltd. New Delhi

6. PROJECT-II

Teaching Scheme:	Examination Scheme:
Practical: 4 Hrs./ Week	Oral : 50 Marks
	Term Work: 100 Marks

The students are required to carry out one of the following projects.
1. Process based Project: Manufacture of product.
2. Equipment based Project: Detailed design and fabrication of the equipment for a given capacity.
3. Experimental based Project: Experimental investigation of basic or applied research problem.
4. Industrial Problems: Any problem or project directly related to existing plants for modification of process or equipment or regarding pollution control and energy conservation under the guidance of a staff member and /or staff members and submit a typed report in duplicate.

The Project Work consists of collection of literature, study of the various processes selection of the process, computation of material and energy balances, process design of important equipments, detailed design of one of the main equipment, plant location and layout, cost Estimation,
economic analysis, details of experimental set up, analysis of data, pollution control, safety, marketing, conclusions and recommendations, bibliography, etc., as applicable to the individual problem.
The object of the project is to make use of the knowledge gained by the student at various stages of the degree course. This helps to judge the level of proficiency, originality and capacity for application of the knowledge attained by the student at the end of the course.
Each group should consist of maximum 5 students. For term-work (Internal) of 100 marks, the assessment should be by conducting frequent written tests, seminars during the year and an oral examination at the end of the year conducted by all the staff members of the department. The Head of the Department should see that the assessment procedure should be the same for all the students of the class. For external 50 marks, the project work shall be assessed by an oral examination by at least two examiners, one internal and one must by external at the end of the year.
The object of the VIVA VOCE examination (Internal and External Orals) is to determine whether the objectives of the project work have been met by the student as well as to assess the originality and initiative of the student as demonstrated in the project work.

7. INDUSTRIAL VISIT / CASE STUDY

Examination Scheme:
Term Work: 25 Marks

During seventh term, every student shall visit minimum three industries or organization pertaining to the Chemical Engineering arranged by College and accompanied by departmental teachers as per AICTE and University norms. The report of technical visit shall be submitted by every student at the end of eight term which shall be evaluated by the concerned teachers through internal Viva Voce.

Faculty of Engineering & Technology

।।अंतरी पेटवू ज्ञानज्योत।।

NORTH MAHARASHTRA UNIVERSITY, JALGAON.

Syllabus For

SECOND YEAR ENGINEERING

BIOTECHNOLOGY

(W.E.F.2007-2008)

NORTH MAHARASHTRA UNIVERSITY, JALGAON

STRUCTURE OF TEACHING & EVALUATION

S.E. (BIOTECHNOLOGY) **W.E.F.2007-2008**

First Term

Sr. No.	Subject	Teaching Scheme Hours/ Week		Examination Scheme				
		Lectures	Practical	Paper Duration Hours	Paper	TW	PR	OR
1	Concepts in Biotechnology	04	--	03	100	--	--	--
2	Microbiology	04	04	03	100	50	50	--
3	Fluid Flow and Solid Handling	04	02	03	100	25	--	25
4	Process Calculations	04	02	03	100	25	--	--
5	Engineering Mathematics-III	04	--	03	100	--	--	--
6	Computer Applications	--	02	--	--	25	50	--
		20	10		500	125	100	25
	Grand Total	**30**			**750**			

Second Term

Sr. No	Subject	Teaching Scheme Hours/ Week		Examination Scheme				
		Lectures	Practical	Paper Duration Hours	Paper	TW	PR	OR
1	Biochemistry	04	02	03	100	25	50	-
2	Chemistry	04	02	03	100	25	--	-
3	Immunology	04	02	03	100	25	50	-
4	Biostatistics	04	02	03	100	25	--	-
5	Process Heat Transfer	04	02	03	100	25	--	25
		20	10		500	125	100	25
	Grand Total	**30**			**750**			

NORTH MAHARASHTRA UNIVERSITY, JALGAON

STRUCTURE OF TEACHING & EVALUATION

T.E. (BIOTECHNOLOGY) **W.E.F.2008-2009**

First Term

Sr. No.	Subject	Teaching Scheme Hours/Week		Examination Scheme				
		Lectures	Practical	Paper Duration Hours	Paper	TW	PR	OR
1	Bio Process Principles	04	--	03	100	25	--	--
2	Chemical Reaction Engineering	04	04	03	100	25	--	50
3	Mass Transfer-I	04	04	03	100	25	50	--
4	Molecular Biology and Genetic Engineering	04	04	03	100	25	--	25
5	Enzyme Engineering	04	--	03	100	25	--	--
		20	12		500	125	50	75
	Grand Total	32			750			

Second Term

Sr. No.	Subject	Teaching Scheme Hours/Week		Examination Scheme				
		Lectures	Practical	Paper Duration Hours	Paper	TW	PR	OR
1	Instrumentation and Process Control	04	02	03	100	25	--	25
2	Biological Thermodynamics	04	02	03	100	25	--	--
3	Mass Transfer-II	04	04	03	100	25	50	--
4	Biotechnology of Waste Treatment	04	04	03	100	25	--	25
5	Fermentation Biotechnology- I	04	--	03	100	25	--	--
6	Practical Training/Mini Project/Special Study	--	--	--	--	25	--	--
		20	12		500	150	50	50
	Grand Total	32			750			

NORTH MAHARASHTRA UNIVERSITY, JALGAON

STRUCTURE OF TEACHING & EVALUATION

B.E. (BIOTECHNOLOGY) W.E.F.2009-2010

First Term

Sr. No.	Subject	Teaching Scheme Hours/Week		Examination Scheme				
		Lectures	Practical	Paper Duration Hours	Paper	TW	PR	OR
1	Bioprocess Engineering -- I	04	--	03	100	25	--	--
2	Bioprocess Modeling and Simulation	04	04	03	100	25	25	--
3	Bioseparation Processes	04	--	03	100	25	--	--
4	Elective –I	04	--	03	100	--	--	--
5	Fermentation Biotechnology-II	04	04	03	100	25	--	50
6	Project –I	--	02	--	--	25	--	25
7	Seminar	--	02	--	--	25	--	--
		20	12		500	150	25	75
	Grand Total	32			750			

Second Term

Sr. No.	Subject	Teaching Scheme Hours/Week		Examination Scheme				
		Lectures	Practical	Paper Duration Hours	Paper	TW	PR	OR
1	Bioprocess Engineering -II	04	04	03	100	25	--	25
2	Bioprocess Engineering and Economics	04	02	03	100	25	--	25
3	Bioinformatics	04	04	03	100	25	25	--
4	Elective –II	04	--	03	100	25	--	--
5	Project –II	--	04	--	--	100	--	50
6	Industrial Visit / Case Study	--	--	--	--	25	--	--
		16	14		400	225	25	100
	Grand Total	30			750			

Subjects:

Elective-I
1)Advanced Biomaterials
2)Plant Tissue Culture & Plant Biotechnology
3)Protein Engineering
4)Food Biotechnology

Elective-II
1)Metabolic Engineering
2)Biosafety & Bioethics
3)Biomedical Fluid Dynamics
4)Applied Genetic Engineering

S.E. BIOTECH. TERM I

1. CONCEPTS IN BIOTECHNOLOGY

Teaching Scheme: **Examination Scheme:**

Lectures: 4 Hrs./ Week **Paper: 100 Marks**

(3Hrs)

UNIT- I

Introduction to Biotechnology:

Definitions, Historical perspectives, Scope and importance, Commercial potential, An interdisciplinary challenge, A Quantitative approach, Classical vs. Modern concepts, Manufacturing quality control, Product safety, Good manufacturing practices, Good laboratory practices, Marketing,Biotechnology in India and Global trends.

Concept of pH, Buffer, Process flow diagrams, Material and energy balances, fluid flow and mixing, Heat transfer, Mass transfer, Unit operations,Homogeneous reactions, Heterogeneous reactions, Reactor engineering.

Protein Structure and Engineering:

Introduction to the world of Proteins, 3-D Shape of Proteins, Structure Function relationship in Proteins, Purification of Proteins, Characterization of Proteins, Protein based products, Designing Proteins, Proteomics. **(10 Hrs, 20 Marks)**

UNIT- II

Recombinant DNA Technology:

Introduction, Tools of rDNA Technology, Making Recombinant DNA, DNA Library, Introduction of Recombinant DNA into host cells, Identification of Recombinants, Polymerase Chain Reaction (PCR), DNA Probes, Hybridization Techniques, DNA Sequencing, Site-directed mutagenesis.

Genomics and Bioinformatics:

Introduction, Genome Sequencing Projects, Gene prediction and Counting, Genome similarity, SNPs and comparative genomics, Functional Genomics, History of Bioinformatics, Sequences and Nomenclature, Information Sources, Analysis using Bioinformatics tools. **(10 Hrs, 20 Marks)**

UNIT- III

Microbial Culture and Applications:

Introduction, Microbial Culture Techniques, Measurement and Kinetics of Microbial Growth, Scale up of Microbial Process, Isolation of Microbial Products, Strain Isolation and Improvement, Applications of Microbial Culture Technology, Bioethics in Microbial Technology. **(10 Hrs, 20 Marks)**

UNIT-IV

Plant Cell Culture and Application:

Introduction, Cell and Tissue Culture Techniques, Applications of Cell and Tissue Culture, Gene Transfer Methods in Plants, Transgenic Plants with Beneficial Traits, Diagnostics in Agriculture and Molecular Breeding, Bioethics in Plant Genetic Engineering.

(10 Hrs**,** 20 Marks)

UNIT- V

Animal Cell Culture and Applications:

Introduction, Animal Cell Culture Techniques, Characterisation of Cell Lines, Scale-up of Animal Culture Process, Applications of Animal Cell Culture, Stem Cell Technology, Bioethics in Animal Genetic Engineering.

Biotechnology and Society:

Public perception, Role of sciences, Engineering, Arts, Commerce, Patenting - Criterion for patents, Discovery vs Invention,Product and process patent, Reading a patent, National and International Patent Laws, Varietal protection, Patenting of biological systems, Ethical issues in agriculture and health care.

(10 Hrs**,** 20 Marks)

REFERENCES

1. P. K Gupta, Introduction to Biotechnology. Rastogi Publications
2. Smith, Biotechnology. Cambridge Press.
3. Ed. Young M.M., Comprehensive Biotechnology (Vol. I,II.III and IV), Pergamon Press, London.
4. Hammand J., Mc Gravery P. and Yusibov V. (Eds.). Plant Biotechnology. Springer Verlag, 2000

2. MICROBIOLOGY

Teaching Scheme:	Examination Scheme:
Lectures: 4 Hrs./ Week	Paper: 100 Marks (3 Hrs)
Practicals : 4 Hrs./ Week	Practical: 50 Marks
	Term Work : 50 Marks

UNIT-I

Microbiology and its scope, microscopy. classification, morphology and physiology of bacteria, yeast, molds, algae and viruses. **(10 Hrs, 20 Marks)**

UNIT-II

Microbial growth kinetics, growth curve, diauxic growth factors influencing growth, continuous and synchronous culture, microbial nutrition and reproduction.

(10 Hrs**,** 20 Marks)

UNIT-III

Pure culture techniques – microbial culture media, isolation, identification and maintenance of cultures, characteristics of pure culture, enumeration techniques.

(10 Hrs**,** 20 Marks)

UNIT-IV

Physical and chemical methods of control of microorganisms, immune response, antigen-antibody interaction. Microbial defense mechanisms under adverse conditions.

(10 Hrs**,** 20 Marks)

UNIT-V

Microbial ecology, incidences of microorganisms in soil, water, air, food and sewage, food spoilage organisms, food borne infections and poisoning organisms.

(10 Hrs**,** 20 Marks)

REFERENCES:

1. M.J. Pelczar, Jr. E.C.S. Chan and N.R. Krieg, Microbiology 5th Ed. , TMH Book Company.
2. Kathleen Talaro and Arthur Talaro. Foundation in Microbiology. W.C.B. Wm. C. Brown Publishers (1994).
3. Stainer R.Y., Ingraharn J.L., Whoolis M.L. and Painter P.R. General Microbiology. The Mc Millan Press Ltd.
4. Robert F. Byod (1984). General Microbiology. Times Mirror / Mosby College Publication.

TERM WORK / PRACTICALS

Term Work Shall be based on any 10 experiments mentioned below.

1-2. Microscopy : Use & care of microscope, examination of prepared slides and wet mounts of bacteria, yeast, molds. Microbial Identification & examination of food samples. Other biomaterials of bacteria, yeast and molds.

3. Micrometry: Measurement of microbial cells.

4. Staining techniques: Simple staining, Gram staining, Endospore staining, Capsule staining.

5-7. Enumeration techniques: Microscopic count using haemocytometer, Viable cell count (By pour plate method) Turbidity measurement as direct expression of growth.

8-9. Culture techniques: Culture media preparation, Cultivation of microorganisms.

10. Isolation of microorganisms by streak plate method.

11. Isolation by serial dilution method, maintenance & preservation.

12. Influence of antimicrobial agent on growth effect of UV radiation & heat on microbial growth.

13. Microbiological examination of water: Coliform & Salmonella counts.

14. Microbiological assay of a growth factor.

REFERENCES:

1. H.W. Seeley Jr. and Paul J.Van Demark, “Microbes in action”. A laboratory manual of Microbiology.D.B. Taraporevala Sons & Co. Pvt. Ltd.

2. Ed. J.R. Norris and D.W. Ribbons, “Methods in Microbiology”, Vol. 3 A, Academic Press, London & New York.
3. Ronald M. Adas, Alfred E. Brown, Kenneth W. Dobra and Llnas Miller (1986). Basic Experimental Microbiology. Prentice Hall.
4. Aneja K.R.(2nd Edn., 1996). Experiments in Microbiology, Plant pathology, Tissue Culture and Mushroom Cultivation. Wishwa Prakashan, New Age International (P) Ltd.
5. S. Harisha. An Introduction to Practical Biotechnology. Laxmi Publications (P) Ltd. New Delhi.

3. FLUID FLOW AND SOLID HANDLING

Teaching Scheme:
Lectures: 4 Hrs./ Week
Practicals :2 Hrs./ Week

Examination Scheme:
Paper: 100 Marks (3 Hrs)
Oral: 25 Marks
Term Work : 25 Marks

Unit-I

Solids and Their Handling

Properties of solids ,screening, industrial screening equipment. Determination of particle size, screen analysis, size reduction of solids,stages of reduction , operating variables, intermediate and fine size reduction, power requirement and mechanism.

Power driven machines: Crushers, grinders, and conveyors.

Problems based on above (10 Hrs**,** 20 Marks)

Unit –II

Filtration: Theory, continuous and batch equipments. Flow of solids through fluids, Equipments for classification of solids. Sedimentation.

Problems based on above. (10 Hrs**,** 20 Marks)

Unit – III

Fluid flow: Properties of fluids, Flow through pipeline.

Fluid statics : Euler’s equation, Hydrostatic Law and Pressure Measurement

Transport of fluids,energy relationships, pipe fittings, minor losses in pipe flow.

Problems based on above. (10 Hrs**,** 20 Marks)

Unit IV

Flow measurements: Orifice meter. Nozzle and Venturi meters, Rotameter and Pitot tube.

Other flow measuring devices such as Ultrasonic flow meters, Anemometers, Electromagnetic flow meters, Flow meters using thermistors.

(10 Hrs**,** 20 Marks)

UNIT-V:

Pumping of fluids:
Pumping equipments for liquid, the reciprocating pump, positive displacemement pump, rotary pumps, centrifugal pumps, design & operating characteristics, NPSH calculations, airlift pumps, pumping equipments for gases:
Pumping equipment for gases:
Reciprocating piston compressors, rotary blowers & compressors, centrifugal blowers & compressors including turbo compressors, vacuum-producing equipment.
Power required for compression of gases, clearance volume, multistage compressor efficiency, the power requirement for pumping through pipeline for liquids & gases.
Inroduction to fluidization. **(10 Hrs, 20 Marks)**

REFERENCES

1. W.L. McCabe & J.C. Smith, Unit Operations in Chemical Engineering, McGraw Hill / Kogakusha Ltd.
2. P.Chattopadhaya. Unit Operations of Chemical Engineering-Volm.I, Khanna Publication New Delhi,
3. R.K. Bansal. Fluid Mechanics, Khanna Publications, New Delhi
4. V.P.Gupta, Alam Singh and Manish Gupta, Fluid Mechanics and hydrostatics, CBS Publishers, New Delhi.
5. R.S.Hiremath & A.P.Kulkarni Unit operation of Chemical Engineering (Mechanical Operations Vol-I) : Everest Publication, Pune
6. J. M. and Coulson and R.F. Richardson; Chemical Engg. Vol. I and II : Butter worth and Heinemann.

TERM WORK / PRACTICALS

Term Work Shall be based on any 08 experiments mentioned below.

1. To study the separation of solid by sedimentation
2. Sieve Shaker: To ascertain the fineness number and to study the differential & cumulative screen analysis of the sand
3. Ball Mill :To verify the laws of crushing & grinding
4. Jaw Crusher : To verify the laws of crushing & grinding
5. Plate & Frame Filter Press: To determine the rate of filtration ,specific cake resistance and filter medium resistance
6. Rotary Vacuum Filter: To find out the rate of filtration
7. Fluidization : To observe the and study the behavior of the bed during fluidisation and to calculate minimum fluidization velocity
8. To determine the coefficient of Venturimeter
9. To determine the coefficient of Orificemeter
10. To determine the coefficient of Nozzlemeter
11. To Verify Bernoulli equation.
12. Reynolds Experiment

4. PROCESS CALCULATIONS

Teaching Scheme:
Lectures: 4 Hrs./ Week
Term Work :2 Hrs./ Week

Examination Scheme:
Paper: 100 Marks (3 Hrs)
Term Work : 25 Marks

UNIT-I :
Units and Dimensions:
Basic and derived units, dimensional analysis, dimensional and empirical equations. Different ways of expressing units of quantities and physical constants.
Properties of Gases , Liquids and Solids:
Ideal and real gas laws, critical properties, properties of mixtures & solutions & plane equilibria, Kay’s rule.

(10 Hrs**,** 20 Marks)

UNIT-II :
Basic Concept:
Humidity and saturation, Psychometric chart, solubility diagrams.
Thermo Physics:
Concept and calculations of involving energy, heat, work & enthalpy of reversible & irreversible process.

(10 Hrs**,** 20 Marks)

UNIT-III :
Material Balances:
Concept of limiting &excess reactants, Tie element, Recycle, Purging, Bypass etc. in batch, stagewise and continuous operations in systems with and without chemical reactions in unit operations.

(10 Hrs**,** 20 Marks)

UNIT-IV :
Thermo Chemistry:
Heat of formation, combustion, solution, dilution etc. and its effects of pressure and temperature on them. Temp. of reaction, Energy balance for system with and without chemical reaction. Process efficiency.

(10 Hrs**,** 20 Marks)

UNIT-V :
Unsteady material and energy balances in Bioprocesses, Energy balances for nuclear, electro chemical and photo chemical processes
Combustion: Introduction, fuels, calorific value of fuels, air requirements.

(10 Hrs**,** 20 Marks)

REFERENCES

1. Bhat B.I. and Vora S.M ; Stoichiometry ; Tata McGraw Hill Publication ; New Delhi

2. Durga Prasad Rao & DVS Murthy ,Process Calculations for Chemical Engineers. McMillan India, New Delhi .
3. K A Gavahane ; Introduction to Stoichiometry ; Nirali Prakashan.
4. Hougen O.A, Watson K.M, & Ragatz R.A.Chemical Process Principles Part-I Asia Publishing House, Mumbai.
5. Himmelbleau D.M. Basic principles and calculations in Chemical Engineering. Prentice Hall Publication.
6. Shekhar Pandharipande and Samir Mushrif, Process Calculations. Pune Vidyarthi Griha Prakashan, Pune
7. Doran Paulin M. Bioprocess Engineering Principles. Academic Press, An Imprint of Elsevier.

TERM WORK

Term Work Shall be based on any 08 assignments on the following.

1. Properties of solids/liquids/gases.
2. Humidity & Saturation.
3. Thermo physics.
4. Thermo chemistry.
5. Material balances.
6. Energy balances.
7. Nuclear, photo chemical and electro chemical processes.
8. Combustion.
9. Steady state and Unsteady state Material and Energy Balances in Bioprocesses

5. ENGINEERING MATHEMATICS –III

Teaching Scheme:	Examination Scheme:
Lectures: 4 Hrs./ Week	Paper: 100 Marks (3 Hrs)

UNIT-I:

Liner Differential Equation:

Liner differential equation of order "n" with constant co-efficient , Method of variations, Homogeneous liner differential equation , Legendre's LDE, Application to chemical engineering. Problems involving batch reactor. **(10 Hrs, 20 Marks)**

UNIT-II:

Simultaneous Linear Differential Equations of form :

1) f1(D)x + f2(D)y = (t)
   (D)x + (D)y = (t)
   Where, D=d/dt.
2) dx/P = dy/Q = dz/R.

Partial Differential Equations:

Solutions of (i) One dimensional heat flow equation.
(ii) Two dimensional heat equation (Laplace Equation)
(iii) Laplace Equation in Polar form.Differential equation of first order & higher degree. **(10 Hrs, 20 Marks)**

UNIT-III:
Laplace Transform :
Definition of Laplace Transform, Inverse Laplace transform, Properties and theorems, Laplace transforms of standard functions, Unit step functions, Ramp functions, Impulse functions, Error functions , Jump functions, Laplace Inverse Transform.
Applications to the solutions of liquid systems, consisting of single tank & two tanks in series (Interacting & non-Interacting), Second order systems (Damped vibrator).
(10 Hrs, 20 Marks)

UNIT-IV:
Vector Integration :
(i) Line Integral, Surface Integral, Volume Integral.
(ii) Greens Lemma, Stoke's Theorem, Gausse's Divergence Theorem.
Finite Fourier Cosine & Sine transforms, Complex Fourier transforms , Infinite Fourier sine and Cosine transforms, Applications of Fourier transforms to boundary value problems such as one dimensional and two dimensional heat flow problems
(10 Hrs, 20 Marks)

UNIT-V:
Numerical Solution of Ordinary Differential Equations :
Taylor's series method, Runga-Kutta method, Piccard's method, Eulers method andLeast square method
Numerical Integration :
Trapezoidal rule, Simpson's 1/3rd rule, Simpson's 3/8th rule and Weddle's rule.
(10 Hrs, 20 Marks)

REFERENCES

1. P .N. Wartikar and J.N. Wartikar, Engineering Mathematics III : Pune Vidyarthi Griha Prakashan, Pune
2. Dr. B.S.Grewal, Higher Engineering Mathematics : Khanna Publications ,New Delhi
3. Wylie and Barrott, Advanced Engineering Mathematics : Tata McGraw Hill Publications.
4. Erwin Kreegszig, Advanced Engineering Mathematics : New age International ,New Delhi
5. Dr.Gokhale and A.N. Singh , Engineering Mathematics III : Nirali Publications.
6. Coughnour Donald R , Process System analysis & control : McGraw Hill, 1991.

6. COMPUTER APPLICATIONS

Teaching Scheme:
Practicals : 2 Hrs./ Week

Examination Scheme
Practical: 50 Marks
Term Work: 25 Marks

TERM WORK / PRACTICALS

Term work & practical should be based on following

1. Introduction to computer, O.S, M.S Office, Programming languages
2. History, C editor – C language
3. a+b, a-b ,a*b , a/b , a % b using keyboard
4. Using conditional operator find out largest number
5. If – else – program using if – else
6. For or while or Do while / nesting of for to print table of 1 to 10
7. Addition using function
8. Array - program using array

REFERENCES

1. Kanetkar Yashawant P. Let us C, BPB Publication, New Delhi.
2. Kanetkar Yashawant P. Let us C Solutions, BPB Publication, New Delhi.
3. Byron Gottfried, Schaum's Outlines Programming with C, Tata McGraw Hill Publication.
4. Fielding A. Computing for Biologists.
5. Wool E.J. Microcomputers in Biochemical Education.

S.E. BIOTECH. TERM II

1. BIOCHEMISTRY

Teaching Scheme:
Lectures: 4 Hrs./ Week
Practicals : 2 Hrs./ Week

Examination Scheme:
Paper: 100 Marks (3 Hrs)
Practical: 50 Marks
Term Work : 25 Marks

UNIT I

Structure and function of biomolecules; carbohydrates, proteins, lipids and nucleic acids. Biochemical separation methods. Vitamins, enzymes and coenzymes.

(10 Hrs**,** 20 Marks)

UNIT-II

Biological membranes and transport across them. Bioenergetics. Major anabolic and catabolic pathways of carbohydrate metabolism and their regulation; glycolysis, TCA cycle, pentose phosphate pathway, galactose metabolism, electron transport and oxidative phosphorylation, gluconeogenesis.

(10 Hrs**,** 20 Marks)

UNIT-III

Lipid metabolism; transport and oxidation of fatty acids in animal tissues, glycerol metabolism, biosynthesis of fatty acids and triacylglycerol.

Protein metabolism; out lines of amino acid metabolism and their significance.

(10 Hrs**,** 20 Marks)

UNIT-IV

Nucleic acid metabolism; mechanism and biosynthesis of DNA and RNA, reverse transcription. Protein biosynthesis, inhibitors of protein synthesis, transport of proteins and signal peptides.

(10 Hrs**,** 20 Marks)

UNIT-V

Typical metabolic pathways of microbes; Entner-Duodoroff pathway, glyoxilate cycle, phosphoketolate pathway.

Biochemical aspects of Hormone Action.

(10 Hrs**,** 20 Marks)

REFERENCES:

1. Lehninger A.L., Neston D.L., “Principles of Biochemistry”, N.M. Cox, CBS Publishers & Distributors.
2. Lubert Stryer “Biochemistry”, W.H. Freemen & Co. , New York.
3. Weil J.H. “General Biochemistry”, New Age International (Pvt. Ltd.).
4. Murray R.K. and others (Eds). Harper’s Biochemistry, 25th Edn. Appleton and Lange Stanford.

TERM WORK / PRACTICALS

Term Work Shall be based on any 10 experiments mentioned below.

1 Estimation of carbohydrates.
2. Estimation of proteins.
3. Estimation of nucleic acids:
4. Isoelectric precipitation.
5. Separation of amino acids by paper chromatography.
6. Separation of sugars by paper chromatography.
7. Extraction of Lipids.
8. Thin layer Chromatography.
9. Gel Electrophoresis.
10-11. Assay of enzyme activity and enzyme kinetics.
12. Identification and estimation of an intermediate of EMP pathway.
13. Cell fractionation.
14. Vitamin Assay.

REFERENCES

1. Plummer David T. "An Introduction to Practical Biochemistry", Tata McGraw-Hill Pubblishing Co. Ltd., New Delhi.
2. Jayraman J. A Laboratory Manual in Biochemistry. New Age International Publishers.
3. Sadasivan S. and Manikam K. Methods in Agricultural Biochemistry. Wiley Eastern Ltd., New Delhi.
4. S. Harisha. An Introduction to Practical Biotechnology. Laxmi Publications (P) Ltd. New Delhi.

2. CHEMISTRY

Teaching Scheme:	Examination Scheme:
Lectures: 4 Hrs./ Week	Paper: 100 Marks (3 Hrs)
Term Work : 2 Hrs./ Week	Term Work : 25 Marks

UNIT- I:

Reaction Mechanism:

Covalent Bond, Homolytic & Heterolytic Fission of Covalent Bond,Electrophiles & Nucleophiles.

Study of reactions with reference to the mechanism involved:

Aldol condensation, Cannizzaro& cross Cannizzaro reactions, Claisen ester condensation, Reimer Tiemann reaction, Grignard reagents & reactions.

SN^1 & SN^2 reactions.

Electrophilic substitution in aromatic rings: Nitration, Sulphonation, Halogenations, Fridel Crafts alkylation& acylations.

Elimination reactions:E_2 , E_1 mechanism.

(10 Hrs, 20 Marks)

UNIT-II:

Stereochemistry:

Basic concept of stereochemistry, Structural Isomerism, Different methods of representation of three dimensional molecule on paper, Conformational isomerism: Conformations of Ethane & n-Butane & their relative stability.

Geometrical isomerism: Cis-Trans isomerism shown by alkenes.

Optical isomerism: Measurement of Optical activity by Polarimeter , Specific rotation, Enantiomerism , Necessary conditions of optical activity, Optical isomerism of Lactic acid & Tartaric acid., Distereoisomerism. Baeyer's angle strain concept , Conformations of Cyclohexanes: Equatorial & axial bonds in cyclohexane.

(10 Hrs**,** 20 Marks)

UNIT-III:

Chemical kinetics:

Objective of chemical kinetics, rate of reaction, velocity constant of a reaction, elementary reaction steps & rate expressions, order & molecularity of reaction, factors influencing the reaction rates, integrated rate expressions for 1^{st}, 2^{nd} , 3^{rd} , & zero order reaction (with example), methods for determining order of reactions, experimental investigation of reaction kinetics.

Arrhenius equation, relationship between chemical kinetics & thermodynamics, problem based on above topics.

Fast reactions , Set up for study of Fast reactions

(10 Hrs**,** 20 Marks)

UNIT-IV:

Classical chemical thermodynamics:

Objective & scope, definition of thermodynamic systems.

Heat work reversibility, maximum work, isothermal & adiabatic process, I^{st} law of thermodynamics, II^{nd} law of thermodynamics, entropy, entropy changes, enthalpy & free energy, Gibbs Helmholtz equation, Third law of thermodynamics. Problems based on above topics.

Criteria of chemical equilibrium, Le Chatelier's theorem, its application to some systems likes ammonia, sulphuric acid, and nitric acid.

(10 Hrs**,** 20 Marks)

UNIT-V:

Surface phenomenon:

Surface tension of liquids, adsorption, adsorption of gases by solids, adsorption isotherm, Freundlich adsorption isotherm, the Langmueirs adsorption isotherm, application of adsorption.

Colloids & emulsion:

Types, methods of preparation, determination of particle size, properties, solution of micro molecules, properties of micro molecular solutions.

(10 Hrs**,** 20 Marks)

REFERENCES

1. Glasstone, Thermodynamics for chemist :McMillan India Ltd.
2. Maron-Prutton, Principles of Physical chemistry: Oxford & IBH publishing Co.Pvt.Ltd. New Delhi
3. Puri & Sharma, A textbook of physical chemistry : S. Chand & Co. Delhi
4. B.S.Behl, Physical Chemistry, S. Chand & Co. Delhi
5. Morrison & Boyd, Organic Chemistry: Allyn Bacon Inc.
6. Pine, Organic Chemistry: McGraw Hill Int.Co.

TERM WORK

Term Work Shall be based on any 08 experiments mentioned below.

1. Preparation of p-nitro acetanilide by nitration.
2. Preparation of Quinone.
3. Determination of rate constant of Hydrolysis of Methyl Acetate.(1^{st} Order)
4. Determination of rate constant of Saponification of Ethyl Acetate.(2^{nd} Order)
5. Determination of surface tension liquids by Stalagmometer.
6. Preparation of colloidal solution of starch.
7. To verify Freundlich adsorption Isotherm
8. Estimation of Acetone
9. Estimation of Aniline
10. Stability of emulsions

REFERENCES

1. S.S.Dara, Experiments and Calculations in Engineering Chemistry, S. Chand & Co. Delhi
2. S.K.Bhasin, Laboratory manual on engineering Chemistry: Dhanpat Rai Pub.New Delhi.

3. IMMUNOLOGY

Teaching Scheme:	Examination Scheme:
Lectures: 4 Hrs./ Week	Paper: 100 Marks (3 Hrs)
Practicals : 2 Hrs./ Week	Practical: 50 Marks
	Term Work : 25 Marks

UNIT-I

Introduction to Immunology: Properties of immune response, Innate and acquired immunity, active and passive immunity.

Cells & Tissues of Immune System: Lymphocytes, Classes of lymphocytes, antigen presenting cells, NK Cells, Mast Cells, Dendritic Cell, Organs of the Immune System, Bone marrow, Thymus, Lymph node, Spleen, CALT, MALT.

(10 Hrs, 20 Marks)

UNIT-II

Molecular Immunology: - Molecular structure of antibody, Classification, Isotypes, Synthesis assembly and expression of immunoglobulin molecules, Nature of antigens, function and diversity, Generation of anti-body diversity.

Antigens: Different characteristics of antigens, mitogens, Hapten, Immunogen, Adjuvants.

(10 Hrs**,** 20 Marks)

UNIT-III

MHC: Discovery of MHC complex, Role of MHC, Structure of MHC molecule, Binding of peptides to MHC molecules, MHC restriction.

Effecter Mechanism of Immune Response: Cytokines, T- cell receptors, cell activation, complement system, antigen processing and presentation, regulation of immune response.

(10 Hrs**,** 20 Marks)

UNIT-IV

Immunological Techniques:- antigen- antibody reactions, Immuno diffusion, immunoelectrophoresis, ELISA, RIA, fluorescence activated cell sorter.

(10 Hrs**,** 20 Marks)

UNIT-V

Applied Immunology:- Immune system in health and disease, autoimmunity, hypersensitivity, tumor immunity, tissue and organ transplant, Synthetic vaccines.

Hybridoma technology: - Fusion of myeloma cells with lymphocytes, production of monoclonal antibodies and their application.

(10 Hrs**,** 20 Marks)

REFERENCES

1. R. A. Goldsby, T.J. Kindt, B.A. Osborne Kuby- Immunology (4th Edition)
2. Ivan Riot- Essentials of Immunology (6th Edition), Blakswell Scientific Publications, Oxford, 1988.
3. Paul W.E. (Eds.), Fundamentals of Immunology, Raven Press, New York, 1988.
4. Roitt I.M. (1998) Essentials of Immunology. ELBS, Blackwell Scientific Publishers, London.
5. Barrett J.T. (1983). Text book of Immunology. Mosby, Missouri.
6. Kuby J.(1994). Immunology., 2nd Edn. W.H.Freeman and Company, New York.

TERM WORK / PRACTICALS

Term Work Shall be based on any 08 experiments mentioned below.

1. Immunoelectrophoresis
2. Radial immunodiffusion
3. Antigen –Antibody interaction: The Ouchterlony procedure
4. Introduction to ELISA reactions
5. AIDS KIT-1: Simulation of HIV-1 detection
6. Western Blot Analysis – demo

7. Immunology of pregnancy test – demo
8.Viral antigen detection by rapid immuno-chromatographic cassette assay
9. Latex agglutination test
10. Precipitin reaction
11. Antibody titer test
12. Agglutination reaction

REFERENCE

1. Harlow and David Lane Antibodies A laboratory Manual: (1988), Cold spring harbor laboratory.
2.Talwar G.R. and Gupta S.K. (Eds.). A Handbook of Practical and Clinical Immunology, Vol. 1 and 2 (2nd Edn.). CBS Publishers and Distributors.

4. BIOSTATISTICS

Teaching Scheme:	Examination Scheme:
Lectures: 4 Hrs./ Week	Paper: 100 Marks (3 Hrs)
Term Work : 2 Hrs./ Week	Term Work : 25 Marks

UNIT-I

Presentation of Data: Frequency distribution, graphical presentation of data by histogram, frequency curve and cumulative frequency curves.

Measure of Location and Dispersion: Mean, Medium, Mode and their simple properties (without derivation) and calculation of median by graphs: range, mean deviation, Standard deviation, Coefficient of variation.

(10 Hrs, 20 Marks)

UNIT-II

Probability and Distribution: Random distributions, events-exhaustive, mutually exclusive and equally likely, definition of probability (with simple exercises), definition of binomial, Poisson and normal distributions and their inter-relations, Simple properties of the above distributions (without derivation).

(10 Hrs, 20 Marks)

UNIT-III

Correlation and Regression: Bivariate data – simple correlation and regression coefficients and their relation, Limits of correlation coefficient, Effect of change of origin and scale on correlation coefficient, Linear regression and equations of line of regression, Association and independence of attributes.

Sampling: Concept of population and sample, Random sample, Methods of taking a simple random sample. **(10 Hrs, 20 Marks)**

UNIT-IV

Tests of Significance: Sampling distribution of mean and standard error, Large sample tests (test for an assumed mean and equality of two population means with known S.D.); small sample tests (t-test for an assumed mean and equality of means of two populations when sample observations are independent, Paired and unpaired t-test for correlation and regression coefficients, T-test for comparison of variances of two populations, Chi-square test for independence of attributes, Goodness of fit and homogeneity of samples.

(10 Hrs**,** 20 Marks)

UNIT-V

Experimental Designs: Principles of experimental designs, Completely randomized, Randomized block and latin square designs, Simple factorial experiments of 22, 23, 24 and 32 types, Confounding in factorial experiments (mathematical derivations not required); Analysis of variance (ANOVA) and its use in the analysis of RBD.

(10 Hrs**,** 20 Marks)

REFERENCES

1. Statistical methods in biology by Norman T.J. Bailey (3rd Edition), Cambridge University Press (1995).
2. Gupta S.C. Fundamentals of Statistics. Himalaya Publishing House, New Delhi.
3. Khan. Biostatistics. Tata Mc Graw Hill Publishers.
4. Daniel W.W.(7^{TH} Edn., 1999). Biostatistics: A Foundation for Analysis in the Health. John Wiley and Sons Inc. New York.
5. Sharma N.K.(1996). Statistical Techniques. Mangal Deep Publications, Jaipur, India.

TERM WORK

Any eight assignments based on the following.

1.Mean , Median, Mode and their properties
2.Calculation of median by graphs, range, mean deviation, standard deviation and coefficient of variation.
3. Exercises on probability, bionomial distribution, Poisson and normal distribution.
4. Problems on coefficient of correlation and regression.
5. Problems on line of regression.
6. Sampling distribution of mean and standard error and Problems on large sample tests.
7. Problems on small sample tests and t- tests for correlation and regression coefficients.
8. T- tests for comparison of variances and goodness of fit.
9. Problems on experimental design.
10. Problems on analysis of variances (ANOVA) and its use in R.B.D.

5. PROCESS HEAT TRANSFER

Teaching Scheme:
Lectures: 4 Hrs./ Week
Practicals: 2 Hrs. / Week

Examination Scheme:
Paper: 100 Marks (3 Hrs)
Oral: 25 Marks
Term Work: 25 Marks

UNIT- I:
Heat transfer by conduction in solids;
Fourier's law of heat conduction ,steady state heat conduction through walls (single and multilayer), heat flow through cylinder ,unsteady state heat conduction ,Derivation of Fourier's heat conduction equation in three dimensions , equation for one dimensional conduction , heat conduction through a semi infinite slab , lumped capacity method of unsteady state conduction .
Principles of heat flow in fluids.

(10 Hrs, 20 Marks)

UNIT-II:
Typical heat exchange equipment ,counter current and parallel flows, energy balances, overall heat transfer coefficient , log mean temperature difference, individual heat transfer coefficient, calculation of overall coefficient from individual coefficients , transfer units in heat exchangers.
Heat transfer to fluids without phase change.

(10 Hrs, 20 Marks)

UNIT- III:
Regimes of heat transfer in fluids, heat transfer by forced convection in laminar and turbulent flow, dimensional analysis method, use of imperials equations heat transfer by forced convection outside tubes, natural convection.
Heat transfer to fluids with phase change.
Dropwise and film type condensation, coefficient for film type condensation, practical use of Nusselt's equations, application to petroleum industries

(10 Hrs, 20 Marks)

UNIT- IV:
Heat transfer to boiling liquids:
Boiling of saturated liquids maximum flux and critical temperature drop, maximum Flux and film boiling.
Radiation heat transfer:
Fundamental of radiation, black body radiation, Kirchoff's law, radiant heat exchange between non black surfaces. Combined heat transfer by conduction, convection, radiation.

(10 Hrs, 20 Marks)

UNIT- V:

Heat exchange equipments:

Heat exchanger single pass 1-1 exchanger, 1-2 shell and tube heat exchanger, correction for LMTD for cross flow, design calculation (Kern Method) in heat exchanger.

Evaporation:

Liquid characteristics and types of evaporator, single effect evaporator calculation, pattern of liquor flow in multiple effect evaporators.

(10 Hrs, 20 Marks)

REFERENCES

1.W.L.McCabe and J.C.Smith , Unit operations in chemical engineering. McGraw Hill/Kogakusha Ltd.
2.Coulson & Richardson , Chemical engineering. – Volume. I , Pergamon Press
3.Kern D.Q. Process Heat Transfer, McGraw Hill Book 1NC New York, 1950
4.D.S.Kumar, Process Heat Transfer, S.K.Kataria and Sons Publisher, New Delhi
5.Dawande S.D. Principals of Heat Transfer and Mass Transfer. Central Techno Publications, Nagpur.

TERM/PRACTICALS

Term Work Shall be based on any 08 experiments mentioned below.

1) Conductivity of metals and / or insulator.
2) Experiment on Pin fins.
3) Experiment on forced convection apparatus.
4) Experiment on natural convection apparatus.
5) Determination of emmisivity of test plate.
6) Stefan Boltzman apparatus .
7) Parallel / counter flow heat exchanger.
8) Study of pool boiling phenomenon and critical heat flux.
9) Study of heat transfer in evaporator .
10) Temperature profile in a rod .
11) Study of evaporators .
12) Dropwise and filmwise condensation .

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NORTH MAHARASHTRA UNIVERSITY,

JALGAON (M.S.)

THIRD YEAR ENGINEERING(T.E.)

BIOTECHNOLOGY

TERM – I & II

W.E.F. 2008-2009

NORTH MAHARASHTRA UNIVERSITY, JALGAON

STRUCTURE OF TEACHING & EVALUATION

T.E. (BIOTECHNOLOGY) W.E.F.2008-2009

First Term

Sr. No.	Subject	Teaching Scheme Hours/Week		Examination Scheme				
		Lectures	Practical	Paper Duration Hours	Paper	TW	PR	OR
1	Bio Process Principles	04	--	03	100	25	--	--
2	Chemical Reaction Engineering	04	04	03	100	25	--	50
3	Mass Transfer-I	04	04	03	100	25	50	--
4	Molecular Biology & Genetic Engineering	04	04	03	100	25	--	25
5	Enzyme Engineering	04	--	03	100	25	--	--
		20	12		500	125	50	75
	Grand Total	32			750			

Second Term

Sr. No.	Subject	Teaching Scheme Hours/Week		Examination Scheme				
		Lectures	Practical	Paper Duration Hours	Paper	TW	PR	OR
1	Instrumentation & Process Control	04	02	03	100	25	--	25
2	Biological Thermodynamics	04	02	03	100	25	--	--
3	Mass Transfer-II	04	04	03	100	25	50	--
4	Biotechnology of Waste Treatment	04	04	03	100	25	--	25
5	Fermentation Biotechnology- I	04	--	03	100	25	--	--
6	Practical Training/Mini Project/Special Study	--	--	--	--	25	--	--
		20	12		500	150	50	50
	Grand Total	32			750			

T.E. BIOTECH TERM I

1. BIOPROCESS PRINCIPLES

Teaching Scheme:	Examination Scheme
Lecturers: 4Hrs/week.	Paper: 100 marks (3Hrs)
	Term work: 25 marks

Unit: I

Introduction: Bioprocess development, Material balance: Procedure for material balance calculations, material balances – worked examples, Material balance with recycle, By pass and purge systems, Growth stoichiometry and elemental balance. Biomass yield, Theoretical O_2 demand, worked out examples on above**,** Energy Balance: Procedure for energy balance calculations without and with reaction, worked out examples, Energy balance equation for cell culture, Fermentation energy balance, worked out examples, Unsteady state material and energy balance (USMEB): Unsteady state material balance equations, unsteady state energy balance equations and worked examples on USMEB.

(10 Hrs, 20 Marks)

Unit: II

Heat transfer in Bioprocess: Design equation for heat transfer process, Energy balance, Logarithmic and arithmetic mean temperature difference, Calculation for heat transfer coefficient for flow outside tubes, without phase change and for stirred liquids, Applications of design equations, Relationship in between heat transfer, cell concentrations and stirring conditions, Numerical based examples on above.

Mass transfer in Bioprocess: Role of diffusion in bioprocessing, Different equations in mass transfer (liquid-solid, liquid-liquid and gas-liquid) , Oxygen uptake in cell culture: Factors affecting cellular oxygen demand, Oxygen transfer from gas bubble to cells, Oxygen transfer in fermenter, measuring dissolved oxygen concentrations, Measurement of K_La: Oxygen balance method, Gassing out techniques (static method of Gassing out and dynamic method of Gassing out) Sulphite oxidation, Factors affecting K_La, Oxygen transfer in large vessels, Numerical based examples on above.

(10 Hrs, 20 Marks)

Unit: III

Fermentation broth: Viscosity, Viscosity measurement, types of viscometers, uses of viscometer with fermentation broths, Rheological properties of fermentation broths, Factors affecting broth viscosity (Cell concentration, cell morphology, and osmotic pressure, product and substrate concentrations).

Mixing in Fermenters: Mechanism of mixing, Assessing mixing effectiveness, estimation of mixing time, Power requirement for mixing: Ungassed Newtonian fluids, ungassed non-Newtonian fluids, Gassed fluids, Calculation of power requirements, Scale up of mixing systems, Improving mixing in Fermenters, Effect of rheological properties on mixing, Role of shear in stirred fementers: Interaction between cells and turbulent eddies, Bubble shear, operating conditions for shear damage.

(10 Hrs, 20 Marks)

Unit: IV

Kinetics of Substrate utilization, product formation and biomass production in cell cultures, General reaction kinetics for biological systems: Zero order kinetics, First order kinetics, Numerical based examples on this, Yields in cell cultures: Overall and instantaneous yields, Theoretical and observed yields, Numerical based examples on this. Cell growth kinetics: Batch growth kinetics, kinetics of balanced growth, Monod growth kinetics, factors affecting growth kinetics with plasmid instability, kinetic implication of endogenous and maintenance metabolisms, transient growth kinetics, unstructured batch growth model, Growth of filamentous organisms, structured kinetic model, Product formation Kinetics: unstructured model, chemically structured product formation kinetics, model, product formation kinetics by filamentous organisms, segregated kinetics models of growth and product formation, Biomass production: Biomass yield from substrate, Kinetics of cell death, Numerical based examples on this.

(10 Hrs, 20 Marks)

Unit: V

Heterogeneous reactions in bioprocessing, Concentration gradient and reaction rates in solid catalyst: True and observed reaction rates, Interaction between mass transfer and reaction, Mass transfer and reaction: Steady state shell mass balance, first order kinetics and spherical geometry, zero order kinetics and spherical geometry, Michaelis-Menten Kinetics and spherical geometry, Prediction of observed reaction rates, The Thiele modulus and effectiveness factor: Zero order kinetics, First order kinetics, Michaelis-Menten Kinetics, The observable Thiele Modulus, Weiss's criteria, Minimum intracatalyst substrate concentration, External mass transfer, Liquid-solid mass transfer correlations: Free moving spherical particles, Spherical particles in packed bed, Minimizing mass transfer effect: Internal mass transfer and external mass transfer, Evaluation of true kinetic parameters, General comments on Heterogeneous reaction in bioprocessing.

(10 Hrs, 20 Marks)

References

1. Pauline M. Doran, Bioprocess Engineering Principles, Academic Press an Imprint of Elsevier.
2. James E. Bailey, David F. Ollis, Biochemical Engineering Fundamentals, Mc Graw-Hill Book Company.
3. Michael L. Shuler, Fikret Kargi, Bioprocess Engineering, Basic concepts, Prentice Hall India Pvt. Ltd., New Delhi.
4. J. F. Richardson and D. G. Peacock, Coulson and Richardson's Chemical Engineering (Vol: 3) Asian Books Pvt. Ltd., New Delhi.
5. Murray Moo-Young, Comprehensive Biotechnology (Vol: 1), Pergamon Press, An imprint of Elsevier.

Term Work shall be based on the following assignments:

1. Material and Energy balances in Bioprocesses
2. Unsteady state material and Energy balances and fermentation energy balances
3. Heat and Mass transfer in bioprocesses
4. Oxygen transfer in fermenter

5. Fermentation broth(Viscosity and Rheological properties)
6. Mixing in fermenter
7. Kinetics of Substrate utilization, product formation and biomass production in cell Cultures
8. Heterogeneous reactions in bioprocesing

2. CHEMICAL REACTION ENGINEERING

Teaching Scheme:
Lectures: 4 Hrs. / Week
Practical: 4 Hrs. / Week

Examination Scheme:
Paper: 100 Marks (3 Hrs)
Oral: 50 Marks
Term Work: 25 Marks

Unit: I
Introduction to chemical reaction engineering: Review of chemical reaction equilibrium, Classification of chemical reaction, rate of reaction, order and molecularity of reaction, rate constant, Temperature dependent term of rate equation, comparison of theories, Activation energy and temperature dependency, rate of reaction predicted by theories, Reaction mechanism.

(10 Hrs, 20 Marks)

Unit: II
Collection and interpretation of kinetic data, Constant volume batch reactor, integral and differential method of analysis of data, Variable volume batch reactor, integral and differential method of analysis of data, The search for rate equation.

(10 Hrs, 20 Marks)

Unit: III
Ideal batch reactor, mixed flow reactor, plug flow reactor, space time and space velocity, holding time and space time for batch, mixed and plug flow reactors, comparison in mixed and plug flow reactors, Combined flow system, Recycle reactor, Autocatalytic reaction, Introduction to multiple reactions: Series and parallel reactions. Introduction to non-ideal flow.

(10 Hrs, 20 Marks)

Unit: IV
Introduction – Rate equations for heterogeneous systems, Contacting patterns in Two – Phase system, Introduction to fluid particle reaction non-catalytic reactions, unreacted core model for Spherical particle of unchanging size, Rate of reaction for shrinking spherical particles, Determination of rate controlling step, Various contacting patterns in fluid solid reactors for fluid-particle non-catalytic reactions

(10 Hrs, 20 Marks)

Unit: V
Introduction to solid catalyzed reactor, Rate equation for adsorption, desorption and surface reaction, Diffusion and reaction in spherical catalyst pellets, Internal effectiveness factor, Over all effectiveness factor, Estimation of diffusion and reaction limited

regimes, Mass transfer and reaction in a packed bed, The determination of limiting situation from reaction data, Introduction to heterogeneous catalytic reactors with applications.

(10 Hrs, 20 Marks)

References

1. Octave Levenspiel, Chemical reaction engineering, John Wiley and sons.
2. J.M. Smith, Chemical engineering kinetics, McGraw Hill
3. S.D. Dawande, Principles of reaction engineering, Central Techno publication, Nagpur.
4. H.Scott Fogler, Elements of chemical reaction engineering, Prentice Hall New Jersy.
5. Lanny D. Schimdt , Chemical reaction engineering, Oxford University Press.

Practical and Term work shall consist of minimum eight experiments from list given below.

1. To determine the reaction rate constant {k} for given reaction.(CSTR / BATCH / SEMIBATCH / PFR)
2. To determine the effect of temperature on reaction rate constant. .(CSTR / BATCH / SEMIBATCH / PFR)
3. To determine the activation energy {E} for the given reaction. .(CSTR / BATCH / SEMIBATCH / PFR)
4. To draw C [t], E [t] and F [t] curve and to calculate the mean residence time {tm} variance { σ^2} and skew ness { S^3} for plug flow reactor.
5. To draw C [t], E [t] and F [t] curve and to calculate the mean residence time {tm} variance {σ^2} and skew ness {S^3} for packed Bed reactor.
6. To study the cascade CSTR.
7. To study the reaction of solid liquid system for an instantaneous reaction for benzoic acid, NaOH and calculate the enhancement factor.
8. To study the isothermal decomposition of ethyl alcohol in tubular reactor packed with activated alumina catalyst.
9. Adsorption: To study the adsorption of Acetic acid on charcoal.

3. MASS TRANSFER-I

Teaching Scheme:	Examination Scheme:
Lectures: 4 Hrs. / Week	Paper: 100 Marks (3 Hrs)
Practical: 4 Hrs. / Week	Practical: 50 Marks
	Term Work: 25 Marks

Unit: I

Introduction to mass transfer operations, Steady state molecular diffusion in fluid at rest, Multicomponent mixture diffusion, Maxwell’s law of diffusion. Diffusion in solids, unsteady state diffusion

(10 Hrs, 20 Marks)

Unit: II

Eddy (turbulent) diffusion: Relation between mass transfer coefficients. Mass transfer coefficient in laminar and turbulent flow. Theories of mass transfer. Equipments for gas liquid operation

(10 Hrs, 20 Marks)

Unit: III

Equilibrium for mass transfer process: Local two phase mass transfer. Local overall mass transfer coefficient, Use of local overall coefficient. Material balances for steady state co current, countercurrent, cross flow cascade, counter flow cascade. Application of mass transfer processes.

(10 Hrs, 20 Marks)

Unit: IV

Introduction to Gas Absorption Operation: Equilibrium solubility of gases in liquids. Material balance for one component transferred in countercurrent flow and co current flow. Countercurrent multistage operation, one component transferred. Continuous contact equipment. Introduction to multi component system. Absorption with chemical reaction. Different absorption operation equipments (plate tower, packed tower, venturiscrubber) Operational difficulties like coning weeping, dumping, priming, flooding in plate and packed tower.

(10 Hrs, 20 Marks)

Unit: V

Introduction to Humidification: Vapour liquid equilibrium, Humidification terms. Determination of humidity, Humidification and dehumidification. Water cooling operation equipment. Introduction to Drying operation: Rate of drying, Mechanism of moisture movement during drying, Drying equipments, Different methods of drying

(10 Hrs, 20 Marks)

Practicals and term work shall be based on experiments mentioned below.

1. Diffusion in Still Air: To estimate mass transfer coefficient for given system at room temperature.
2. Liquid – Liquid Diffusion: To determine diffusion coefficient for given system as function of concentration.
3. Solid – Liquid Diffusion: To determine mass transfer coefficient for dissolution of benzoic acid without chemical reaction.
4. Wetted Wall Column: To determine mass transfer coefficient for air – water system.
5. Absorption in Packed Column: To find mass transfer coefficient of given system.
6. Cooling Tower: To determine volumetric mass transfer coefficient for air – water system.
7. Natural Drying (Batch): To obtain drying curve for batch drying operation.

8. Fluidized Bed Dryer: To determine the rate of drying and to obtain mass transfer coefficient for the given material.

References:

1. R.E.Treybal , Mass transfer operation ,McGraw Hill Publication
2. Coulson and Richardson Chemical Engineering (Vol. I and II), Pergamon Press
3. Christie J.Geankoplis ,Transport Processes and Unit Operations ,Prentice Hall inc
4. P. Chattopadhayay ,Unit operation in Chemical Engg. (Vol. I and II), Khanna Publications Delhi.

4. MOLECULAR BIOLOGY AND GENETIC ENGINEERING

Teaching Scheme:	Examination Scheme
Lecturers: 4Hrs/week.	Paper: 100 marks (3Hrs)
Term work: 4Hrs/week	Oral: 25 marks
	Term work: 25 marks

Unit: I

Introduction, Replication, DNA repair and DNA recombination:

C-value paradox, organization of genes (overlapping genes, antigens), central dogma, one gene – one polypeptide hypothesis. Replication: Enzymes and proteins involved in DNA replication: Structure and functions of DNA polymerase I,II,III, primase, polynucleotide ligase, endonuclease, helicase, single stranded binding proteins, topoisomerase. Types of DNA replication: Semi conservative method of replication, Meselson and Stahl experiment, bidirectional DNA replication, generalized model for the DNA replication, replication of E.Coli and eukaryotes chromosomes. DNA repair: Mismatch repair, base-excision repair, nucleotide excision repair, direct repair. DNA recombination: Homologous genetic recombination, site –specific recombination. Enzymes in DNA recombination

(10 Hrs, 20 Marks)

Unit: II

Gene expression

Transcription: RNA polymerase of prokaryotes and Eukaryotes (structure, types and function), transcription factors, Basal transcription factors, mechanism of transcription in eukaryotes and prokaryotes, Eukaryotic promoters, the enhancers.

RNA processing: Introduction, processing of the ribosomal RNA, transfer RNA, and the messenger RNA (eukaryotic),RNA splicing by group 1 and group 2 introns (mechanism). Translation:-Genetic code; wobble hypothesis, ambiguity, degeneracy, universality of the genetic code. Protein synthesis:-Structure of Ribosome, t –RNA, messenger RNA. Steps in the protein synthesis: Activation of the amino acids, initiation (formation of amino acyl t –RNA), Elongation; termination and release, folding and post translational processing

(10 Hrs, 20 Marks)

Unit: III

Regulation of gene expression in prokaryotes and eukaryotes:

Introduction, levels of DNA regulation:-DNA replication in gene regulation, regulation of the transcription, Operon concepts (lac, tryptophan and arabinose operon) regulatory proteins, DNA binding proteins (zinc finger and helix –turn- helix), protein binding domains (leucine-Zipper and basic helix -loop-helix), Regulation of translation, regulation of genes expression in eukaryotes.

(10 Hrs, 20 Marks)

Unit: IV

Genetic engineering

Introduction, Brief outline of the genetic engineering (rDNA)

Properties of good vectors, vectors used in genetic engineering: plasmid vectors (PBR 322, PUC plasmids, M13 vectors), cosmids, bacteriophages, yeast artificial chromosomes, bacterial artificial chromosomes. Enzymes used in genetic engineering: Restriction endonuclease (type I, II and III), DNA ligase, DNA polymerase, Reverse transcriptase, polynucleotide kinase, terminal deoxynucleotidyl transferase, alkaline phosphatase. Integration of the DNA insert into the vector: Both ends of the cohesive and the compatible, Both ends cohesive and separately matched, Both ends cohesive and mismatched, both ends flush / blunt one end cohesive and compatible.

(10 Hrs, 20 Marks)

Unit: V

Construction of the DNA libraries: Isolation and purification of nucleic acids, isolation of plasmids, construction of the genomic and cDNA libraries, methods of gene transfer: direct transformation (polyethylene glycol, Ca++, microinjection, nuclear transplantation), Using vectors (Ti plasmids in plants,SV40 vectors for animals), using viruses (cauliflower mosaic virus, Gemine virus, papilioma virus, retro virus), Gene transfer in bacteria (conjugation, transformation and transduction), analysis and expression of cloned gene ,Gene amplification ,PCR and its application: Basic PCR and inverse PCR, molecular probes and its application, Labeling of probes: radioactive and non radioactive probe labeling.

(10 Hrs, 20 Marks)

References:

1. B.D. Singh, Genetics –Rastogi publication
2. Lehninger , Principles of the biochemistry- Nelson MacMillan press
3. B.D. Singh Basic biotechnology , Kalyani Publisher.
4. Primrose S. B. Principles of gene manipulation- Blackwell scientific publication
5. Bruse Albertis , Molecular biology of the cell , Garland publication.

Practical and Term work shall consist of minimum eight experiments from list given below .

1. Isolation of genomic DNA from bacteria.
2. Isolation of RNA from yeast.
3. Isolation of total plasmid DNA from bacteria.
4. Restriction digestion of genomic DNA of bacteria.
5. Ligation of bacterial DNA.

6. Calculation of molecular weight by using DNA marker with agrose gel electrophoresis.
7. DNA extraction from Blood.
8. Plasmid preparation.
9. DNA fingerprinting (by RFLP)
10. To study Bacterial transduction.

References:

1. S. Harisha. An Introduction to Practical Biotechnology. Laxmi Publications (P) Ltd. New Delhi.
2. Aneja K.R.(2nd Edn., 1996). Experiments in Microbiology, Plant pathology, Tissue Culture and Mushroom Cultivation. Wishwa Prakashan, New Age International (P) Ltd.
3. Plummer David T. "An Introduction to Practical Biochemistry", Tata McGraw-Hill Pubblishing Co. Ltd., New Delhi.
4. Jayraman J. A Laboratory Manual in Biochemistry. New Age International Publishers

5. ENZYME ENGINEERING

Teaching Scheme:	Examination Scheme
Lecturers: 4Hrs/week.	Paper: 100 marks (3Hrs)
	Term work: 25 marks

Unit: I

Introduction, Nomenclature and classification of enzyme, Chemical nature and properties of enzymes: General basis of catalysis (Activation energy), Thermodynamic definition of enzyme catalysis, Binding energy, Transition state, Specificity (Substrate Specificity , Stereo specificity and Geometric specificity), Active site, allosteric site. Structure and Function of some cofactor and coenzymes. Factors effecting enzymes activity, Models of enzyme activity: Lock and key model, Induced fit, Substrate Strain model. Isoenzyme, with example and its application.

(10 Hrs, 20 Marks)

Unit: II

Kinetics of enzyme:

Enzyme kinetics, rate equation, Rate of reaction, First order and second order reaction, Michaelis – menten equation (Steady state kinetics) and Haldane relationship, Significance of Km, Lineweaver – Burk or Double – reciprocal plot, Eadie-Hofstee plot, Hanes plot, Turnover number, Specificity constant, Bisubstrate reaction, Inhibition kinetics : Reversible inhibition (Competitive, uncompetitive and Mixed inhibition) with kinetics, Irreversible inhibition, Application of enzyme inhibition, Regulation of enzyme activity (coarse control and fine control) and it's types, Allosteric enzymes, Kinetic properties of Allosteric enzymes , models for allosteric behaviors (MWC model and KNF model), Feedback inhibition, Cascade system (Genetic regulation) ,Numerical on above kinetics.

(10 Hrs, 20 Marks)

Unit: III

Enzymatic catalysis**:**

Catalytic mechanism : Acid-base catalysis, Covalent catalysis, Metal ion catalysis, Electrostatic catalysis, Proximity and Orientation effects, preferential binding of the transition state complex, Mechanism and action of some enzymes: chymotrypsin, RnaseA, Lysozyme, Hexokinase, Enolase, Lactate dehydrogenase, Alcohol dehydrogenase, Glutathione reductase, Pyruvate dehydrogenase.

Bisubstrate or Multisubstrate reaction: Ping – Pong mechanism, sequential mechanism, (Compulsory ordered and Random ordered), Enzyme model
(Host guest complexation chemistry).

(10 Hrs, 20 Marks)

Unit: IV

Immobilization of enzymes**:**

Techniques of enzyme Immobilization : Adsorption, Covalent linkage, Matrix entrapment, Encapsulation with example, Kinetics of immobilized enzyme, effect of solute Partition and diffusion on the kinetics of immobilized enzymes, Immobilized enzyme in bioconversion process (Production of L-amino acid from racemic mixture), Bioreactors using immobilized enzymes.

Enzyme Purification –

Introduction, objective in enzyme Purification, Steps involved in enzyme purification: Choice of source, Method of homogenization, Methods of separation: Depends on size or mass (Centrifugation, Gel filtration), Method depend on Polarity (Ion-exchange, electrophoresis, Iso-electric focusing), depends on changes in solubility (change in pH, ionic strength, Dielectric constant), Based on specific binding (Affinity chromatography)
Example of purification procedure (Adenylate kinase, RNA polymerase).

(10 Hrs, 20 Marks)

Unit: V

Enzyme engineering and Industrial uses of enzymes:

Design and construction of novel enzymes (protein engineering), Artificial Enzymes, Enzymes used in detergents, use of Proteases in food, Leather and wood industries, methods involved in production of Glucose syrup from starch, production of maltose and sucurose, glucose from cellulose, Use of Lactase in dairy industry, glucose oxidase and catalase in food industry, medical application of enzymes, Enzymes in biosensors.

(10 Hrs, 20 Marks)

References:

1. Lehninger, Nelson and cox. Principles of Biochemistry –Macmillan publishers.
2. Voet and Voet, Biochemistry, Wiley publisher.
3. Biotol series, Principles of Cell energetics , Butterworth- Heinemann Ltd,Jordan Hill, Oxford.

4. Biotol Series, Principles of enzymology and its application, Butterworth-Heinemann Ltd,Jordan Hill, Oxford.
5. Nicholascprice and Tewis stereous, Fundamentals of Enzymology, Oxford University press.
6. Palmer, Enzymes, Oxford University press.
7. Michael L. Shuler, Fikret Kargi, Bioprocess Engineering, Basic concepts, Prentice Hall India Pvt. Ltd., New Delhi.. .
8. J. F. Richardson and D. G. Peacock, Coulson and Richardson's Chemical Engineering (Vol: 3) Asian Books Pvt. Ltd., New Delhi
9. Murray moo-young, Comprehensive Biotechnology Pergemon Press(Vol 2)
10. Pauline M. Doran, Bioprocess Engineering Principles, Academic Press an Imprint of Elsevier.
11. James E. Bailey, David F. Ollis, Biochemical Engineering Fundamentals, Mc Graw-Hill Book Company.

Term work shall be based on following assignments:

1. Enzymes: Nomenclature, Classification and Properties.
2. Enzyme Kinetics: Michaelis – Menten Equation and evaluation of parameters of Michaelis – Menten Equation.
3. Inhibition kinetics of enzyme.
4. Enzymatic catalysis.
5. Bisubstrate or Multisubstrate reaction.
6. Immobilization of enzyme.
7. Enzyme purification.
8. Enzyme engineering and Industrial application of enzymes.

T.E. BIOTECH TERM II

1. INSTRUMENTATION AND PROCESS CONTROL

Teaching Scheme:	Examination Scheme:
Lectures: 4 Hrs. / Week	Paper: 100 Marks (3 Hrs)
Practical: 2 Hrs. / Week	Oral: 25 Marks
	Term Work: 25 Marks

Unit: I

Qualities of Measurement: The meaning of measurement, the elements of instruments, Static Characteristics, Dynamic characteristic. Expansion Thermometers: Introduction, Temperature scales, Constant volume gas thermometer, Bimetallic Thermometer, Industrial pressure spring thermometer, Response of Thermometer.

Thermoelectric Temperature Measurement: Introduction, Simple thermocouple circuit, Industrial thermocouples, Thermocouple lead wires, thermal wells, response of thermocouples. Resistance Thermometer: Introduction, Industrial resistance-thermometer bulbs, Resistance Thermometer element, Resistance thermometer circuit, RTD.

(10 Hrs, 20 Marks)

Unit: II

Pressure and Vacuum Measurement: Introduction, Indicating pressure gage, Bellows pressure element, Useful ranges of absolute pressure measuring gages, Mclead vacuum gage.

Measurement of Level: Float and tape liquid level gage, Float and shaft liquid level unit, Level measurement in pressure vessels, Gamma ray method, Ultrasonic method and resistive method.

Introduction, Theory, Instrumentation, advantages, and Application of: pH measurement, Refractrometry, Potentiometry, colourometry and Flame photometry.

(10 Hrs, 20 Marks)

Unit: III

Characteristics of Chemical Process Control, Mathematical Modeling of Chemical Processes, State Variables and State Equation for Chemical Processes. Input –Output Model, Linearization of non linear systems, Solution of Linear differential equation using Laplace Transform.

First order system and their transfer functions. Dynamic behavior of first order system , Pure capacity process, First order system with variable time constant and gain, Response of first order system in series :Interacting and Non-interacting.

(10 Hrs, 20 Marks)

Unit: IV

Second order system and their transfer function. Dynamic behavior of second order system: under damped and over damped and critically damped systems, Transportation lag. Higher order systems.

(10 Hrs, 20 Marks)

Unit: V

Introduction to feedback control, Controllers and final control elements. Control action block diagram of chemical reactant control systems.

Dynamic behavior of feedback control processes: P, PD, PI, and PID.

Stability analysis by Routh criteria, Root Locus Diagram

Frequency response analysis of linear processes: Bode’s diagram, Nyquist plots.

(10 Hrs, 20 Marks)

Reference:

1. D.P.Eckman, Industrial Instrumentation, Willey Eastern Ltd., New Delhi.
2. Patranabis D. Industrial Instrumentation, Tata – Mcgraw Hill Publications, New Delhi.
3. Gurdeep Chatwal and Sham Anand, Instrumental methods of Chemical analysis, Himalaya publication House, Mumbai.
4. V.P. Kudesia and S.S. Sawhaney, Instrumental methods of chemical analysis Pragati Prakashan, P.O.Box No. 62, Begum Bridge,Meerut250001,U.P.
5. Nakra B.C. and K.K. Chaudhary, Instrumentation Measurement and Analysis, Tata – McGraw Hill, New Delhi.
6. B.K.Sharma.Goel, Instrumentation methods of chemical analysis, Publishing House,11,Shivaji Road, Meerut-250001,U.P.
7. George Stephanpolous, Chemical Process Control, Prentice Hall of India.
8. D.R. Coughnour, Process System Analysis and Control, McGraw-Hill.
9. R.P.Vyas, Process Control and Instrumentation {2nd edition}. Central Techno publication, Nagpur.
10. K. Krishnaswamy, Process Control, New age International.

Practical and term work shall consist of minimum eight experiments given below.

1. To study the response of bimetallic thermometer.
2. Calibration of thermocouple.
3. To measure the pH of given solution..
4. To determine concentration of given solution by colorimeter
5. Flame photometry
6. Abbey’s refractometer
7. Dynamic behavior of first order system: Single tank system.
8. Dynamic behavior of first order system in series: Two tank non-interacting system.
9. Two tank interacting system.
10. Dynamic behavior of second order system: Mercury Manometer
11. Dynamic behavior of final control Element: Pneumatic control valve.
12. Study of Pneumatic controllers: Proportional Controller/ Proportional Derivative Controller/ Proportional Integral Controller/ Proportional Integral Derivative Controller

2. BIOLOGICAL THERMODYNAMICS

Teaching Scheme:
Lecturers: 4Hrs/week.
Term work: 2Hrs/week

Examination Scheme
Paper: 100 marks (3Hrs)
Term work: 25 marks

Unit: I
Introduction:
Distribution of energy, system boundary and surroundings, energy and biological world, energy flow (transformation), mass and energy recycling, energy conversions, energy (nutritional) requirements of living systems, cell structure and division of labor in cells, metabolism (anabolism, catabolism), energy relations between catabolic and anabolic pathways, intermediary metabolism, three types of non linear metabolic pathways, Energy production and consumption in metabolism, flow of electrons in organisms, energy coupling reactions, activation energy(enzyme reaction), living cells as self regulating chemical engines, assembly of information macro molecules .

(10 Hrs, 20 Marks)

Unit: II
Biological Thermodynamics Concepts:
Types of systems, biological thermodynamics, zeroth law and first law of thermodynamics, internal energy, enthalpy, Hess's law, entropy and second law of thermodynamics, entropy in biological world, Gibb's free energy, Gibb's and Helmholtz function(derivation), relation between Gibb's energy and equilibrium, standard free energy change in biochemical reactions, additive nature of standard free energy with examples, effect of pH and temperature on Gibb's function and equilibrium, third law of thermodynamics, thermodynamic aspects of protein folding, thermodynamics of renaturation and denaturation of DNA, Thermodynamics of transport systems through membranes.

(10 Hrs, 20 Marks)

Unit: III
Energy Currency:
Structure and properties of ATP, ADP and AMP, ATP-hydrolysis and free energy change, calculation of ultimate standard free energy change during ATP-hydrolysis, standard free energy of hydrolysis of phosphate containing compounds (4 examples), energy production by group transfer (ATP), ranking of biological phosphatic compounds in cell, nucleophilic displacement reaction of ATP, ATP and active transport system, ATP and muscle contraction, conditions affecting the standard free energy change of hydrolysis of ATP, dynamics of phosphate group turnovers in cell, Transphosphorylation between nucleotides, inorganic polyphosphate, requirement of ATP (energy currency) in signal transduction processes (Insulin receptor, Epinephrine cascade) and others.

(10 Hrs, 20 Marks)

Unit: IV
Oxidation – Reduction:
Thermodynamics and compartmentalization, biological oxidation and reductions, flow of electrons to do biological work, conjugate redox pair, electrochemical cell, electromotive force (emf), electrode potential, standard reduction potential measurement, standard

reduction potentials of some biological important half reactions, standard potentials and Gibbs free energy , standard reduction potential to calculate free energy change, effect of concentration, pH, temperature on redox potential, structure and function of electron carriers in cells: NADH, NADPH, FADH, FMN.

(10 Hrs, 20 Marks)

Unit: V

Oxidative Phosphorylation and photophosphorylation:

Structure of mitochondria, electron transport system through complex I, II, III and IV in detail with structure, proton gradient and proton-motive force, ATP synthesis (chemiosmotic model), structure of ATP synthetase, mechanism of ATP synthesis by ATPase, shuttle system (malate aspartate shuttle, glycerol 3-phosphate shuttle), regulation of oxidative phosphorylation .

Photosynthesis: Introduction, ultra-structure of chloroplast, primary and secondary photo-pigments, Hills reaction, light dependant reactions, cytochrome complex, Photo system I and II, ATP synthesis by photophosphorylation, stoichiometry of photophosphorylation, carbon fixation reaction or dark reaction.

(10 Hrs, 20 Marks)

Reference:

1. Lehninger, Nelson and cox. Principles of Biochemistry Macmillan publishers.
2. Voet and Voet, Biochemistry, wiley publisher.
3. Biotol series, Principles of Cell energetics , Butterworth- Heinemann Ltd,Jordan Hill, Oxford.
4. Robert K.Murray, Daryl K.Granner, Harpers Illustrated Biochemistry, Mc Graw Hill.
5. Lubert Strayer, Jeremy M.Berg, Biochemistry , W.H.Freeman and Company. Newyork.
6. K.V.Narayan, Chemical Engineering Thermodynamics, PHI.

Term work shall consist of any eight assignments from the following

1. Enthalpy and First law of thermodynamics.
2. Entropy and second law of thermodynamics.
3. Calculation of Standard Gibbs free energy in biological reaction.
4. Energy production during metabolism.
5. Study of Energy Currency in Living organism.
6. Biological oxidation-reduction reaction.
7. Calculation of Standard electrode potential in biological system.
8. Oxidative Phosphorylation
9. Photophosphorylation.

3. MASS TRANSFER-II

Teaching Scheme:
Lectures: 4 Hrs. / Week
Practical: 4 Hrs. / Week

Examination Scheme:
Paper: 100 Marks (3 Hrs)
Practical: 50 Marks
Term Work: 25 Marks

Unit: I

Introduction to distillation process, Vapor liquid equilibrium, The methods of distillation (Binary mixture), The fractionating column, Condition for varying overflow in non-ideal system(Binary), Batch distillation, Multi component mixture, Azeotropic, extractive and steam distillation, Introduction to distillation equipments.

(10 Hrs, 20 Marks)

Unit: II

Introduction to extraction process, Liquid equilibria, Material balances for stage wise contact methods, Extraction with reflux, Fractional extraction, Stage contact and continuous contact type extractors.

(10 Hrs, 20 Marks)

Unit: III

Introduction to crystallization, Growth and properties of crystals, Effect of impurities in crystallization, Effect of temperature on solubility, Fractional crystallization, Caking and yield of crystals, Different type of crystallizers.

(10 Hrs, 20 Marks)

Unit: IV

Introduction to adsorption operation, Type of adsorption operation, Nature of adsorbents, Adsorption equilibria, Adsorption of vapor, gas mixture and liquids, Material balances for stage wise for operation, Continues contact process for adsorption, Unsteady state fixed bed adsorption, Principle of ion exchange operation, Equilibria for ion exchange operation, Rate of ion exchange operation, Application of ion exchange operation.

(10 Hrs, 20 Marks)

Unit: V

Introduction to leaching operation, Mass Transfer in leaching operation, Calculation of stages for different processes, Graphical method for calculation of no. of stages ,counter current washing process, Equipments for leaching operation, Introduction to membrane separation process, Different Types of membrane separation process, (Ultrafilteration , Reverse Osmosis, Dialysis, Electro Dialysis, Pervaporation), General membrane equation, Liquid membrane

(10 Hrs, 20 Marks)

Practical and Term Work shall consists of any eight experiments from the following

1. Simple Distillation: To verify Rayleigh’s equation for simple distillation
2. Ternary Diagram: To construct ternary diagram for acetic acid –water – benzene
3. Tie Lines

4. Liquid – Liquid Extraction: To study and determine the efficiency of cross current liquid- liquid extraction.
5. Leaching
6. Crystallization
7. Adsorption: To study adsorption of acidic acid on activated charcoal
8. Determination of HTU, HETP and NTU
9. Spray Column
10. Ion Exchange
11. Bubble Cap Distillation
12. Study of Mass Transfer Equipments

Reference:

1. Coulson and Richardson, Chemical Engineering (Vol. II), Pergamon Press
2. R. E. Tryebal, Mass Transfer Operation, McGraw hill.
3. Christie J. Geankoplis ,Transport Processes and Unit Operations ,Prentice Hall inc
4. P. Chattopadhyay, Unit operations in Chemical Engg. Vol. I and II, Khanna Publication,New Delhi.

4. BIOTECHNOLOGY OF WASTE TREATMENT

Teaching Scheme:	Examination Scheme
Lecturers: 4Hrs/week.	Paper: 100 marks (3Hrs)
Term work: 4Hrs/week	Oral: 25 marks
	Term work: 25 marks

Unit: I

Introduction:

Introduction to waste treatment, site surveys for waste treatment programme, strengths of fermentation waste, disposal of effluents, treatment process(physical, chemical and biological),introduction to microorganisms,bacterial growth and factors affecting growth kinetics, introduction to stoichiometry and kinetics of waste treatment, important biological reactions: Aerobic heterotrophic reaction, nitrification, denitrification, anaerobic digestion.

(10 Hrs, 20 Marks)

Unit: II

Biochemistry of Waste Treatment:

Introduction, oxygen uptake, dissolved oxygen, enzymes, inhibition, nitrogen metabolism, phosphorus and sulphur, elements and growth factors, fate of individual chemicals, structure-activity relationships, multisubstrates and species interactions, biochemical indicators, precipitation in waste treatment, coagulation in waste treatment, ecology of polluted water (physical, chemical and biotic effects) in brief. Problems on measurement of dissolved oxygen.

(10 Hrs, 20 Marks)

Unit: III

Waste Treatment Processes:

Characteristics of activated sludge, theory of activated sludge process, design, operation and control, operation and design features of trickling filters , rotating biological contractor, aerated lagoons, anaerobic digestion, packed beds, land farming.

(10 Hrs, 20 Marks)

Unit: IV

Nitrification and Denitrification and Anaerobic Treatment:

Introduction, forms of nitrogen, nitrifying and denitrifying bacteria, stoichiometry of nitrification and denitrification, process variables in nitrification and denitrification process, Nitrification processes: plug flow v\s complete mix, single stage v\s two stage systems, biofilm nitrification, denitrification using methanol, organic matter and thiosulfate and sulfide. Anaerobic treatment by methanogenic method, anaerobic reactor system.

(10 Hrs, 20 Marks)

Unit: V

Biological Degradation:

Introduction, determination of biological degradability, Pilot studies: PCB (polychlorinated biphenols) biodegradation, methyl ethyl ketone, Aerobic biodegradation: TCE (trichloro ethane) degradation, polycyclic aromatic hydrocarbon degradation, oil degradation, phenanthrene degradation, Treatment scheme of some industrial waste: dairy, paper, tannery distillation, and sugar. Biodegradation of waste by fungi, anaerobic biodegradation, engineering strategies for bioremediation.

(10 Hrs, 20 Marks)

Reference:

1. Bruce E Rittmann, Rurry L.Mc carty, Environmental Biotechnology:Principles and applications (Mcgraw Hill international)
2. A.K.Chatterji, Introduction to environmental biotechnology (Eastern Economy edition)
3. Nicholas P.Cheremisinoff, Biotechnology for waste water treatment (Eastern Economy edition)
4. Murray Moo - Young, Comprehensive biotechnology, vol 4- (Pergamon Press)
5. P. F. Stanbury, A. Whitaker and S. J. Hall, Principles of fermentation technology (Aditya book private limited)

Term Work shall consists of any eight experiments from the following

1. To determine alkalinity and pH of given sample.
2. To determine total solids and suspended solids of given sample.
3. To determine dissolved oxygen of given sample.
4. To determine initial oxygen demand.
5. To determine B.O.D. of the given sample.
6. To determine C.O.D. of the given sample.
7. To determine sludge volume index of the sample.
8. To determine M.P.N test of the given water sample.
9. To study Microorganisms of the given water sample.
10. Estimation of inorganic ion in water.

11. Evaluation of the effect of process, variables in the performance of activated sludge process (DEMO) / Study of activated sludge process
12. Evaluation of performance of anaerobic digestor (DEMO)/ Study of anaerobic digester

5. FERMENTATION BIOTECHNOLOGY- I

Teaching Scheme:	Examination Scheme
Lecturers: 4Hrs/week.	Paper: 100 marks (3Hrs)
	Term work: 25 marks

Unit: I

An introduction to fermentation process, Isolation methods for Industrial microorganisms, Culture preservation and stability, the improvement of industrial microorganisms.

(10 Hrs, 20 Marks)

Unit: II

Media for Industrial fermentation, Introduction ,typical media, Medium fermentation: Water, Energy sources, Carbon sources, Nitrogen sources, Minerals, Growth factors, Nutrient recycle, Buffers, Precursors, Metabolic regulators, Oxygen requirement and antifoams, Medium optimization: Animal cell media, serum, serum free media, supplement, protein free media, trace element, osmality, pH, Non-nutritional media supplements.

(10 Hrs, 20 Marks)

Unit: III

Sterilization: Introduction, Medium sterilization, Design of Batch sterilization process: Calculation of Del factor during heating and cooling, Calculation of holding time at constant temperature, Richard's rapid method for the design of sterilization cycles, the scale up of batch sterilization processes, Method of batch sterilization, Design of continuous sterilization process, Sterilization of the fermenter, Sterilization of the feeds, Sterilization of liquid wastes, Filter sterilization: Filter sterilization of fermentation media, air and fermenter exhaust air, the theory and design of depth filters.

(10 Hrs, 20 Marks)

Unit: IV

The development of Inocula for industrial fermentation: Introduction, Criteria for the transfer of inoculums, The development of inocula for yeast processes, The development of inocula for bacterial processes, The development of inocula for mycelial processes, The aseptic inoculation of plant fementers, Solid state fermentation.

(10 Hrs, 20 Marks)

Unit: V

Ageing and Death in microbes, Basic principles: Ageing of microbes, Death of microbes, Viability among microbes, Survival and populations: Cryptic growth, Injury among microbes, Stress and survival: The physiological status of the population, overt and acheal stress, Starvation: Substrate accelerated death (SAD), Metabolic and substrate injury, Thymine – Len death, survival of slowly growing bacteria, Differentiation and survival, Effect of Environment on microbial activity: Introduction, mechanism of microorganism response to the environment, dissolved oxygen, redox potential, and response to CO_2, water activity, effects of pH, temperature and shear, General control strategies, Mixed culture and mixed substrate systems: Introduction, mixed cultures, mixed substrate, co metabolism.

(10 Hrs, 20 Marks)

References

1. P. F. Stanbury, A. Whitaker and S. J. Hall, Principle of Fermentation Technology, Aditya Books (P) Ltd, New Delhi.
2. Murray Moo-Young, Comprehensive Biotechnology (Vol: 1), Pergamon Press, An imprint of Elsevier.
3. L. E. Casida, Industrial Microbiology, New Age Industrial Publishers.
4. Pauline M. Doran, Bioprocess Engineering Principles, Academic Press an Imprint of Elsevier.

Term Work shall consist of any eight assignments from the following.

1. Isolation methods of industrial microorganisms
2. Maintenance and preservation of cultures
3. Media for industrial fermentation
4. Sterilization of media
5. Air sterilization
6. Inoculum development
7. Solid state fermentation
8. Ageing and death in microorganisms
9. Effect of environment on microbial activity

6. PRACTICAL TRAINING / MINI PROJECT / SPECIAL STUDY

Examination Scheme
Term work: 25 marks

• Every student has to undergo industrial/practical training for a minimum period of two weeks during summer vacation between (S.E Second Term) fourth and (T.E. First Term) fifth term or during winter vacation between fifth and sixth term (T.E. First Term and Second Term).

• The industry in which practical training is taken should be a medium or large scale industry.

• The paper bound report on training must be submitted by every student in the beginning of (T.E. Second Term) sixth term along with a certificate from the company where the student took training.

• The report on training should be detailed one.

• Maximum number of students allowed to take training in company should be five. Every student should write the report separately.

• In case if a student is not able to undergo practical training , then such students should be asked to prepare special study report on a recent topic from reported literature
Or
A mini project related to the Biotechnology.
Fields includes like Microbiology, Immunology, Molecular biology, Bioprocess, Biochemistry and on Enzyme technology.
Project report should be details of work, carried out by student.
• The practical training/special study/ mini project shall carry a term work of 25 marks.
Every student shall be required to present a seminar in the respective class in the presence of two teachers. These teachers (fixed by the head of department in consultation with the Principal) shall award marks based on the following:
(a) Report 10 marks
(b) Seminar presentation 10 marks
(c) Viva-voce at the time of Seminar presentation 05 marks

Total 25 marks

============XXXXX==========

North Maharashtra University, Jalgaon
M.E. (Computer Science and Engineering)
Syllabus with effect from Year 2009-10

First Year Term I

Sr. No.	Subject	Teaching Scheme per Week		Examination Scheme				
		L	P	Paper Hr.	Paper	TW	PR	OR
1	Advanced Software Engineering	3	-	3	100	-	-	-
2	Distributed Systems	3	-	3	100	-	-	-
3	Net-Centric Computing	3	-	3	100	-	-	-
4	Applied Algorithms	3	-	3	100	-	-	-
5	Elective- I	3	-	3	100	-	-	-
6	Laboratory Practice-I	-	6	-	-	100	-	50
7	Seminar-I	-	4	-	-	100	-	-
	Total	15	10		500	200		50
	Grand Total	**25**		**750**				

Elective I

1) Embedded Software Design
2) Digital Image & Video Processing
3) Mathematical Foundations of Computer Science
4) Software Project Management

First Year Term II

Sr. No.	Subject	Teaching Scheme per Week		Examination Scheme				
		L	P	Paper Hr.	Paper	TW	PR	OR
1	Advanced Database Management Systems	3	-	3	100	-	-	-
2	Web Engineering	3	-	3	100	-	-	-
3	Parallel Computing	3	-	3	100	-	-	-
4	Soft Computing	3	-	3	100	-	-	-
5	Elective- II	3	-	3	100	-	-	-
6	Laboratory Practice-II	-	6	-	-	100	-	50
7	Seminar-II	-	4	-	-	100	-	-
	Total	15	10		500	200		50
	Grand Total	**25**		**750**				

Elective II

1) Software Testing And Quality Assurance
2) Cryptography and Network Security
3) Pattern Recognition
4) Mobile Computing

Second Year Term I

Sr. No.	Subject	Teaching Scheme per Week		Examination Scheme				
		L	P	Paper Hr.	Paper	TW	PR	OR
1	Seminar-III	-	4	-	-	50	-	50
2	Project Stage –I	-	18	-	-	100	-	-
	Total	-	22	-	-	150		50
	Grand Total	**22**		**200**				

Second Year Term II

Sr. No.	Subject	Teaching Scheme per Week		Examination Scheme				
		L	P	Paper Hr.	Paper	TW	PR	OR
1	Progress Seminar	-	-	-	-	50	-	-
2	Project Stage –II	-	18	-	-	150	-	100
	Total	-	18	-	-	200	-	100
	Grand Total	**18**		**300**				

Rules and Regulations for M.E. in Computer Science & Engineering

1. The post graduate degree in engineering consisting of 2 years (4 terms) shall be designated as Master of Engineering in Computer Science & Engineering.

2. A candidate may be permitted to register him/her self for the M.E. degree in Computer Science and Engineering under the faculty of engineering & technology of North Maharashtra University Jalgaon ,only if the candidate holds a bachelor's degree in Engineering & technology of North Maharashtra University , Jalgaon or its equivalent in Computer Engineering / Computer Science & Engineering / Computer Technology /Information Technology/ Electronics/ Electronics and Telecommunication /Electrical recognized by AICTE & North Maharashtra University , Jalgaon.

3. The student shall be admitted to First Year Term II if his/her Term I is granted.

4. The student shall be admitted to the Second Year when ever he/she clears all the theory papers of First Year. The student in any case should not be allowed to start project work before passing all the subjects of first year. The student will have to work on his/her project for minimum one year after passing first year subjects. He/she will not be allowed to submit his/her thesis/dissertation before that.

5. Every student will be required to produce a record of laboratory work in the form of journal, duly certified for satisfactory completion of the term work by the concerned teacher & head of the department.

6. A student whose term is not granted on account of less attendance (Minimum 80%) or non-submission of term work is required to repeat the term.

7. Any approved guide will not be allowed guide more than 5 students in a particular batch.

8. Each student is required to present Seminar-I in the First Year Term I on any related state of the art topic of his own choice approved by the department.

9. The term-work & presentation of the Seminar-I will be evaluated by departmental committee consisting of guide and two faculty members of the department appointed by Director/Principal of the college as per the recommendation of the Head of the Department.

10. Each student is required to present Seminar-II in the First Year Term II on any related state of the art topic of his own choice approved by the department.

11. The term-work & presentation of the Seminar-II will be evaluated by departmental committee consisting of guide and two faculty members of the department appointed by Director/Principal of the college as per the recommendation of the Head of the Department.

12. Each student is required to present Seminar-III in the Second Year Term I on special topic. The topic should be on any of the area not included in the regular curriculum. The report should include detailed study of specific concept (i.e. analysis, design & implementation.). This can be a theoretical study or practical implementation approved by the department/guide.

13. Guidelines for the Seminar-III in Second Year Term I:

1. Seminar-III should be conducted at the end of Second Year Term I.
2. The term-work of the Seminar-III will be evaluated by departmental committee consisting of guide and two faculty members of the department appointed by Director/Principal of the college as per the recommendation of the Head of the Department.
3. The Seminar-III presentation will be evaluated by examiners appointed by University, one of which should be the guide.
4. Student must submit the Seminar Report in the form of soft bound copy
5. The marks of Seminar-III should be submitted at the end of Second Year Term I to the University.

14. Guidelines for the Progress Seminar in Second Year Term II:

- Progress Seminar should be conducted in the middle of Second Year Term II.
- The Progress Seminar Term-Work will be evaluated by departmental committee consisting of guide and two faculty members of the department appointed by Director/Principal of the college as per the recommendation of the Head of the Department.
- Student must submit the progress report in the form of soft bound copy.
- The marks of progress seminar should be submitted along with the marks of Project Stage-II.

15. Minimum passing marks for all Theory shall be 40% and for Term work and Oral shall be 50%.

16.He/she has to present/publish atleast one paper in reputed National/International Journal/Conference on his/her Project work before submission of his/her Thesis/Dissertation.

17. The Term Work of Project Stage –II will be assessed jointly by the pair of Internal and External examiner along with oral examination of the same.

18. The class will be awarded on the basis of aggregate marks of all four terms, giving equal weightage to all terms as shown below:

a) Less than 50%	: Fail
b) 50% to less than 60%	: Second Class
a) 60% to less than 70%	: First Class
b) 70% & above	: First Class with Distinction.

19. Each student is required to complete his/her master's degree within **Five** academic years from the date of admission, failing which he/she will be required to take fresh admission in first year.

M.E. COMPUTER SCIENCE & ENGINEERING
FIRST YEAR TERM I

SUBJECT: ADVANCED SOFTWARE ENGINEERING

Lectures: 3 Hrs per week	Theory: 100 Marks

Objective:

After successfully completing the module student should be apply the systematic approach towards the effective software development, also able to demonstrate knowledge of software design, development and processes using software engineering approaches and practices.

Pre-requisites:

Knowledge of Software Engineering.

DETAILED SYLLABUS

1. Introduction to Software Engineering: Software Engineering Processes, Project Management concept, Project Effort estimation, LOC and function point based estimates, Requirement Analysis and Specifications, Formal Requirements, Specifications, Socio-technical Systems, Dependability, Critical Systems Specification, Formal Specification. Analysis Modeling, Elements of Analysis Model.
2. Design Concepts and Principles: Fundamental issues in Software Design, Effective Modular Design, cohesion and coupling. Architectural Design, Distributed Systems Architecture, Application Architectures, Real-time Systems, User Interface Design, Component Level Design, Modeling Language(UML)
3. Software Development Methodologies: Iterative Software Development, Software Reuse, CBSE, Critical Systems Development Software Evolution. Verification and Validation, Software Testing, Software Testing Principles, Alternative Paradigms: Extreme Programming, Agile Software Engineering, Principles behind Agile method, Agile method and Project Management.
4. Object Oriented Software Engineering: Software Process Improvement, Software Economics, Software Quality, Software Metrics, Software Maintenance, Risk management, Requirement Engineering, Object oriented concepts and principles, OO Analysis, OO Design, OO Testing,
5. Advanced Software Engineering Process: Formal Methods, Basic concepts, Mathematical Preliminaries, Clean room Software Engineering, Component Based Software Engineering, Client/Server Software Engineering, Web Engineering, Reengineering

BOOKS

Text Books:

1. K.K Aggarwal & Yogesh Singh," Software Engineering", 3rd Edition, New Age International, 2007

References:
1. Ian Somerville,“Software Engineering”, 8th Edition, Addison-Wesley,2006,
2. Roger S Pressman,**“**Software Engineering: A Practitioner's Approach” 6th Edition, McGraw Hill,2005.
3. Fenton and Pfleeger “Software Metrics:- A Rigorous and Practical Approach” , 2nd Edition , Tomson Learning
4. Grady Booch, Rumbaugh, Jacoboson,“Unified Modeling Language User Guide”, Addison Wesley.

M.E. COMPUTER SCIENCE & ENGINEERING
FIRST YEAR TERM I

SUBJECT: Distributed Systems

Lectures: 3 Hrs per week	**Theory: 100 Marks**

Objective:
This course aims to build concepts regarding the fundamental principles of distributed systems. The design issues and distributed operating system concepts are covered.

Pre-requisites: Operating Systems and Computer Networks

DETAILED SYLLABUS

1. INTRODUCTION: Definition of a Distributed system, Goal, Types of distributed system

2 .ARCHITECTURES : Architectural styles, System Architectures, Architectures versus Middleware, Self management in distributed systems

3. PROCESSES: Threads, Virtualization, Clients, Servers, Code migration.

4 .COMMUNICATION: Fundamentals, Remote Procedure Call, Message Oriented Communication, Stream oriented communication, Multicast communication.

5. NAMING: Names, Identifiers and Addresses, Flat, Naming, Structured Naming, Attribute based Naming, LDAP

6. SYNCHRONIZATION: Clock Synchronization, Logical Clocks, Mutual Exclusion Global Positioning of nodes, Election Algorithms.

7. CONSISTENCY AND REPLICATION: Introductions, Data Centric Consistency Models, Client Centric Consistency Models, Replica Management, Consistency Protocols.

8. FAULT TOLERANCE: Introduction to fault tolerance, Process resilience, Reliable Client Server Communication, Reliable group, Recovery

9. DISTRIBUTED FILE SYSTEMS: Architecture, Process Communication, Naming, Synchronization, Consistency and Replication, Fault tolerance, Security.

10 DISTRIBUTED COORDINATION-BASED SYSTEMS: Introduction to coordination models- Architectures, Processes communication, Synchronization, Consistency and Replication, Fault tolerance, Security.

BOOKS

Text Books:

1. Andrew S. Tanenbaum, Maarten Van Steen, “Distributed System: Principals and Paradigms”, 2/E, PHI.

References:
1. George Coulouris, Jean Dollimore and Tim Kindberg,“Distributed Systems Concepts and Design”, Fourth Edition, Pearson Education, 2005. 2. Pradeep K. Sinha, "Distributed Operating Systems Concepts and Design" , PHI. 3. Galli D.L., “Distributed Operating Systems: Concepts and Practice”, Prentice-Hall,2000

M.E. COMPUTER SCIENCE & ENGINEERING
FIRST YEAR TERM I

SUBJECT: NET-CENTRIC COMPUTING

Lectures: 3 Hrs per week	**Theory: 100 Marks**

Objective:
After successfully completing the module student should be :
Familiar with different network technologies, Different Network performance, Modeling and estimation measures, Function and responsibilities of Network Administration, Different Network Design Techniques, Knowledge of High Speed Network, Issues regarding Network Security, Knowledge of IP Telephony, Storage Network and Compression Techniques.

Pre-requisites:
Knowledge of Data Communication and Computer Networks.

DETAILED SYLLABUS

1. Network Technology :
   Introduction, Media Issues, Data Link Protocols, The OSI Model, Networking topologies, Types of Networks, protocols capabilities, NetBIOS, IPX,TCP/IP,CSMA/CD, token passing, frame relay, networking devices, Repeaters, Bridges, Routers, switches, gateways, Network design issues, Data in support of Network Design, Network design tools, protocols and architecture.
2. Network Performance, Modeling and Estimation :
   Issues related with optimizing network performance, probability, stochastic processes, modeling and performance evaluation. Queuing theory, queuing models, estimating model parameters, throughput utilization, modeling network as graph external and internal representation, complexity issues, network traffic controls.
3. Network Administration :
   Function and responsibilities, network issues:-planning, implementation, fault diagnosis and recovery.
4. Network Design :
   Problem definition, multipoint line layout heuristics, CMST algorithms, ESAU-William's algorithm, Sharma's algorithm, unified algorithm, Bin packing algorithm, Terminal assignments and concentrator location.
5. High Speed Networks :
   Need, characteristics, challenges, applications, frame relay, ATM, ISDN, High speed LANs: Ethernet, fiber channel, DQDB, SMDS, B_ISDN, STM, DSL, and DWDM, Architecture Transport, Switching and Routing in optical domain, optical network management, Internetworking.
6. Network security :
   Basic cryptographic techniques, security in OSI architecture, internet and networked computing, Kerberos, firewalls, proxy, etc. Security applications in commerce and banking.
7. IP Telephony :
   VOIP system architecture, protocol hierarchy, structure of a voice endpoint,

Protocols for the transport of voice media over IP networks, Providing IP quality of service for voice, signaling protocols for VOIP,PSTN gateways, VOIP applications.

8. Storage Networks :
   Introduction, challenges, SCSI protocols and architecture: RAID, Backup and mirroring, Fiber channel attached storage. Network attached storage including NFS, CIFS, and DAFS, Management of network storage architectures. New storage protocols, architectures and enabling technologies.
9. Compression :
   Overview of Information Theory, Lossless Compression: Run-Length Encoding, Facsimile compression, String Matching algorithms. Lossy compression: DCT, Wavelet compression.

BOOKS

References:

1. Stallings. W.-"High Speed Networks and Internets: Performance and Quality of service",Pretice Hall 2002
2. Kershenbaum A.-"Telecommunications Network Design Algorithms" Tata McGraw Hill.
3. Ramaswami R. ,Shivrajan K-"Optical Networks", Morgan Kaufmann.
4. Douskalis B.-"IP Telephony: The Integration of Robust VOIP service",Perason Education Asia.
5. Douglas E.Comer-"Computer NetWorks and Internet", Pearson Education Asia.
6. Stallings W.-"High Speed Networks :TCP/IP and ATM Design principles", Prentice Hall,1998.
7. Andrew Tanenbaum- "Computer Network", PHI.

M.E. COMPUTER SCIENCE & ENGINEERING
FIRST YEAR TERM I

SUBJECT: APPLIED ALGORITHMS

Lectures: 3 Hrs per week	Theory: 100 Marks

Objective:
Algorithm design and analysis is a fundamental and important part of computer science. This course introduces students to advanced techniques for the design and analysis of algorithms, and explores a variety of applications.

Pre-requisites:
Knowledge of Algorithms, Discrete structure and graph theory.

DETAILED SYLLABUS

1. **Introduction**: The role of algorithms in computing, analyzing algorithms, designing algorithms, growth of functions- asymptotic notation,standard notations and common functions, recurrences- the substitution method, the recursion tree method, the master method.
2. **Advanced data structures** Red - black trees- properties of red-black trees, rotations, insertion, deletion, B-trees-definition of B-Tree, basic operations on B-Tree, deleting a key from B-Tree, Binomial heaps- binolial trees and binomial heaps, operations on binomial heaps, Fibonacci heaps- structure of Fibonacci heaps, mergeable heap operations, decreasing a key and deleting a node, bounding the maximum degree.
3. **Advanced Design and Analysis Techniques** Dynamic Programming- assembly line scheduling, matrix chain multiplication, elements of dynamic programming, longest common subsequence, optimal binary search trees, Greedy Algorithms- an activity selection problem, elements of greedy strategy, Huffman codes, Amortized Analysis- aggregate analysis, the accounting method, the potential method.
4. **Graph algorithms** Minimum Spanning Trees- growing a minimum spanning tree, the algorithms of Kruskal and Prim, Single-source shortest paths- the Bellman-Ford algorithm, Single-source shortest path in directed acyclic graphs, Dijkstra's algorithm, all pair shortest paths- shortest path and matrix multiplication, the Floyd-Warshall algorithm, Johnson's algorithm for sparse graphs.
5. **Sorting networks** Comparision networks, the zero-one principle, a bitonic sorting networks, a merging network, a sorting network

BOOKS

Text Books:

1. Corman, Leiserson, Rivest, Stein,"Introduction To Algorithms", PHI, 2nd Edition.
2. Horowitz, Sahni, Rajasekaran,"Fundamentals of Computer Algorithms", Universities Press, 2nd Edition.

References:

1. Aho,"Design and Analysis of Algorithms", Pearson, LPE
2. A V Aho, J. D. Ullman, "Design and analysis of algorithms", Pearson LPE.
3. Bressard, Bratly, "Fundamentals of Algorithms", Pearson LPE/PHI

M.E. COMPUTER SCIENCE & ENGINEERING FIRST YEAR TERM I	
SUBJECT: EMBEDDED SOFTWARE DESIGN (ELECTIVE-I)	
Lectures: 3 Hrs per week	**Theory: 100 Marks**

Objective:

After successfully completing the module student should be :
Capable of actively participating or successfully managing a embedded software development project by applying design life cycle concepts, able to demonstrate knowledge of real time constraint with concepts of RTOS as well as porting of any RTOS

Pre-requisites:

Knowledge of Microprocessors and Microcontrollers and their interfacing

DETAILED SYLLABUS

1. Embedded Design Life Cycle: Introduction Product Specification ,Hardware/Software partitioning , Iteration and Implementation, Detailed hardware and software Design, Hardware/Software Integration ,Product Testing and Release, Maintaining and upgrading existing products.

2. Selection Process & Development Environment: RTOS availability, Tool Chain availability, The Execution Environment, On chip Peripherals ,Debugging & Testing : BDM, JTAG, NEXUS & ICE
3. Advanced Embedded Processors: ARM Embedded Systems, ARM Processor Fundamentals, Introduction to the ARM ,Instruction Set, Introduction to the Thumb Instruction Set ,Efficient C Programming Writing and Optimizing ARM Assembly Code, Digital Signal Processing, Exception and Interrupt Handling, Firmware
4. Writing Software for Embedded Systems: The Compilation Process, Native Vs Cross-Compilers, and Runtime Libraries, Writing a Library, Using Alternative Libraries, using a standard library, porting Kernels extensions for embedded systems, Downloading, Emulation and Debugging techniques.
5. RTOS - µC/OS-II: RTOS Services in Contrast to Traditional O.S. Sample Code, Real-Time Systems Concepts, Kernel Structure, Task Management, Time Management, Inter task Communication and Synchronization, , Memory Management, Porting µC/OS -II
6. Understanding Linux Kernel: Introduction, Memory Addressing , Processes , Interrupts and Exceptions, Timing Measurements, Memory Management, Process Address Space, System Calls ,Signals, Process Scheduling, Kernel Synchronization, The Virtual File system, Managing I/O Devices , Disk Caches , Accessing Regular Files, Swapping: Methods for Freeing Memory, The Ext2 Files system, Process Communication , Program Execution, Porting of Linux Kernel
7. Understanding Windows Embedded CE Kernel: Introduction to Windows Embedded CE Kernel , Boot process, Memory Management, Files Database and Registry, Process and Threads, Communications , Porting of Linux Kernel

BOOKS
Text Books:
1. Embedded Systems Design – Introduction to Processes, Tools, Techniques, Arnold S Burger, CMP books 2. Embedded Systems Design by Steave Heath, Newnes. 3. “ARM Systems Developers Guide Designing and Optimizing System Software” By Andrew N Sloss, Dominic Symes & Cheris Wright ELSEVIER Publication. 4. Understanding the Linux Kernel Daniel P. Bovet Marco Cesati Publisher: O'Reilly First Edition October 2000 ISBN: 0-596-00002-2, 702 pages 5. Building Embedded Linux Systems by Karim Yaghmour 6. Inside Microsoft Windows CE By John Murray
References:
1. ARM System on chip architecture by Steve Furbur 2. µC/OS-II by Jean Labrossewww.uCOS-II.com 3. Programming Microsoft Windows Embedded CE

M.E. COMPUTER SCIENCE & ENGINEERING
FIRST YEAR TERM I

SUBJECT: DIGITAL IMAGE and VIDEO PROCESSING (ELECTIVE-I)

Lectures: 3 Hrs per week	**Theory: 100 Marks**

Objective: Digital Image Processing is a rapidly evolving field with growing applications in science and engineering. Image processing holds the possibility of developing the ultimate machine that could perform the visual functions of all living beings. There is an abundance of image processing applications that can serve mankind with the available and anticipated technology in the near future.

Pre-requisites: Digital Signal Processing, & Computer Graphics

DETAILED SYLLABUS

1. **Digital Image Processing Systems:** Introduction, Structure of human eye, Image formation in the human eye, Brightness adaptation and discrimination, Image sensing and acquisition, Storage, Processing, Communication, Display. Image sampling and quantization, Basic relationships between pixels
2. **Image Transforms (Implementation):** Introduction to Fourier transform, DFT and 2-D DFT, Properties of 2-D DFT, FFT, IFFT, Walsh transform, Hadamard transform, Discrete cosine transform, Slant transform, Optimum transform: Karhunen - Loeve (Hotelling) transform.
3. **Image Enhancement in the Spatial Domain:** Gray level transformations, Histogram processing, Arithmetic and logic operations, Spatial filtering: Introduction, Smoothing and sharpening filters
4. **Image Enhancement in the Frequency Domain:** Frequency domain filters: Smoothing and Sharpening filters, Homomorphic filtering
5. **Wavelets and Multiresolution Processing:** Image pyramids, Subband coding, Haar transform, Series expansion, Scaling functions, Wavelet functions, Discrete wavelet transforms in one dimensions, Fast wavelet transform, Wavelet transforms in two dimensions
6. **Image Data Compression:** Fundamentals, Redundancies: Coding, Interpixel, Psycho-visual, Fidelity criteria, Image compression models, Error free compression, Lossy compression, Image compression standards: Binary image and Continuous tone still image compression standards, Video compression standards.
7. **Morphological Image Processing:** Introduction, Dilation, Erosion, Opening, Closing, Hit-or-Miss transformation, Morphological algorithm operations on binary images, Morphological algorithm operations on gray-scale images
8. **Image Segmentation:** Detection of discontinuities, Edge linking and Boundary detection, Thresholding, Region based segmentation
9. **Image Representation and Description:** Representation schemes, Boundary descriptors, Regional descriptors
10. **Introduction to Video Processing:** Spatio-temporal sampling, inter frame and intraframe coding, motion estimation techniques, video compression standards.

BOOKS

Text Books:

1. R.C.Gonsales R.E.Woods, "Digital Image Processing", Second Edition, Pearson Education
2. Anil K.Jain, "Fundamentals of Image Processing", PHI
3. K. R rao and J.J. Hawang, "Techniques and Standards for Video and Audio Coding", Prentice Hall PTR

References:

1. William Pratt, "Digital Image Processing", John Wiley
2. Milan Sonka,Vaclav Hlavac, Roger Boyle, "Image Processing, Analysis, and Machine Vision" Thomson Learning
3. N Ahmed & K.R. Rao, "Orthogonal Transforms for Digital Signal Processing" Springer
4. B. Chanda, D. Dutta Majumder, "Digital Image Processing and Analysis", PHI.

M.E. COMPUTER SCIENCE & ENGINEERING
FIRST YEAR TERM I

SUBJECT: MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE (ELECTIVE-I)

Lectures: 3 Hrs per week	**Theory: 100 Marks**

Objective:
The purpose of this course is to develop mathematical foundations for computer science and computer engineering. In addition, applications of mathematical principles to computer science and engineering are presented.

Pre-requisites:
Knowledge of Theory of Computer Science, Discrete Structure and Graph Theory.

DETAILED SYLLABUS

1. **Probability and Information Theory.**
   Introduction. Basic Concept of Probability. Properties. Basic Calculation. Random Variables and their Probability Distributions. Birthday Paradox. Information Theory. Redundancy in Natural Languages.
2. **Computational Complexity.**
   Introduction. Turing Machines. Deterministic Polynomial Time. Probabilistic Polynomial Time. Non-deterministic Polynomial Time. Non-Polynomial Bounds. Polynomial-time Indistinguishability.
3. **Algebraic Foundations.**
   Introduction. Groups. Rings and Fields. The Structure of Finite Fields. Group Constructed Using Points on an Elliptic Curve.
4. **Number Theory.**
   Introduction. Congruences and Residue Classes. Euler's Phi Function. The Theorems of Fermat, Euler and Lagrange. Quadratic Residues. Square Roots Modulo Integer. Blum Integers.
5. **Fuzzy Logic**
   Operations of fuzzy sets, fuzzy arithmetic & relations, fuzzy relations equations, MATLAB introduction, programming in MATLAB scripts, functions and their Applications
   Case study: Development of fruit sorting system using fuzzy logic in MATLAB

BOOKS

Text Books:

1. Modern Cryptography: Theory and Practice by Wenbo Mao, Low Price Edition, Pearson Education

References:

1. Fuzzy logic in engineering by T. J. Ross, Willey Publications
2. Fuzzy sets theory and its applications, H.J. Zimmermann, Kluwer Academic Publications, 4th edition.
3. Elements of Discrete Mathematics, C.L.Liu, TMH, 2nd edition

M.E. COMPUTER SCIENCE & ENGINEERING
FIRST YEAR TERM I

SUBJECT: SOFTWARE PROJECT MANAGEMENT
(ELECTIVE-I)

Lectures: 3 Hrs per week	**Theory: 100 Marks**

Objective:
After successfully completing the module student should be :
Capable of actively participating or successfully managing a software development project by applying project management concepts, able to demonstrate knowledge of project management terms and techniques

Pre-requisites:
Knowledge of Software Engineering.

DETAILED SYLLABUS

1. Introduction to Project Management: Importance of software project management, stages and stakeholders of a software project, elements of software project, Importance of software project management, Stages of Project, The Stakeholder of Project, Project Management Framework, Software Tools for Project Management.
2. Project Planning: Integration Management, Scope Management, Stepwise Project Planning, Use of Software (Microsoft Project) to Assist in Project Planning Activities.
3. Project Scheduling: Time Management, Project Network Diagrams, Use of Software (Microsoft Project) to Assist in Project Scheduling.
4. Project Cost Management: Importance and Principles of Project Cost Management, Resource Planning, Cost Estimating, Cost Control, Use of Software (Microsoft Project) to assist in Cost Management.
5. Project Quality Management: Quality of Information Technology Projects, Stages of Software Quality Management, Quality Standards, Tools and Techniques For Quality Control.
6. Project Human Resources Management: Human Resources Management, Keys to Managing People, Organizational Planning, Issues in Project Staff Acquisition and Team Development, Using Software to Assist in Human Resource Management.
7. Project Communication Management: Communications Planning, Information Distribution, Performance Reporting, Administrative Closure, Suggestions for Improving Project Communications, Using Software to Assist in Project Communications.
8. Project Risk Management: The Importance of Project Risk Management, Common Sources of Risk in IT projects, Risk Identification, Risk Quantification, Risk Response Development and Control, Using Software to Assist in Project Risk Management.
9. Project Procurement Management: Importance of Project Procurement Management, Procurement Planning, Solicitation, Source Selection, Contract Administration, Contract Close-out.

10. Project Management Process Groups: Introduction to Project Management Process Groups, Project Initiation, Project Planning, Project Executing, Project Controlling and Configuration Management, Project Closing.

BOOKS

Text Books:

1. Kathy Schwalbe, “Information Technology Project Management”, International Student Edition, THOMSON Course Technology
2. Bob Hughes and Mike Cotterell, “Software Project Management” Third Ed., Tata McGraw-Hill
3. Elaine Marmel, “Microsoft Office Project 2003 Bible”, Wiley Publishing Inc.

References:

1. Basics of Software Project Management, NIIT, Prentice-Hall India
2. Pankaj Jalote, “Software Project Management in Practice”, Pearson Education
3. S.A. Kelkar, “Software Project Management”, A Concise Study, Revised Edition,PHI

<u>M.E. COMPUTER SCIENCE & ENGINEERING</u> **FIRST YEAR TERM I**	
SUBJECT: Laboratory Practice-I	
Practical: 6 Hrs per week	**Term Work: 100 Marks** **Oral: 50 marks**
DETAILED SYLLABUS	
Experiments/Assignments based on 1. Advanced Software Engineering 2. Net-Centric Computing 3. Elective- I The concerned subject in-charge should frame minimum of six laboratory assignments, two from each subject.	

M.E. COMPUTER SCIENCE & ENGINEERING **FIRST YEAR TERM I**	
SUBJECT: Seminar-I	
Practical: 4 Hrs per week	**Term Work: 100 Marks**
DETAILED SYLLABUS	
Seminar on related state of the art topic of student's own choice approved by the department.	
TERM WORK	
1.The term-work & presentation of the Seminar-I will be evaluated by departmental committee consisting of guide and two faculty members of the department appointed by Director/Principal of the college as per the recommendation of the Head of the Department.	

M.E. COMPUTER SCIENCE & ENGINEERING
FIRST YEAR TERM II

SUBJECT: ADVANCED DATABASE MANAGEMENT SYSTEMS

Lectures: 3 Hrs per week	**Theory: 100 Marks**

Objective: The course gives an overview of motivation and background of the new developments, and is intended as an introduction to the most important advances with respect to the classical relational database systems.

Pre-requisites:
Knowledge of Database Management System, Operating System.

DETAILED SYLLABUS

1. **The Extended Entity Relationship Model and Object Model**
(a) The ER model revisited
(b) Motivation for complex data types
(c) User defined abstract data types and structured types
(d) Subclasses
(e) Superclasses
(f) Inheritance
(g) Specialization and generalization
(h) Relationship types of degree higher than two

2. **Object–Oriented Databases**
(a) Overview of object–oriented concepts
(b) Object identity
(c) Object structure and type constructors
(d) Encapsulation of operations
(e) Methods and persistence
(f) Type hierarchies and inheritance
(g) Type extents and persistent programming languages
(h) OODBMS architecture and storage issues
(i) Transactions and concurrency control
(j) Examples of ODBMS

3. **Object Relational and Extended Relational Databases**
(a) Database design for an ORDBMS
(b) Nested relations and collections
(c) Storage and access methods
(d) Query processing and optimization
(e) An overview of SQL3
(f) Implementation issues for extended type
(g) Systems comparison of RDBMS
(h) OODBMS
(i) ORDBMS

4. **Paralled and Distributed Databases and Client–Server Architecture**
(a) Architectures for parallel databases
(b) Parallel query evaluation
(c) Parallelizing individual operations
(d) Sorting Joins
(e) Distributed database concepts
(f) Data fragmentation
(g) Replication and allocation techniques for distributed database design
(h) Query processing in distributed databases
(i) Concurrency control and recovery in distributed databases
(j) An overview of client–server architecture

5**. Enhanced Data Models for Advanced Applications**
(a) Active database concepts
(b) Temporal database concepts
(c) Spatial databases: concept and architecture
(d) Deductive databases and query processing
(e) Mobile databases
(f) Geographic information systems

BOOKS

Text Books:

1.Elmsari and Navathe, Fundamentals of Database Systems
2.Ramakrishnan and Gehrke, Database Management Systems.

References:

1. Korth, Silberschatz, Sudarshan, Database System Concepts
2. Rob and Coronel, Database Systems: Design, Implementation and Management
3. Date and Longman, Introduction to Database Systems

M.E. COMPUTER SCIENCE & ENGINEERING
FIRST YEAR TERM II

SUBJECT: WEB ENGINEERING

Lectures: 3 Hrs per week	Theory: 100 Marks

Objective:
Provides an introduction to the discipline of Web Engineering. This course aims to introduce the methods and techniques used in Web-based system development. In contrast to traditional Software Engineering efforts, Web Engineering methods and techniques incorporate unique aspects of the problem domain such as: document oriented delivery, fine-grained lifecycles, user-centric development, client-server legacy system integration and diverse end user skill levels.

Pre-requisites:
Knowledge of both Internet communication concepts and an introductory programming knowledge (Java & Javascript).

DETAILED SYLLABUS

1. **An Introduction to Web Engineering:** Categories of Web Applications, Characteristics of Web
2. **Requirements Engineering for Web Applications:** Requirements, Engineering Activities, RE Specifics in Web Engineering, Principles for RE of Web, Adapting RE Methods to Web Application Development, Requirement Types.
3. **Modeling Web Applications:** Modeling Specifics in Web Engineering, Levels, Aspects, Phases,
4. Customization, Modeling Requirements, Content Modeling, Hypertext Modeling, Presentation Modeling, Customization Modeling, Methods and Tools.
5. **Web Application Architectures:** Fundamentals, Specifics of Web Application Architectures, Components of a Generic Web Application Architecture, Layered Architectures, Data-aspect Architectures.
6. **Technology-aware Web Application Design:** Web Design from an Evolutionary Perspective, Presentation Design, Interaction Design, Functional Design, Context-aware Applications, Device-independent Applications, Reusability.
7. **Technologies for Web Applications:** Client/Server Communication on the Web, Client-side Technologies, Document-specific Technologies, Server-side Technologies.
8. **Testing Web Applications:** Fundamentals, Test Specifics in Web Engineering, Test Approaches, Test Scheme, Test Methods and Techniques, Test Automation.
9. **Operation and Maintenance of Web Applications:** Challenges Following the Launch of a Web Application, Promoting a Web Application, Content Management, Usage Analysis, From Software Project Management to Web Project Management.
10. **Web Project Management:** Challenges in Web Project Management, Managing Web Teams, Managing the Development Process of a Web Application.

11. **The Web Application Development Process:** Requirements for a Web Application Development Process, Analysis of the Rational Unified Process, Analysis of Extreme Programming.
12. **Usability of Web Applications:** Design Guidelines, Web Usability Engineering Methods, Web Usability Engineering Trends.
13. **Performance of Web Applications:** System Definition and Indicators, Characterizing the Workload, Representing and Interpreting Results, Performance Optimization Methods.
14. **Security for Web Applications:** Aspects of Security, Encryption, Digital Signatures and Certificates, Secure Client/Server-Interaction, Client Security Issues, Service Provider Security Issues.
15. **The Semantic Web – The Network of Meanings in the Network of Documents:** Fundamentals of the Semantic Web, Technological Concepts, Specifics of Semantic Web Applications.

BOOKS

Text Books:

1. Gerti Kappel, Birgit Pr ¨ oll, Siegfried Reich, Werner Retschitzegger, “Web Engineering: The Discipline of Systematic Development of Web Applications”, John Wiley
2. Pressman, Roger S. and Lowe, David, “Web Engineering: A Practioner's Approach”,McGraw-Hill Higher Education

References:

1. Mishra, “Web Engineering And Applications”, Macmillan Publishers India
2. Emilia Mendes, and Nile Mosley, “Web Engineering”, Springer

M.E. COMPUTER SCIENCE & ENGINEERING
FIRST YEAR TERM II

SUBJECT: Parallel Computing

Lectures: 3 Hrs per week	Theory: 100 Marks

Objective:
Upon completion of this course students will be able to understand and employ the fundamental concepts and mechanisms which form the basis of the design of parallel computation models and algorithms, recognize problems and limitations to parallel systems, as well as possible solutions

Pre-requisites:
Computer architecture, Data structures.

DETAILED SYLLABUS

1. Introduction:
   Need, Models of computation, SISD, MISD,SIMD-Shared Memory SIMD, Interconnection network SIMD, MIMD, Programming MIMD, Special Purpose Architecture, Analysis of algorithm, Running time, No of processors, Cost, Other Measures-Area, Length, Period, Expressing Algorithm.
2. Parallel processing:
   parallel computer structure, designing of parallel algorithms, analyzing algorithms, general principles of parallel computing.
3. Parallel sorting algorithms
   Batcher's bitonic sort, Bitonic sort using the perfect Shuffle, parallel bubble sort, Odd- even transpose sort, Tree sort.
4. Quick Sort:
   Parallel Quick sort for CRCW PRAM, Parallel formulation for practical architectures,Shared Address space parallel formulation, message passing parallel formulation, pivot selection.
5. Sorting:
   Sorting on the CRCW, CRFW, EREW models, searching a sorted sequence, CREW,CRCW & EREW searching, searching on a random sequence EREW, ERCW, CREW & CRCW searching on SIMD computers, searching on a Tree, mesh, A Network for merging, merging on the CRFW, ERFW models
6. Computing Fourier Transforms:
   Computing the DFT in parallel, a parallel FFT algorithm.

BOOKS

References:

1. Design & Analysis of Parallel Algorithm by Salim & Akil, PHI.

2. Design Efficient Algorithm for Parallel Computers by Michel J. Quinn, TMH.

M.E. COMPUTER SCIENCE & ENGINEERING
FIRST YEAR TERM II

SUBJECT: SOFT COMPUTING

Lectures: 3 Hrs per week	Theory: 100 Marks

Objective:

By the end of the course a student is expected to become able to apply Genetic Algorithms, Fuzzy Logic and Artificial Neural Networks as computational tools to solve a variety of problems in their area of interest ranging from Optimization problems to Pattern recognition and control tasks.

Pre-requisites:

The prerequisite for this course is a basic understanding of problem solving, design and analysis of algorithms and computer programming. A prior course in Artificial Intelligence will be an advantage.

DETAILED SYLLABUS

1. Introduction to soft computing, Biological Neuron, Artificial Neuron, Characteristics of Neural Network, Neural Network Architectures, Learning in Neural Networks, Various learning Methods and Learning Rules, Single layer Perceptron, training and classification, Linear Separable classification, Applications of Neural Networks for Pattern Recognition, Classification and Clustering.
2. Introduction to Multilayer Perceptron, various activation functions, Delta and Generalized Delta Learning rule, Error Back Propagation training and algorithm, Counter Propagation Network, Boltzman Machine.
3. Recurrent Network, configuration, stability, Associative Memory: Concepts, performance analysis, BAM, ART.
4. Self-organizing Networks: Unsupervised Learning, Self-organized Map.
5. Introduction to fuzzy sets and fuzzy logic systems, Fuzzy set definitions, operations, Fuzzy rules, Fuzzy reasoning. Fuzzy inference systems, Fuzzy models.
6. Introduction to Genetic Algorithms, Biological Inspiration, The Genetic Algorithm, Genetic Operators, Genetic Algorithm through example, Sample problems, Genetic Algorithm Implementation, Tweaking the Parameters and Process, Various Problems with Genetic Algorithm.
7. Applications of Neural Network, Fuzzy Logic, Genetic Algorithms: Signal Processing, Image Processing, Pattern Recognitions, communication systems, Biological Sequence Alignment and Drug Design, Robotics and Sensors, Information Retrieval Systems, Share Market Analysis, Natural Language Processing.

BOOKS

Text Books:

1. J.M.Zurda, “Introduction to Artificial Neural Networks”, Jaico Publishing House.
2. D. E. Goldberg, “Genetic Algorithms in Search and Optimization, and Machine Learning”, Addison-Wesley, 1989.

3. Jang, Sun, & Mizutani, “Neuro-Fuzzy and Soft Computing”, PHI.
4. M. Mitchell, “An Introduction to Genetic Algorithms”, Prentice-Hall, 1998.

References:

1. S. Haykin, “Neural Networks”, Pearson Education, 2nd Ed., 2001.
2. Klir & Yuan, “Fuzzy Sets and Fuzzy Logic”, PHI, 1997.
3. Chin-Teng Lin & C. S. George Lee, “Neural Fuzzy Systems”, Prentice Hall PTR.
4. S. Rajasekaran & G. A. V. Pai, “Neural Networks, Fuzzy logic, and Genetic Algorithms”, PHI.
5. V. Kecman, “Learning and Soft Computing”, MIT Press, 2001.
6. S. N. Sivanandam & S. N. Deepa, Principles of Soft Computing, Wiley - India, 2007
7. D. E. Goldberg, Genetic Algorithms in Search, Optimization, and Machine Learning, Addison-Wesley, 1989.

M.E. COMPUTER SCIENCE & ENGINEERING
FIRST YEAR TERM II

SUBJECT: SOFTWARE TESTING AND QUALITY ASSURANCE (ELECTIVE-II)

Lectures: 3 Hrs per week	**Theory: 100 Marks**

Objective:
After successfully completing the module student should be apply the testing fundamentals and testing skill to validate and verify the software system, also able to demonstrate knowledge of testing strategies by applying the different testing tools.

Pre-requisites:
Knowledge of Software Engineering.

DETAILED SYLLABUS

1. Software Testing Background: Infamous Software Error Case Studies, What Is a Bug? Why Do Bugs Occur? The Cost of Bugs, What Exactly Does a Software Tester Do? What Makes a Good Software Tester? The Software Development Process, Product Components, Software Project Staff, Software Development Lifecycle, Models, The Realities of Software Testing, Testing Axioms, Software Testing Terms and Definitions.
2. Testing Fundamentals : Examining the Specification, Performing a High-Level Review of the Specification, Low-Level Specification, Test Techniques, Black-Box Testing, Test-to-Pass and Test-to-Fail, Equivalence Partitioning, Data Testing, State Testing, Other Black-Box Test Techniques, Examining the Code, Static White-Box Testing: Examining the Design and Code, Formal Reviews, Coding Standards and Guidelines, Generic Code Review, Checklist, Testing the Software with X-Ray Glasses, Dynamic White-Box Testing, Dynamic White-Box Testing Versus Debugging, Testing the Pieces, Data Coverage, Code Coverage
3. Applying Testing Skills: Configuration Testing, An Overview of Configuration Testing, Approaching the Task, Obtaining the Hardware, Identifying Hardware Standards, Configuration Testing Other Hardware, Compatibility Testing, Compatibility Testing Overview, Platform and Application Versions, Standards and Guidelines, Data Sharing Compatibility, Foreign-Language Testing, Making the Words and Pictures Make Sense, Translation Issues, Localization Issues, Configuration and Compatibility Issues, How Much Should You Test? Usability Testing, User Interface Testing, ,What Makes a Good UI?, Testing for the Disabled: Accessibility Testing,
4. Testing the Documentation: Types of Software Documentation, The Importance of Documentation Testing, What to Look for When Reviewing Documentation, The Realities of Documentation Testing, Testing for Software Security, War Games the Movie, Understanding the Motivation, Threat Modeling, Is Software Security a Feature? Is Security Vulnerability a Bug? Understanding the Buffer Overrun, Using Safe String Functions, Computer Forensics, Website Testing, Web Page Fundamentals, Black-Box Testing, Gray-Box Testing, White-Box Testing, Configuration and Compatibility Testing, Usability Testing, Introducing Automation.

5. Supplementing Testing: Automated Testing and Test Tools ,The Benefits of Automation and Tools, Test Tools, Software Test Automation, Random Testing, Realities of Using Test Tools and Automation, Bug Bashes and Beta Testing, Having Other People Test Your Software, Test Sharing, Beta Testing, Outsourcing Your Testing
6. Working with Test Documentation: Planning Your Test Effort, The Goal of Test Planning, Test Planning, Writing and Tracking Test Cases, The Goals of Test Case Planning, Test Case Planning Overview, Test Case Organization and Tracking, Reporting What You Find, Getting Your Bugs Fixed, Isolating and Reproducing Bugs, Not All Bugs Are Created Equal, A Bug's Life Cycle, Bug-Tracking Systems , Measuring Your Success, Using the Information in the Bug Tracking Database
7. The Future: Software Quality Assurance, Quality Is Free, Testing and Quality Assurance in the Workplace, Test Management and Organizational Structures, Capability Maturity Model (CMM),ISO 9000, Software Quality and Software Metrics.

BOOKS

References:

1.Ron Patton, “Software Testing”, Pearson publication.
2.Roger S Pressman, **“**Software Engineering: A Practitioner's Approach” 6th Edition, McGraw Hill,2005.
3.Marine Hutcheson, “Software Testing Fundamentals: Methods and Metrics”, John Wiley Publication,2003.

M.E. COMPUTER SCIENCE & ENGINEERING
FIRST YEAR TERM II

SUBJECT: CRYPTOGRAPHY AND NETWORK SECURITY (ELECTIVE-II)

Lectures: 3 Hrs per week	Theory: 100 Marks

Objective:

The course introduces the principles of number theory and the practice of network security and cryptographic algorithms. At the end of the course the student will understand: Data Encryption Standard and algorithms, IP and Web Security, Protocols for secure electronic commerce, Concepts of Digital Watermarking and Steganography.

Pre-requisites:

Probability theory and Discrete Mathematics

DETAILED SYLLABUS

1. Foundations of Cryptography and Security Ciphers and Secret Messages, Security Attacks and Services
2. Mathematical Tools for Cryptography Substitutions and Permutations, Modular Arithmetic, Euclid!s Algorithm, Finite Fields, Polynomial Arithmetic, Discrete Logarithms
3. Conventional Symmetric Encryption Algorithms Theory of Block Cipher Design Feistel Cipher Network Structures, DES and Triple DES, Modes of Operation (ECB,CBC, OFB,CFB), Strength (or Not) of DES
4. Modern Symmetric Encryption Algorithms IDEA, CAST, Blowfish, Twofish, RC2, RC5, Rijndael (AES) Key Distribution
5. Stream Ciphers and Pseudo Random Numbers, Pseudo random sequences, Linear Congruential Generators, Cryptographic Generators, Design of Stream Cipher, One Time Pad
6. Public Key Cryptography, Prime Numbers and Testing for Primality, Factoring Large Numbers, RSA, Diffie-Hellman, ElGamal, Key Exchange Algorithms, Public-Key Cryptography Standards
7. Hashes and Message Digests Message Authentication, MD5, SHA, RIPEMD, HMAC
8. Digital Signatures, Certificates, User Authentication, Digital Signature Standard (DSS and DSA), Security Handshake Pitfalls, Elliptic Curve Cryptosystems
9. Authentication of Systems Kerberos V4 and V5, X.509 Authentication Service
10. Electronic Mail Security Pretty Good Privacy (PGP), S/MIME, X.400
11. 12 3/28 IP and Web Security Protocols IPSec and Virtual Private Networks, Secure Sockets and Transport Layer (SSL and TLS)
12. Electronic Commerce Security, Electronic Payment Systems, Secure Electronic Transaction (SET), CyberCash, iKey Protocols, Ecash (DigiCash)
13. Intrusion detection – password management – Viruses and related Threats – Virus Counter measures – Firewall Design Principles – Trusted Systems
14. Digital Watermarking and Steganography, Biometrics for security- signature verification, figure print recognition, voice recognition, Iris recognition system.

BOOKS
Text Books:
1. William Stalling, "Cryptography and Network Security, Principles and Practice", Pearson/PHI Publication 2. B A Forouzan, "Cryptography and Network Security", TMH
References:
1. Bruce Schneier, "Applied Cryptography", John Wiley & Sons Inc 2. Charles B. Pfleeger, Shari Lawrence Pfleeger, "Security in Computing", Pearson Education 3. D Denning, "Cryptography and Data Security", Addision-Welesly

M.E. COMPUTER SCIENCE & ENGINEERING
FIRST YEAR TERM II

SUBJECT: PATTERN RECOGNITION
(ELECTIVE-II)

Lectures: 3 Hrs per week	Theory: 100 Marks

Objective: This course teaches the fundamentals of techniques for classifying multi-dimensional data, to be utilized for problem-solving in a wide variety of applications, such as engineering system design, manufacturing, technical and medical diagnostics, image processing, economics, and psychology.

Pre-requisite: Linear Algebra, Probability and Statistics

DETAILED SYLLABUS

1. **Introduction:** Machine perception, Pattern recognition systems, Design cycle, Learning and Adaptation
2. **Bayesian Decision Theory:** Bayesian decision theory: Continuous features, Minimum-error rate classification, classification, Classifiers, Discriminant functions and Decision surfaces, Normal density, Discriminant functions for normal density, Bayes Decision theory: discrete features
3. **Maximum-Likelihood and Bayesian Parameter Estimation:** Maximum likelihood estimation, Bayesian estimation, Bayesian parameter estimation: Gaussian caseand General theory, Prolems of dimentionality, Hidden Markov Model
4. **Nonparametric Techniques:** Density estimation, Parzen windows, k_n-Nearest-Neighbor estimation, Nearest-Neighbor rule, Matrics and Nearest-Neighbor classification
5. **Linear Discriminants Functions:** Linear discriminant functions and decision surfaces, Generalised linear discriminant functions, 2-Category linearly separable case, Minimising the Perceptron criterion function, Relaxation procedure, Non-separable behavior, Minimum squared error procedure, Ho-Kashyap procedures, Multicategory generalizations
6. **Nonmetric Methods:** Decision tree, CART, ID3, C4.5, Gramatical methods, Gramatical interfaces
7. **Algorithm Independent Machine Learning:** Lack of inherent superiority of any classifier, Bias and Variance, Resampling for estimating statistic, Resampling for classifier design, Estimating and comparing classifiers, Combining classifiers
8. **Unsupervised Learning and Clustering:** Mixture densities and Identifiability, Maximum-Likelihood estimations, Application to normal mixtures, Unsupervised Bayesian learning, Data description and clustering criterion function for clustering, Hierarchical clustering
9. **Applications of Pattern Recognition**

BOOKS

Text Books:

1. Duda, Hart, and Stock, "*Pattern Classification*", John Wiley and Sons.
2. Gose, Johnsonbaugh and Jost, "*Pattern Recognition and Image analysis*", PHI

M.E. COMPUTER SCIENCE & ENGINEERING FIRST YEAR TERM II	
SUBJECT: Mobile Computing (ELECTIVE-II)	
Lectures: Hrs per week	**Theory: 100 Marks**

Objective:

After successful completion of the course student should get knowledge about: Mobile Computing Architecture, mobile technologies: GSM, Bluetooth, GPRS, CDMA and should be capable to develop mobile computing applications.

Pre-requisites:

Knowledge of Computer Networks.

DETAILED SYLLABUS

1. Introduction: Mobile Computing, Dialogue Control, Networks, Middleware and Gateways, Application and Services, Developing Mobile Computing Applications, Security in Mobile Computing.
2. Mobile Computing Architecture: Internet – The Ubiquitous Network, Architecture for Mobile Computing, Three-Tier Architecture, Design considerations for Mobile Computing, Mobile Computing through Internet, Making Existing Applications Mobile-Enabled.
3. Emerging Technologies: Introduction, Bluetooth, Radio Frequency Identification, Wireless Broadband, Mobile IP, IPV6, Java card.
4 Mobile Transport Layer: Traditional TCP - Congestion Control, Slow Start, Fast Retransmit/Fast Recovery, Implications on Mobility, Classical TCP Improvements - Indirect TCP, Snooping TCP, Mobile TCP, Fast Retransmit/Fast Recovery, Transmission/Time-Out Freezing, Selective Retransmission, Transaction Oriented TCP.
5. Support for Mobility: File Systems – Consistency, Coda, Little work, Ficus, Mio-NFS, Rover, World Wide Web - Hypertext Transfer Protocol, Hypertext Markup Language, Some Approaches that Might Help Wireless Access, System Architectures, Wireless Application Protocol - Architecture, Wireless Datagram Protocol, Wireless Transport Layer Security, Wireless Transaction Protocol, Wireless Session Protocol, Wireless Application Environment, Wireless Markup Language, WML script, Wireless Telephony Application, Push Architecture, Push/Pull Services.
6. Global System for Mobile Communications (GSM): Global System for Mobile Communications, GSM Architecture, GSM Entities, Call Routing in GSM, PLMN Interfaces, GSM Addresses and Identifiers, Network Aspects in GSM, GSM Frequency Allocation, Authentication and Security.
7. General Packet Radio Service (GPRS): Introduction, GPRS and Packet Data Network, GPRS Network Architecture, GPRS Network Operations, Data Services in GPRS, Applications for GPRS, Limitations of GPRS, Billing and Charging in GPRS.
8. CDMA and 3G: Introduction, Spread-Spectrum Technology, Is-95, CDMA versus GSM, Wireless Data, Third Generation Networks, Applications on 3G.
9. Security Issues in Mobile Computing: Introduction, Information

Security, Security Techniques and Algorithms, Security Protocols, Public Key Infrastructure, Trust, Security Models, Security Frameworks for Mobile Environment.
BOOKS
Text Books:
1. Talukder Asoke K. and Yavagal Roopa R ," Mobile Computing (Technology, Applications and Service Creation) ",Tata Mcgraw-Hill. 2. Jochen Schiller, Addison-Wesley, "Mobile Communications ",2nd Edition.

M.E. COMPUTER SCIENCE & ENGINEERING **FIRST YEAR TERM II**	
SUBJECT: LABORATORY PRACTICE-II	
Practical: 6 Hrs per week	**Term Work: 100 Marks** **Oral: 50 marks**
DETAILED SYLLABUS	
Experiments/Assignments based on 1. Advanced Database Management Systems 2. Soft Computing 3. Elective- II The concerned subject in-charge should frame minimum of six laboratory assignments, two from each subject.	

M.E. COMPUTER SCIENCE & ENGINEERING **FIRST YEAR TERM II**	
SUBJECT: SEMINAR-II	
Practical: 4 Hrs per week	**Term Work: 100 Marks**
DETAILED SYLLABUS	
Seminar on related state of the art topic of student's own choice approved by the department.	
TERM WORK	
1. The term-work & presentation of the Seminar-II will be evaluated by departmental committee consisting of guide and two faculty members of the department appointed by Director/Principal of the college as per the recommendation of the Head of the Department.	

M.E. COMPUTER SCIENCE & ENGINEERING
SECOND YEAR TERM I

SUBJECT: SEMINAR-III

Practical: 4 Hrs per week	**Term Work: 50 Marks** **Oral: 50 Marks**

DETAILED SYLLABUS

Seminar on special topic. The topic should be on any of the area not included in the regular curriculum. The report should include detailed study of specific concept (i.e. analysis, design & implementation.). This can be a theoretical study or practical implementation approved by the department/guide.

TERM WORK

1. Seminar-III should be conducted at the end of Second Year Term I.
2. The term-work of the Seminar-III will be evaluated by departmental committee consisting of guide and two faculty members of the department appointed by Director/Principal of the college as per the recommendation of the Head of the Department.
3. The Seminar-III presentation will be evaluated by examiners appointed by University, one of which should be the guide.
4. Student must submit the Seminar Report in the form of soft bound copy
5. The marks of seminar-III should be submitted at the end of Second Year Term I to the University.

M.E. COMPUTER SCIENCE & ENGINEERING SECOND YEAR TERM I	
SUBJECT: PROJECT STAGE-I	
Practical: 18 Hrs per week	**Term Work: 100 Marks**
DETAILED SYLLABUS	
Project will consist of a system Development in Software/Hardware. Project Work should be carried out using Software Engineering principles and practices.	
TERM WORK	
The term-work of the Project Stage-I will be evaluated by departmental committee consisting of guide and two faculty members of the department appointed by Director/Principal of the college as per the recommendation of the Head of the Department.	

<u>M.E. COMPUTER SCIENCE & ENGINEERING</u> **SECOND YEAR TERM II**	
SUBJECT: PROGRESS SEMINAR	
	Term Work: 50 Marks

1. Progress Seminar should be conducted in the middle of Second Year Term II.
2. The Progress Seminar Term-Work will be evaluated by departmental committee consisting of guide and two faculty members of the department appointed by Director/Principal of the college as per the recommendation of the Head of the Department.
3. Student must submit the progress report in the form of soft bound copy.
4. The marks of progress seminar should be submitted along with the marks of Project Stage-II.

M.E. COMPUTER SCIENCE & ENGINEERING SECOND YEAR TERM II	
SUBJECT: PROJECT STAGE-II	
Practical: 18 Hrs per week	**Term Work: 150 Marks** **Oral:100 Marks**
DETAILED SYLLABUS	
This is continuation of Project Stage-I. The complete System Development in software/hardware carried out using Software Engineering principles and practices is expected. It should be a working system either software or hardware or combination of both. He/she has to present/publish atleast one paper in reputed National/International Journal/Conference on his/her Project work before submission of his/her Thesis/Dissertation.	
TERM WORK	
1. The Term Work of Project Stage –II will be assessed jointly by the pair of Internal (Guide) and External examiner along with oral examination of the same.	

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North Maharashtra University, Jalgaon

(NACC Accredited 'B' Grade University)

FACULTY OF COMMERCE & MANAGEMENT

MASTER IN BUSINESS ADMINISTRATION

NEW STRUCTURE OF M.B.A.

Semester-I and II (w.e.f.-July 2009)			
Paper	**Semester-I A : Credit Courses**	**Paper**	**Semester-II A : Credit Courses**
101	Management Science	201	Management Practices
102	Accountancy For Managers	202	Business Research Methods
103	Managerial Economics	203	Global Economic Scenario
104	Information Technology For Managers	204	Management Information System and ERP
105	Introduction To Operations Management	205	Financial Management
106	Organizational Behaviour	206	Human Resource Management
107	Corporate Social Responsibility	207	Marketing Management
B: Qualifying Non-Credit Course		**B: Qualifying Non-Credit Course**	
108	Corporate Communication Skills	208	Quantitative Techniques

Semester-III and IV (w.e.f.-July 2010)			
Paper	**Semester-III Credit Courses**	**Paper**	**Semester-IV Credit Courses**
301	Strategic Management	401	e-Commerce & Excellence Management
302	Entrepreneurship & Project Management	402	Family Business Management
303	Legal Aspects Of Business-I	403	Legal Aspects Of Business-II
304	Specialization-I (Major)*	404	Specialization-V (Major)*
305	Specialization-II (Major)	405	Specialization-VI (Major)
306	Specialization-III (Major)	406	Specialization-VII (Major)
307	Specialization-IV (Major)	407	Project Report & Viva-Voce
308	Specialization (Minor-I)**	408	Specialization (Minor-II)**

*Specialization In Major Subjects (Any One)		**Specialization In Minor Subjects (Any One)	
A	Financial Management	A	Financial Management
B	Marketing Management	B	Marketing Management
C	Human Resource Management	C	Human Resource Management
D	Operations Management	D	Operations Management
E	Agro Business Management	E	Agro Business Management

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North Maharashtra University, Jalgaon

(NACC Accredited 'B' Grade University)

FACULTY OF COMMERCE & MANAGEMENT

STRUCTURE OF MASTER IN BUSINESS ADMINISTRATION (M.B.A.)

Semester-I and II (w.e.f.-July 2009)									
Paper	**Semester-I A : Credit Courses**	**Maximum marks**			**Paper**	**Semester-II A : Credit Courses**	**Maximum marks**		
		Int.	Ext.	Total			Int.	Ext.	Total
101	Management Science	40	60	100	201	Management Practices	40	60	100
102	Accountancy For Managers	40	60	100	202	Business Research Methods	40	60	100
103	Managerial Economics	40	60	100	203	Global Economic Scenario	40	60	100
104	Information Technology For Managers	40	60	100	204	Management Information System and ERP	40	60	100
105	Introduction To Operations Management	40	60	100	205	Financial Management	40	60	100
106	Organizational Behavior	40	60	100	206	Human Resource Management	40	60	100
107	Corporate Social Responsibility	40	60	100	207	Marketing Management	40	60	100
Total Maximum Marks		**280**	**420**	**700**	**Total Maximum Marks**		**280**	**420**	**700**
B: Qualifying Non-Credit Course					**B: Qualifying Non-Credit Course**				
108	Corporate Communication Skills	40	60	100	208	Quantitative Techniques	40	60	100

Semester-III and IV (w.e.f.-July 2010)									
Paper	**Semester-III A : Credit Courses**	**Maximum marks**			**Paper**	**Semester-IV A : Credit Courses**	**Maximum marks**		
		Int.	Ext.	Total			Int.	Ext.	Total
301	Strategic Management	40	60	100	401	e-Commerce & Excellence Management	40	60	100
302	Entrepreneurship & Project Management	40	60	100	402	Family Business Management	40	60	100
303	Legal Aspects Of Business-I	40	60	100	403	Legal Aspects Of Business-II	40	60	100
304	Specialization-I (Major)*	40	60	100	404	Specialization-V (Major)*	40	60	100
305	Specialization-II (Major)	40	60	100	405	Specialization-VI (Major)	40	60	100
306	Specialization-III (Major)	40	60	100	406	Specialization-VII (Major)	40	60	100
307	Specialization-IV (Major)	40	60	100	407	Project Report & Viva-Voce	40	60	100
308	Specialization (Minor-I)**	40	60	100	408	Specialization (Minor-II)**	40	60	100
Total Maximum Marks		**320**	**480**	**800**	**Total Maximum Marks**		**320**	**480**	**800**

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FACULTY OF COMMERCE & MANAGEMENT

EQUIVALENCE OF OLD AND NEW COURCES FOR MASTER IN BUSINESS ADMINISTRATION (M.B.A.)

Old Paper	Old courses (w.e.f.- July 1998)	New Paper	New courses (w.e.f.- July 2009-10)
Semester-I			
			Credit Courses : Semester-I
101	Management Science-I	101	Management Science
102	Management Accounting -I	102	Accounting For Managers
103	Managerial Economic Analysis -I	103	Managerial Economics
105	Computer Applications -I	104	Information Technology For Managers
205	Operations & Material Management	105	Introduction To Operations Management
107	Organizational Behavior-I	106	Organizational Behavior
207	Organizational Behavior-II	107	Corporate Social Responsibility
104	Communication Skills	108	Corporate Communication Skills
Semester - II			
			Credit Courses : Semester-II
201	Management Science-II	201	Management Practices
204	Research Methodology Business Ethics & Professional Values	202	Business Research Methods
203	Managerial Economic Analysis -II	203	Global Economic Scenario
302	Information System for Management	204	Management Information System and ERP
202	Management Accounting -II	205	Financial Management
304	Human Resource Management	206	Human Resource Management
206	Marketing Management	207	Marketing Management
106	Quantitative Techniques for Management	208	Quantitative Techniques
Semester - III			
402	Corporate Planning & Strategic Management	301	Strategic Management
301	Computer Application -II	302	e-Commerce & Excellence Management
303	Business Regulatory System-I	303	Legal Aspects Of Business-I
305	Specialization-I	304	Specialization-I (Major)*
306	Specialization-II	305	Specialization-II (Major)
307	Specialization-III	306	Specialization-III (Major)
		307	Specialization-IV (Major)
		308	Specialization (Minor-I)**
Semester - IV			
404	International Business Environment	401	Family business management
401	Business & Government	402	Entrepreneurship & Project Management
403	Business Regulatory System-II	403	Legal Aspects Of Business-II
405	Functional Elective -IV	404	Specialization-V (Major)*
406	Functional Elective -V	405	Specialization-VI (Major)
		406	Specialization-VII (Major)
407	Project Report & Viva-Voce	407	Project Report & Viva-Voce
		408	Specialization (Minor-II)**

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FACULTY OF COMMERCE & MANAGEMENT

New Syllabus: M.B.A. (w.e.f. July -2009)

SEMESTER: I

Paper: 101: Management Science

60 + 40 Pattern: External Marks 60 +Internal Marks 40 = Maximum Total Marks: 100

Required Lectures: 50 hours

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1. **Nature & Development of Management** (6)
    a. Management : Concept, Nature, Importance
    b. Management : Art and Science & as a Profession, Management Vs Administration
    c. Evolution of Management: Introduction to Scientific Management by Taylor, Administrative Management by Fayol, Contribution of Peter Drucker, Decision Theory Approach, Contingency Approach, Human behavior Approach,
2. **Functions of Management –I** (7)
    a. Functions of Management, Levels of Management & their respective Functions, Managerial Skills & roles, Managerial Functions in MNC's
    b. Planning: Nature, Scope, Objective and Significances of Planning, Key factors to planning, Types of Plans, Process of Planning, Effective planning-Principles, Barriers & How to overcome barriers, Planning Premises and Forecasting.
    c. Decision Making – Types of Decision , decision making processes, Individual Vs Group decision making, Information Technology & Decision Making (attributes of useful information, information sharing)
3. **Management Functions - II** (6)
    a. Organizing: Concept, Organization Theories, Designing Organization Structure, Forms of Organizational Structure, Departmentation- need, importance & bases of Departmentation, Span of Control - Determination of factors affecting Span of Control, Delegation of Authority, Authority & Responsibility, Line & Staff, and Formal & Informal Organization.
    b. Staffing: Concept, Manpower Planning.
    c. Directing: Concept, Direction and Supervision, Importance of Directing, Principles of Directing.
4. **Management Functions - III** (6)
    a. Coordination – Need & Importance, Coordination & Cooperation, Techniques of Effective coordination.

b. Controlling : Concept, Types of control, Method : Pre-control - Concurrent control - Post control, an Integrated Control System, Concept of Quality, Factors affecting Quality, Developing a Quality Control system - Pre-control of inputs, Concurrent control of operations, Post control of outputs.

5. **Re-engineering Organizations and Teams** (4)
   a. Re-inventing the organization -Meaning and Concept, Intrapreneurship.
   b. Making Teams Effective- focusing on performance, focusing on team basis, Uncommon sense finding about teams
   c. The new organizational paradigm

6. **Management Audit** (4)
   a. Meaning and Definitions, Objectives and Scope
   b. Advantages and Disadvantages of Management Audit
   c. Difference between Management Audit and Statutory Audit
   d. Drafting reports for Managerial effectiveness

7. **Management Practices** (6)
   a. Concepts of - Kai-Zen, Disaster Management, Event Management
   b. Risk Management, Time Management, Hospitality Management,
   c. Seven Sigma , Theory Z, 5-S system, Blue Ocean Strategy

8. **Case Study** (11)
   - A real word situation facing a manager should be considered for analysis & discussion

REFERENCE BOOKS:

1. Stoner , Freeman & Gilbert Jr – Management (Prentice Hall Of India ,6th Edition)
2. Koontz – Principles Of Management (Tata Mc Graw Hill, 1st Edition 2008)
3. Robbins & Coulter – Management (Prentice Hall Of India,8th Edition)
4. Robbins S.P And Decenzo David A. – Fundamentals Of Management : Essential Concept And Applications (Pearson Education ,5th Edition)
5. L.M.Prasad – Principals Of Management (Himalaya Publications)
6. Sherlekar & Sherlekar – Modern Business & Organisation (Himalaya Publications)
7. Dr. Manmohan Prasad – Management – Concepts & Practices (Himalaya Publications)
8. Hiller Frederick S. And Hiller Mark S. – Introduction To Management Science : A Modelling And Case Studies Approach With Spreadsheets (Tata Mc Graw Hill, 2nd Edition 2008)
9. Weihrich Heinz And Koontz Harold – Management : A Global And Entrepreneurial Perspective (Mc Graw Hill 12th Edition 2008)
10. Thomas N. Duening , John M.Ivancevich : Management
    (Biztantra , An Imprint Of Dreamtech Press, New Delhi.
11. T Ramasamy : Principles Of Management - Himalaya Publications

12. R.N.Gupta :Principles Of Management , S. Chand
13. Griffin, Ricky W. :Management Principles & Application (Cenage Learning/Thomson Press)

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FACULTY OF COMMERCE & MANAGEMENT

New Syllabus: M.B.A. . (w.e.f. July -2009)

SEMESTER: I

Paper: 102: Accounting for Managers

60 + 40 Pattern: External Marks 60 +Internal Marks 40 = Maximum Total Marks: 100

Required Lectures: 50 hours

1) Introduction to Concepts & Conventions of Accounting (7)

a) Financial Accounting, Management Accounting & Cost Accounting:

b) Basic Concepts in Financial Accounting & Cost Accounting

c) Preparation of Cost sheet

d) Accounting Concepts & Conventions

e) Accounting Standards: AS-1, AS-2, AS-3,AS-5,AS-6,AS-9, AS-10, AS-20,AS-22

2) **Accounting for Planning & control**

a) **Budget & Budgetary Control** (10)

i) Concept, Objectives, & Limitations

ii) Classification of Budgets – Operating, Financial & Capital Budget

iii) Cash Budget, Flexible budget, Production Budget, Sales Budget

b) **Standard Costing** (7)

i) Concept, Essentials of an effective system of standard costing

ii) Material & labour Variances

iii) Causes & Disposition of the above variances

3) **Accounting For Managerial Decision Making**

a) **Analysis & Interpretation of Financial Statements** (12)

i) Introduction & Limitations of Financial Statements

ii) Techniques of financial Statement Analysis**:** Comparative Financial Statements, Common Size Statement, Trend Analysis.

iii) Ratio analysis : Liquidity Ratios, Activity Ratios, Profitability Ratios, Solvency Ratios

iv) Limitations of Ratio Analysis

v) Funds flow & Cash Flow Analysis : Concept of Funds, Funds flow statement, & Cash flow statement (Refer AS-3)

b) **Marginal Costing & Break Even Analysis** (8)

i) Concept of Marginal Cost: Contribution, Variable Cost, Fixed Cost, Semi-Variable Cost, Margin of Safety, PV Ratio

ii) Assumptions of Break Even Analysis & Calculations of Break Even Point

4) **Management of Working Capital** (6)

a) Concepts: Gross and Net, Permanent & Temporary, Operating Cycle

b) Disadvantages of insufficient Working Capital

c) Financing Of Working Capital, Maximum Permissible Bank finance

d) Factors Determining Working Capital Requirement

e) Estimation of Working Capital Requirement

References:

1. Management Accounting: I. M. Pandey, Vikas Publication
2. Management Accounting: James Jimbalvo, Willy India
3. Management Accounting: Dr. Jawaharlal, Himalay Publications
4. Management Accounting: Dr. S.N. Maheshwari & Dr. S.K. Maheshwari, Vikas Publications
5. Principles of Management Accounting: Manmohan & S. N. Goyal
6. Accounting Standards: D. S. Rawat ,
7. Accounting for Managers: Thukaram Rao , new age
8. Management Accounting: Ravi Kishore, Taxmann Publications
9. Management Accounting: Khan & Jain , Tata Mc-Graw Hill
10. Corporate Accounting : Ashok & Deepak Sefgal
11. Management Accounting: Prasanna Chandra, Prentice Hall
12. Cost Accounting: RSN Pillai & V. Bagavathi
13. Students guide to Cost & Management Accounting: Ravi Kishore, Taxmann Publications
14. Management Accounting: Dr. J. Madegowada, Himalaya

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FACULTY OF COMMERCE & MANAGEMENT

New Syllabus: M.B.A. (w.e.f. July -2009)

SEMESTER: I

Paper: 103: Managerial Economics

60 + 40 Pattern: External Marks 60 +Internal Marks 40 = Maximum Total Marks: 100

Required Lectures: 50hours

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1) Basic Of Managerial Economics (10)

- a) Nature & Scope Of Managerial Economics
- b) Managerial Decisions In Competitive Markets
- c) Industry And Firms
  - i) Definitional Problems
  - ii) Standard Industrial Classification
  - iii) Industrial Structure In India
- d) Measuring & Maximizing Economic Profit
- e) Maximizing The Value Of A Firm
- f) Demand: Determinants, Elasticity And Forecasting Methods
- g) Supply : Determinants And Its Elasticity
- h) Competition And Market Power
- i) Meaning ,Measurement And Determinants Of Market Power

2) Different Market Structures And Equilibrium Of Firm In Product & Input Markets (18)

- a) Traditional Theory Of Firm : Profit Maximizing Theory
- b) Managerial Decisions for Firms and Industry In Perfect Competition & Imperfect Competition
  - i) Demand Curves, Average And Marginal Revenue Curves & Costs Curves
  - ii) Profit Maximization Output & Pricing Decisions In The Short Run & In The Long Run
  - iii) Profit Maximizing Input Usage
    - (1) Marginal Revenue Product & Hiring Decisions
    - (2) Average Revenue Product &The Shutdown Decision
- c) Oligopoly Markets
  - i) Strategic Decision Making In Oligopoly Markets
  - ii) Game Theory
    - (1) Cooperative & Non Cooperative Behavior
    - (2) Decision With Dominant Strategy
    - (3) Nash Equilibrium
  - iii) Importance Of Entry Barriers
- d) Modern Theory Of Firm :Alternative Maximizing Theory
  - i) The Separation Of Ownership From Control
  - ii) Principal-Agent Theory
  - iii) Sales Maximizing Theory
  - iv) Importance Of Non Maximizing Theories
- e) Pricing Practices
  - i) Price Discrimination
  - ii) Full Cost Pricing
  - iii) Product Life Cycle Pricing
  - iv) Transfer Pricing

3) Economics Of Regulation **(10)**

a) The Need For Government Intervention And Social Control Over Industries

b) The Ways & Means For Government Regulation Of Industries

i) Property Right Regulation

ii) Patents

iii) Subsidy Policy

iv) Tax Policy

c) Cost Of Regulation & Government Intervention

d) Competition & The Role Of The Government

i) Government Failures

ii) Deregulation And Privatization

iii) Regulatory Reforms For Promoting Competition

4) Economics Of Corporate Growth, Merger, Diversification & Innovation **(12)**

a) Corporate Growth

i) The Need For Growth

ii) The Theory Of Growth Of The Firm

(1) Downei Theory

(2) Penrose Theory

(3) Marries

iii) Growth ,Profitability & Size

b) Diversification And Collusion

i) Meaning ,Extent & Types

ii) Reasons For Diversification and Collusion

c) Merger

i) Meaning And Reasons For Merger

ii) Difference Between Merger &Takeovers

iii) The Effect Of Merger

iv) Recent Merger Activities In Indian Economy-

d) Innovation

i) Concept & Meaning

ii) The Extent Of Innovation And Industrial Structure

iii) Technology Opportunities & Innovation

iv) Innovation & Competition In Competitive Markets

References

1) An Introduction To Industrial Economics: P.J.Devine, N.Lee, R.M.Jones &W.J.Tyson (4th Edition) (Anmol Publication, New Delhi)

2) Industrial Economics: R.R.Barthwal, Wiley Eastern Ltd

3) Managerial Economics: H.Craig Peterson,W.Cris Lewis,Prentice- Hall Of India,3rd Ed.

4) Economics:Principles &Policy: W.J.Baumal & Alan S Blinder,Harcourt Brace Jovanovich, Publishers

5) Principles Of Economics: Lipsey + Chrystal,Oxford

6) Managerial Economics: Concept & Application: Christopher R. Thomas & S.Charles Maurice, Mc-Graw Hill, 8th Ed.

7) Managerial Economics: Mark Hirschey , Thomson 10ed.

8) Industrial Organization: Luis M.B.Cabral,Jaico Publishing House

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FACULTY OF COMMERCE & MANAGEMENT

New Syllabus: M.B.A. . (w.e.f. July -2009)

SEMESTER: I

Paper: 104: Information Technology For Managers

60 + 40 Pattern: External Marks 60 +Internal Marks 40 (Test Marks 20 + Practical Marks 20) = Maximum Total Marks: 100

Required Lectures: 50hours

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1) Fundamentals of Information Technology **(03)**

a) Basics Of Computer: I/P, O/P Hardware, System/Application Software

b) What Is Information Technology, Basic Concepts

c) Benefits In Information Technology

2) Introduction To Database **(06)**

a) Business Intelligence

b) Managing Data : File Environment, Data Problems And Difficulties, Solutions, Data Life Cycle, Data Sources, Data Quality

c) Database Management System

d) Logical Data Models

e) Data Warehousing

f) Data Mining – Concept And Application

g) Structured Query Language(SQL)

3) Information & Communication Technology In Organizations **(03)**

a) Impact Of Information Technology On Organizations

b) Improving Business Processes Through ICT

4) IT Oversight And Governance In Organizations **(06)**

a) The Role Of Business Processes

b) The Missing Roles Of IT Governance That Cause Business Failure

c) Modern Roles And Responsibilities Of IT & Business Units

d) IT Governance And Business Vision, Mission, And Objectives

e) Benefits Of Effective IT Governance

5) Strategic Issues Of Information Technology **(03)**

a) Strategic Advantage & Information Technology

b) Information Technology & Corporate Strategy

c) Integrating Technology With Business Environment

6) Implementation Issues Of IT In Organizations **(04)**

a) Understanding The Need

b) System Study Of The Concern Component

c) IT Infrastructure Design

d) Installation & Configuration

e) Training To Decision Making And Operating Staff

7) International Business & Information Technology **(03)**

a) Key Issues In International Environment
b) Managing Information Technology Internationally
c) Transnational Virtual Firms & IT

8) Role Of Government & E- Governance **(03)**

a) Concept of E-Governance W.R.T. Govt.
b) Need, Benefits Of E-Governance W.R.T. Govt.
c) Areas of E-Governance W.R.T. Govt.
d) E-Governance Initiatives In India

9) Web Revolutions **(08)**

a) Network Computing: Internet & Web, Intranet & Extranet
b) Internet Software Agents: Search Engines, Directories, Software & Intelligent Agents
c) Portals: Information & Corporate Portals
d) Communication: Web-Based Call Centers, Electronic Chat Rooms, Voice Communications, Blogging
e) Virtual Collaboration, Groupware, Electronic Meeting Systems, Electronic Teleconferencing
f) E-Learning, E-Learning Vs Distance Learning, Benefits Of E-Learning, Virtual Universities, Virtual Work & Telecommuting

10) Mobile And Wireless Technology **(03)**

a) Broadband (High-Speed Packet-Based Wireless)
b) Voice Over Packet Networks (Vop)
c) General Packet Radio Service (GPRS)
d) Wireless Application Protocol (WAP)
e) Messaging

11) MS Office – 2007 **(08)**

a) Microsoft Word 2007- Creating Word Documents, Mail Merge, Use Of Advanced Functions
b) Microsoft Access 2007 – Creation Of Database, Queries, Reports, Labels & Forms
c) Microsoft Excel 2007 – Creation And Application Of Spread Sheet, Data Analysis And Management, Use Of Formulas, Functions And Graphs & Charts
d) MS PowerPoint 2007 – Creation, Organization And Presentation
e) Use Of Outlook Express- Mailing Through Outlook And Managing Groups

List Of Practical

1. MS Word – Creation Of Document, Formatting, Editing
2. Organizing Information With Tables And Outlines
3. Mail Merge Application
4. MS-Access – Creating Database, Defining Primary Keys, Designing Query
5. MS-Access – Designing Reports, Labels And Forms
6. Creating And Editing Worksheet
7. Creating And Using Formulae And Functions
8. Sorting And Querying Data, Working With Graphs And Charts
9. MS Power Point Slides, Use Of Templates And Slide Designs
10. Developing A Professional Presentation On Business Plan
11. Internet : Web Search And Surfing For Information
12. Publishing Documents On Web
13. Creating And Managing E-Mail Account

14. Creating And Managing Blog
15. Manipulation Of Data Base Using SQL – Create, Insert, Select, Select All
16. Manipulation Of Data Base Using SQL – Select Query, Cross Tab Query, Make-Table Query, Update Query, Append Query, Delete Query
17. To Design A Query To Access Selected Fields From Table To Generate Knowledge Base

References

1. Information Technology For Management By Henry Lucas, 7th Edition, Tata Mc-Graw Hill, New Delhi
2. Information Technology For Management: Transforming Organisations In The Digital Economy By Turban, Mclean, Wetherbe, 4th Edition, Willy India Edition, New-Delhi
3. Business Process Management: Integration In A Web-Enabled Environment By Margaret May, Prentice Hall Financial Times, Pearson Education, New Delhi.
4. Manage IT As A Business: How To Achieve Alignment And Add Value To The Company By Bennet P. Lientz & Lee Larssen, Elsevier Butterworth–Heinemann
5. E-Commerce E-Business By C.S. Rayudu, Himalaya Publication, New Delhi
6. Fundamentals Of Information Technology By Alexis Leon, Leon, Vikas Publications, New Delhi
7. MS-Office 2007 For Dummies By Peter Weverka Willy, New Delhi
8. MS-Office 2007 By Rutkosky, BPB Publication, New Delhi

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FACULTY OF COMMERCE & MANAGEMENT

New Syllabus: M.B.A. . (w.e.f. July -2009)

SEMESTER: I

Paper: 105: Introduction To Operations Management

60 + 40 Pattern: External Marks 60 +Internal Marks 40 = Maximum Total Marks: 100

Required Lectures: 50hours

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1) The System Of Operations Management **(12)**

a) Production & Operations Management
   i) Meaning & Nature of Operations Management
   ii) Role of Operations Managers
   iii) Operation Management Vis-à-vis other functions in organisations
   iv) Challenges before Operations Management
   v) Product Design
   vi) Process Design
   vii) Automation

b) The Nature Of Business Policy
   i) Formation & Implementation

c) Operations Policy
   i) Competitive Advantage
   ii) Policy Implications & Implementation

d) Management & Services
   i) Characteristic , Classification & Quality Of Services
   ii) Designing Service Processes
   iii) Service Scenario Of India

e) Business Process Outsourcing & Offshoring
   i) Introduction To Outsourcing, Offshoring, Near Shoring & Form Shoring
   ii) Indian Continent: As A Outsourcing Hub

2) Capacity Management **(12)**

a) Need for Operations Planning & Control

b) Capacity & Capacity Planning
   i) Meaning, Need & Importance Of Capacity
   ii) Types Of Capacity
   iii) Process of Capacity Planning
   iv) Capacity Measurement

c) Capacity Management Strategies
   i) Provision For Variation Or Efficient Adjustment
   ii) Elimination Of The Need For Adjustment
   iii) Capacity expansion strategy

d) Factors Influencing The Choice Of Strategy
   i) Feasibility Factors
   ii) Desirability Factors & Factors W.R.T. Customer Order

3) Facilities Planning **(12)**

a) Product Selection
b) Process
c) Locational Design(Numerical On Locational Analysis
d) Layout Of Facilities
e) Need & Objectives On Layout Planning
f) Basic Types Of Layouts
g) Layout Planning Procedure
h) Material Handling
i) Factors Affecting Facility Location Planning

4) Materials & Inventory Management **(14)**

a) Materials Planning & Control
   i) Significance & Benefits Of Material Planning – Material Requirement Planning, Aggregate Planning
   ii) Factors Influencing Material Planning
   iii) Guidelines & Problems On Material Planning
b) Introduction To Material Budgeting,
   i) Material Control
   ii) Records Of Material Control
c) Vendor Development & Rating
   i) Need For Vendor Development
   ii) Vendor Evaluation & Selection Process
   iii) Factors On Vendor Evaluation & Rating
   iv) Vendor Motivation (Records & Punishment)
   v) Numerical On Vendor Rating
      (1) Categorical Plan
      (2) Weighted Point Plan
      (3) Cost Ratio Plan
d) Introduction To Value Analysis & Value Engineering
   i) Historical Perspective
   ii) Types Of Values & Their Function
   iii) Value Tests
   iv) Steps In Value Analysis
   v) Value Engineering & Simplification Analysis
   vi) Benefits Of Value Engineering
e) Inventory Management
   i) Functions & Classifications
   ii) Importance
   iii) Inventory Models (Simple E.O.Q. & E.O.Q. With Discounts)
f) Concepts of : Lean Manufacturing, Flexible Manufacturing System, Group Technology

References

1. Production & Operations Management – Kanishka Bedi – Oxford Press
2. Production & Operations Management – Chunawala & Patel – Himalaya Publishing House
3. Production & Operations Management – K.Ashwathappa & K. Shridhar Bhat - Himalaya
4. Production & Operations Management – Upendra Kachru – Excel Books
5. Operations Management – Ray Wild – Thomson Learning
6. A Modern Approach To Operations Management – Dr Ram Naresh Roy – New Age International
7. Materials Management – K. Shridhat Bhat - Himalaya Publishing House
8. Industrial Engineering & Production Management – M. Mahajan- Dhanpat Rai & Sons
9. Industrial Engineering & Management – O.P Khanna - Dhanpat Rai & Sons
10. Operations Management – Evans & Collier – Cenage Publishing
11. Operations Management – Russel & Taylor – Willey India.

SEMESTER: I

Paper: 106: Organizational Behavior

60 + 40 Pattern: External Marks 60 +Internal Marks 40 = Maximum Total Marks: 100

Required Lectures: 50hours

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1) Introduction (6)

a) Definition of O.B,
b) Key elements of O.B.
c) Nature & Scope of O.B.
d) O.B. Process
e) Disciplines contributing to O.B.
f) Organization Culture & Diversity
g) Emerging challenges and opportunities for O.B.
h) International O.B

2) Individual Perspective (7)

a) Personality. Concept. Determinants and Types, How Personality influences O.B
b) Attitudes. Types, Components & Functions. Attitudes& O.B.
c) Concept of Job Satisfaction.
d) Perception. Definition, Basic Elements, Factors Influencing Perception, Attribution.
e) Impression Management.
f) Learning. Meaning. Determinants, Principles, Learning & Behavior

3) Interpersonal Relationship (7)

a) Developing interpersonal relations
b) Conflict. Meaning, Sources, Types.
c) Intrapersonal Conflict - Role Identity, Role Perception, Role Expectation, Role Conflict.
d) Interpersonal Conflict (Transactional Analysis and Johari Window)
e) Aspects of Conflict (Functional and Dysfunctional)
f) Conflict Management

4) Group Dynamics (6)

a) Groups in Organization, Nature, Membership, Process of Group Development, Types of Groups, Group structure
b) Group Norms, Group Conformity, Group Cohesion, Group Size, Group Think, Group Shift.
c) Group dynamics & Inter-group dynamics

5) Motivation (6)

a) Meaning
b) Types of Motives
c) Theories of Motivation
  i) Hierarchy of needs Theory
  ii) Theory X and Theory Y
  iii) Motivation-Hygiene Two Factor theory
  iv) ERG theory
  v) Vroom's Expectancy theory
  vi) Mc Cellands Learned Needs Theory
  vii) Goal Setting Theory
  viii) Reinforcement Theory
d) Motivation applied - Financial and non-Financial motivators

6) Leadership (6)

a) Meaning , Functions, Styles, Traits of Leadership
b) Theories of Leadership
c) Likert's System of 4
d) Fielders Leadership Contingency theory
e) Hersey-Blanchards Situational Leadership Theory
f) Path Goal Theory

g) Charismatic Leadership Theory
h) Transformation Leadership Theory
i) Ohio State Leadership Quadrants and Management Grids

7) Change Management and Development **(6)**

a) Why Organization changes?, Planned Change, Resistance to change, Managing resistance to change
b) Meaning of organization development, Characteristics, Objectives.
c) Work stress : Meaning of Stress, Nature and sources of stress, Consequences of Stress, Stress & Task Performance, Coping Strategies for the Stress

- **Case study:** A real word situation facing a manager should be considered for analysis & discussion **(12)**

References

1. Organization Behavior – Arun Kumar & N. Meenakshi, Vikas Publishers
2. Organization Behavior – Schernerhorn, Hunt, Osborn, Willy India
3. Foundation of OB – Slocum & Hellriegel, Cenage Learning
4. Organization Behavior – Nelson & Quick, Cenage Learning
5. Organization Behavior – Dr. Nirajkumar, Himalaya Publications
6. Organization Behavior – K. Ashwathappa
7. Management & OB – Jayantee Mukherjee-Saha, Excel Books
8. Organization Behavior – Suja R. Nair, Himalaya Publications
9. Organization Behavior –Stephen P . Robbins, Pearson
10. Organization Behavior –S.S. Khanka
11. Organization Behavior –Fred Luthans
12. Human Behavior at Work –Keith Devis
13. Organization Behavior – P G Aquinas, Excel books, New Delhi
14. Organization Behavior – M.N. Mishra, Vikas Publications

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North Maharashtra University, Jalgaon

(NACC Accredited 'B' Grade University)

FACULTY OF COMMERCE & MANAGEMENT

New Syllabus: M.B.A. (w.e.f. July -2009)

SEMESTER: I

Paper: 107: Corporate Social Responsibility

60 + 40 Pattern: External Marks 60 +Internal Marks 40 = Maximum Total Marks: 100

Required Lectures: 50hours

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1) Understanding Social Issues (10)

a) Social Issues : Concept, Characteristic and Causes of Social Problems

b) Social Issues *vis-a-vis* corporate environment: Castism, Regionalism, Agitation in Youth, Urbanization, Terrorism, Black money, Corruption, Sexual Harassment at Workplace, Scams, Bribery, Cheating etc. & their impact on Society

c) Values, norms & beliefs

d) Culture, Cultural différences & Discrimination – Equal opportunities.

e) Business & Society

f) Impact of Technology on the society - Social Cost of Development

2) Business Ethics (12)

a) Basic Framework

i) Meaning & Importance & Factors affecting Business Ethics

ii) Morality, Applied Ethics, Moral Standards, Code of Ethics

b) Ethical Mind

i) Basics of Mind Management

ii) Objective & Subjective Mind

iii) Training the Mind

iv) Self Development

v) Stages of Self Development

vi) Effects of Past Tendencies

c) Ethical Decision Making

i) Ethical D/M Process

ii) Transparency as a factor in decision making

iii) Ethical consistency, Ethical enquiry and reasoning

iv) Ethical Dilemma

v) Role & Qualities Of CEO

vi) Business ethics & CEO

3) Corporate Social Responsibility – I (10)

a) Understanding CSR

i) Concept & Definition of Corporate Social Responsibility

ii) Scope of Corporate Social Responsibility

iii) Corporate Social Responsibility and the Law

iv) Corporate Social Responsiveness

v) Corporate Social Performance

vi) Corporate Citizenship

vii) Corporations as Stakeholders

viii) Diverging Views on Social Responsibility(Arguments for & against)

ix) Social Responsibility & Indian Corporations

b) A Stakeholder Approach to Socially Responsible and Ethical Behavior

i) Organizational Stakeholders, Categorizing Stakeholders

(1) boards of directors,

(2) management,

(3) investors/shareholders,

(4) auditors, and

(5) government

ii) Criterion for Determining The Social Responsibility of Business

iii) Areas of Social Responsibility of Business

iv) Social Accounting & Social Audit

4) Corporate Social Responsibility – II (8)

a) Ethical issues in Functional Areas

i) Advertising, Marketing, HRM, Finance & Accounting & Information Technology

ii) Intellectual Property Rights

iii) Ethical issues in Merger and Acquisitions

b) Unethical Behavior in Organizations

i) Understanding Unethical Behavior

ii) Individual Factors Contributing to Unethical Behavior

iii) Organizational Factors Contributing to Unethical Behavior

5) Corporate Governance (10)

a) Understanding Corporate Governance

i) Concept, Meaning, Relevance & Principles of Corporate Governance

ii) Issues in Corporate Governance

iii) Parties to Corporate Governance

iv) Professionalization of Corporate Governance

v) 'Good' Corporate Governance

vi) Corporate Governance Practices in India

vii) Desirable corporate Governance in India

viii) Naresh Chandra Committee Report – 2002

ix) Narayan Murthy Committee Report – 2003

x) Corporate Governance Rating

b) Business Applications of Corporate Governance

i) Corporate Governance in Public Sector

ii) Privatization & Corporate Governance

iii) Corporate Governance in Banks

References

1. Ethics and Corporate Social Responsibility: Why Giants Fall by Ronald R. Sims, Greenwood Press, 2003.
2. Corporate Governance: Principal Policies & Practices by Fernando, Pearson Education
3. Corporate Ethics: The Business Code of Conduct for Ethical Employees by Steven R. Barth, Aspatore Books, 2003
4. Business Ethics by Agalgatti, Nirali Publication
5. Ethics in Management & Indian Ethos by Biswanath Ghosh, Vikas Publications

6. Ethical Management: Text cases in BE & CG by Satish Modi, Mcmillions
7. Business Ethics Manisha Paliwal, New age International
8. Business Ethics & Values by Senthil Kumar, Himalaya Publications
9. Business Ethics: Concept & Cases by Manuel Velasquez
10. Business Ethics: Text & Cases, by C.S.V. Murthy, Himalaya Publication
11. Social Problems in India by Ram Ahuja, Rawat Publications.
12. Corporate Governance by PP Arya, BB Tandan, AK Vashistha, Deep & Deep Publication.
13. Corporate Social Responsibility by R. Jatna, D. Crowther, Deep & Deep Publication
14. Business Ethics in Corporate Governance by CSV Murthy, Himalaya Publication
15. Corporate Social Responsibility by Baxi & Prasad, Excel Books
16. Corporate Governance - Economic Reforms & Development by Reed Darryl & Sanjay Mukherjee, Oxford
17. Corporate Social Responsibility by Philip Kotler, Nancy Lee, John Willey, New Delhi

North Maharashtra University, Jalgaon

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FACULTY OF COMMERCE & MANAGEMENT

New Syllabus: M.B.A. (w.e.f. July -2009)

SEMESTER: I

Paper:108:Corporate Communication Skills

60 + 40 Pattern: External Marks 60 +Internal Marks 40 (Test Marks 20 + Practical Marks 20) = Maximum Total Marks: 100

Required Lectures: 50hours

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1) Communication **(6)**

- **a)** Meaning, Objectives, Process & Importance of communication
- **b)** Types of Communication
  - i) Verbal-Non verbal : Kinesics & Proxemics
  - ii) Written-Oral
  - iii) Formal-Informal & Internal-External
- **c)** Means of Communication
- **d)** Barriers & Measures to overcome the barriers to Communication
- **e)** Principles of effective communication

2) Communication Skills **(14)**

- **a)** Reading Skills: Rapid Reading, Comprehension.
- **b)** Speaking Skill: Speech-preparation, Guidelines for Effective speech, Negotiation, Discussion
- **c)** Listening Skill: Importance, Process, and Barriers & Guidelines for Effective Listening.
- **d)** Presentation Skill: Types of Presentations, Propositions about presentations, Types of delivery, Process of Preparing & Delivering.
- **e)** Computer based Power Point presentation
- **f)** Interview : Types, Preparation, Conducting and Appearing for interview
- **g)** Meeting – Planning, Agenda, Layout, Leading the meeting, Drafting Minutes of Meeting & Steps for effective meeting outcomes.

3) Written Communication **(12)**

- **a)** Meaning, Distinction with Oral Communication, Merits & Limitations of Written communication.
- **b)** Letter writing: Layout of Business letter, types of layouts, Essentials of Good Business letters, Attitude in Business writing
- **c)** Purpose of letters: Resume, Application. Writing Direct Messages by Manager – Delivering: Positive, Neutral & Negative Information.
- **d)** Holding Press Conferences & Preparing Press Releases, Media Interviews
- **e)** Report Writing: Meaning & Nature of Report, Formats of Reports – Formal, Informal reports, Writing Reports - Data collection, organizing, presentation of the Report.
- **f)** Drafting Skills: Documents, Policies, Procedures, Rules, Note taking etc.

4) Organizational Communication **(8)**

- **a)** Meaning & Importance of Organizational Communication
- **b)** Internal communication: Notice, Circular, Memo.
- **c)** External Communication – Enquiries, Quotations, Bank & Financial Institutions

5) Case Study Methods **(10)**

- **a)** Meaning of the Case study method
- **b)** Types of Cases
- **c)** Analyzing the Case – Case Analysis Approaches
- **d)** Case Analysis Process
- **e)** Discussing & Presenting a Case
- **f)** Writing the Case Report
    - **Note for Practical:** Practice sessions for development of skills should be regularly conducted. Continuous assessment based on participation and performance should be evaluated for 20 marks in internal assessment.

References

1. Business Communication for Managers By Penrose / Rasberry / Myers, Cenage Learning.
2. Business Communication by Raman & Singh, Oxford Publication.
3. Communication Today By Ruben Roy, Himalaya Publication.
4. Business Communication By Sehgal & Khetarpal, Excel Books
5. Business Communication – C.S. Raydu – Himalaya Publishing House
6. Communication For Business – Taylor - Pearson Education
7. Communication Skills – Dr Rao & Dr. Das – Himalaya Publication
8. Contemporary Business Communication – Scot Ober – Biztantra :Dreamtech
9. Business Communication Today – Bovee, Thill, Schatzman – Pearson
10. Basics of Business Communication – Lesikar & Flatley – Tata McGraw Hills
11. Business Communication – R.K. Madhukar – Vikas Publication

COLLEGE OF ENGINEERING AND TECHNOLOGY , BAMBHORI, JALGAON

CIVIL ENGINEERING DEPARTMENT

TEACHING LOAD - 2009 – 2010 (Term – I)

Sr. No	Name	Year and Branch	Subject	Theory (Hrs)	Practical (Batch × hrs)	Total
1	Dr. Rakesh Mowar	TE (Civil)	GTE	04	-	04
2	Dr. M. Husain	BE (Civil) ME (Civil) ME (Civil)	ENV II EEM Project & Seminar	04 03	01 × 01 06 × 02	20
3	S L Patil	SE (Civil) BE (Civil) BE (Civil)	SUR-I Elective Project	04 04	02 × 02 02 × 02 02 × 02	20
4	S B Pawar	SE (Civil) SE (Civil) TE (Civil)	BCM CG TRE	04 - 04	04 × 02 02 × 02 01 × 01	21
5	P A Shirule	FE (Common) SE (Civil) TE (Civil) BE (Civil) M E (Civil)	EM SOM GTE Seminar DOMWSSS ES	08 04 - 03 03	02 × 02 - 02 × 02 01 × 02 01 × 01 01 × 01	30
6	F I Chavan	FE (Common) SE (Chem)	EM SOM	08 04	03 × 02 02 × 02	22
7	Jayant Kale	BE (Civil) FE (common)	CM EM	04 08 -	07 × 02	24
8	Bharati Mahajan	FE (Common) TE (Civil)	EM NACA	04 04	06 × 02 02 × 02	24
9	Sonali B Patil	TE (Civil) B E (Civil) F E (Common)	FM II WRE EM	04 04	02 × 02 - 06 × 02	24
10	N. L. Fegade	S.E. (Civil) B.E. (Civil) F. E. (common)	CT QSV EM	04 04	02 x 02 02 x 02 05x 02	26
11	Jaydeepsingh pardeshi	BE(Civil) T.E. (Civil) FE (common)	QSV SDD I EM	04 08	01 × 02 02 × 04 01× 02	24

Teaching Load Distribution
2009 -10 Term II
Civil Engineering Department

Name of teacher	FE									SE	TE	BE	ME	Total
RM	A	B	C	D	E	F	G	H	I		GTE II L4			4
MH	ECE L1				ECE L1	ECE L1	ECE L1	ECE L1	ECE L1			PROJ P8	PROJ P10	24
SBP														NIL
SLP	ECE L1P1						ECE L1	ECE L1	ECE L1	EG L4P4		PROJ P8	WSM L4	25
PAS				ECE L1	ECE L1						GTEII P4	CM II L2P4 PROJ P8	AWTT L4	24
FIC		ECE L2	ECE L2							SUR II L4P4	EEI L4P4		IWWWM L4	24
BVM						ECE L1 P3					TOSII L4T2	WREII L4P4	ELEC L4	22
JNK										BDD L4P8	SDDII L4P8			24
SBPt							ECE P3	ECE P3		FMI L4P4		ELECT L4P4		22
JAP					ECE P3				ECE P3	TOSI L4T2		SDDIII L4P8		24
JRM	ECE P2	ECE P3	ECE P3	ECE P3							TREII L4T2	CMII L2	AWWTT L4	23

SSBT'S COLLEGE OF ENGINEERING & TECHNOLOGY, BAMBHORI.

DEPARTMENT OF CHEMICAL ENGINEERING

TEACHING LOAD DISTRIBUTION FOR SEMESTER I (2009-2010)

SR. NO.	NAME	YEAR & BRANCH	SUBJECT	TH (Hrs)	PR BATCH x (Hrs)	TOTAL
1	DR.K.S.WANI	M.E.(ENV)	AP	3	1	
		B.E.	BCE	4	0	
			PROJECT	0	2	
			SEMINAR	0	2	12
2	DR. V.R.DIWARE	B.E.	CRE-II	4	4X2=8	
			PROJECT	0	2	
			SEMINAR	0	2	
		T.E.	PEDD-I	4	0	20
3	S.A.THAKUR	MBA-II	BRS-I	2	0	
		B.E.	TP	4	0	
		T.E.	MT-I	4	4X2=8	18
4	V.P.SANGORE	T.E.	CP II	0	2X1=2	
		S.E.	CHE-I	4	2X2=4	
			CHE-II	4	2X2=4	18
5	N.Y.GHARE	B.E.	PDC	4	2X2=4	
			CET	4	0	
			PEDD-I	0	4X2=8	20
6	A.R.LOKHANDE	B.E.	EE	4	2X1=2	
			PROJECT	0	2	
			SEMINAR	0	2	
		T.E.	PHT	4	2X1=2	
		S.E.	CA	0	2X2=4	20
7	S. FARAH	T.E.	CP II	4	2X1=2	
			PHT	0	2X1=2	
		S.E.	UO I	4	2X2=4	
		B.E.	EE	0	2X1=2	18
						126

SSBT'S COLLEGE OF ENGINEERING & TECHNOLOGY, BAMBHORI.

DEPARTMENT OF BIOTECHNOLOGY

TEACHING LOAD FOR SEMESTER I (2009-2010)

SR.NO.	NAME	YEAR	SUBJECT	TH (Hrs)	PR BATCH X (Hrs)	TOTAL
1	Dr.I.D.Patil	SE	PCAL	04	--	
		TE	CRE	04	---	
		BE	Project & Seminar		04	
		ME(Env.)	EEC	03	01	16
2	Sharanappa A	TE	BPP	04	--	
		BE	BPE-I	04	--	
		BE	BPMS	04	1X04	
		BE	Project & Seminar	--	04	20
3	S.B.Badgujar	SE	MB	04	--	
		TE	ENZE	04	--	
		BE	PTPB (Elective I)	04	--	
		BE	Project & Seminar	--	04	16
4	Ms. P. Pande	TE	MBGE	04	1X04	
		BE	FBT-II	04	1X04	16
5	Mr.Jayant P.P.	SE	MB	--	1X04	
		SE	CB	04	--	
		SE	PCAL	--	1X02	
		SE	CA	--	1X02	
		BE	BSP	04	--	16
6	Mrs. S.M.Badgujar	SE	FFSH	04	1X02	
		TE	MT-I	04	1X04	
		TE	CRE	--	1X04	18
					TOTAL	102

SSBT'S COLLEGE OF ENGINEERING & TECHNOLOGY, BAMBHORI.

DEPARTMENT OF BIOTECHNOLOGY

TEACHING LOAD FOR SEMESTER II (2009-2010)

SR.NO.	NAME	YEAR	SUBJECT	TH (Hrs)	PR BATCH X (Hrs)	TOTAL
1	Dr.I.D.Patil	SE	PHT	04	--	
		TE	MT-II	04	1X04	
		BE	Project		04	16
2	Sharanappa A	TE	BTH	04	--	
		BE	Elective-II	04	--	
		BE	BioInfo	--	1X04	
		BE	Project	--	04	16
3	S.B.Badgujar	SE	BCH	04	--	
		TE	FBT-I	04	--	
		BE	BPE-II	04	--	
		BE	Project	--	04	16
4	Ms. P. Pandey	SE	BCH	--	1X02	
		TE	BWT	04	1X04	
		TE	BTH	--	1X02	
		BE	BioInfo	04	---	16
5	Mr.Jayant P.P.	SE	IMM	04	1X02	
		BE	BPEE	04	1X02	
		BE	BPE-II	--	1X04	16
6	Mrs. S.M.Badgujar	SE	CHE	04	1X02	
		SE	PHT	--	1X02	
		TE	IPC	04	1X02	14
					TOTAL	94

APP-11-LOAD-BT

LOAD DISTRIBUTION
COMPUTER DEPARTMENT
SEM-I 2009-10

Sr No.	Name of Staff	Year & Branch	Subject	TH	PR	Total
1	K.P. Adhiya	BE COMP(A+B)	ADVANCED UNIX PROGRAMMING	4	6*2	20
		BE COMP	PW &SEMINAR	-	04	
2	M. E. Patil	TECOMP(A)	SP	4	--	16
		TECOMP(B)	SP	4	--	
		TECOMP(A)	ADTL		04	
		BE COMP	PW &SEMINAR	--	04	
3	Sandip S. Patil	BECOMP(A)	AI	4	01*02	16
		BECOMP(b)	AI	4	01*02	
		BE COMP	PW &SEMINAR	--	04	
4	Ashish Bhole	TECOMP(A)	CN	4	02*02	16
		TECOMP(b)	CN	4	--	
		BE COMP	PW &SEMINAR	--	04	
5	Saroj Patil	SECOMP(A)	PL-I	3	3*4	15
6	S.S. Gharde	BECOMP(A)	OOMD	4	3*2	18
		BECOMP(b)	OOMD	4	--	
		BE COMP	PW &SEMINAR	--	04	
7	Sheetal Patil	SECOMP(A)	DSGT	4	-	18
		SECOMP(A)	DSGT	4	-	
		TECOMP(a)	ADTL	--	2*4	
		BE COMP	PW &SEMINAR	--	02	
8	Vrishali Sonawane	TECOMP(A)	CG	4	3*2	24
		TECOMP(b)	CG	4	3*2	
		BE COMP	PW &SEMINAR	--	04	
9	Deepak Bage	BE COMP(a)	ES	4	--	18
		BECOMP(b)	ES	4	3*2	
		BE COMP	PW &SEMINAR	--	4	
10	Ashwini Lokhande	SECOMP(A)	DSMP	4	--	20
		SECOMP(B)	DSMP	4	4*2	
		BE COMP	PW & SEMINAR	--	4	

11	Nilima Patil	SECOMP(B)	Pl-I	3	4* 4	21
		BE COMP	PW &SEMINAR	-	2	
12	N.Y.Suryawanshi	TECOMP(A)	TCS	4	--	18
		TECOMP(B)	TCS	4	--	
		TECOMP(b)	sp	--	3*2	
		BE COMP	PW &SEMINAR	--	04	
13	Priti Sharma	TECOMP(B)	ADTL	--	3*4	20
		SECOMP(a)	DSMP	--	3*2	
		BE COMP	PW &SEMINAR	--	02	
14	Harsha Deshmukh	SECOMP(A)	IME	4	--	16
		SECOMP(b)	IME	4	--	
		BECOMP(B)	OOMD	--	3*2	
		BE COMP	PW &SEMINAR	--	02	
15	Amol Chaudhari	TECOMP(a)	MP-II	04	3*2	18
		TECOMP(b)	MP-II	04	---	
		BE COMP	PW &SEMINAR	--	04	
16	Harmony shah	TECOMP(b)	MP-II	--	03*02	20
		BECOMP(A)	ACN	4	--	
		BECOMP(B)	ACN	4	--	
		BECOMP(B)	ES	--	03*02	
17	Rashmi rathi	TECOMP(A)	sp	--	3*2	06
18	Yogeshwari borse	BECOMP(a)	AI	--	02*02	16
		BECOMP(B)	AI	--	02*02	
		TECOMP(b)	CN	--	03*2	
		TECOMP(A)	CN	--	01*2	

TOTAL: - 320

S.S.B.T'S College of Engineering & Technology, Bambhori, Jalgaon

Department of Information Technology

Load Distribution(Sem-I)2009-10

Sr. No.	Staff Name	Designation	Class	Subject	Theory	Practical	Total Load
1	Mrs. A.K.Bhavsar	Asst. Prof.	BE IT	OOMD	04	02*03=06	14
			BE IT	PW		02	
			BE IT	Seminar		02	
2	Mr.S.J.Patil	Lecturer	BE IT	PW	--	02	18
			TE IT	CN	04	02*03=06	
			SE IT	PPM	04	--	
			BE IT	Seminar	--	02	
3	Mr.N.P.Jagtap	Lecturer	BE IT	ERP	04	02*03=06	20
			TE IT	ADTL()	--	04*01=04	
			SE IT	IME	04	--	
			BE IT	PW		02	
4	Mr.S.H.Rajput	Lecturer	TE IT	TCS	04	--	20
			SE IT	DSμP	04	02*03=06	
			TE IT	CG	--	02*01=02	
			BE IT	Seminar	--	02	
			BE IT	PW		02	
5	Ms.M.P.Chaudhari	Lecturer	TE IT	SP	04	02*03=06	18
			TE IT	DSGT	04	--	
			EE IT	ADTL	--	01*04=04	
6	Mr.R.M.Patil	Lecturer	BE IT	ES	04	02*03=06	18
			BE IT	CG	04	02*02=04	
7	Mr.R.B.Sangore	Lecturer	BE IT	E-COM	04	--	20
			TE IT	MT	04	02*03=06	
			TE IT	ADTL		04*01=04	
			BE IT	Seminar	--	02	
8	Mr.A.S.Agrawal	Lecturer	BE IT	AUP	04	02*03=06	17
			SE IT	PL-I	0 3	04*02=08	
9	Mr. G.H. Patil	Programmer	SE IT	PL-1 (PR)	--	04*02=08	08
						Total	153

APP-11-LOAD-IT

COLLEGE OF ENGINEERING & TECHNOLOGY, BAMBHORI.

ELECTRONICS & TELECOMMUNICATION DEPARTMENT

TEACHING LOAD SHEET Term- I (2009-2010)

Sr. No.	Name	Teaching	Hours	Project & Seminar		Total
		Theory Subject Hrs.	Practical (Batch*Hrs.)			
01	Prof. S.R.Suralkar	DCLD(B) 04	3 * 2 = 06	02	02	14
02	Prof.M.P.Deshmukh	ECM(A) 04 SDC(B) 04	2*2 = 04 1 * 4 = 04	02	__	18
03	Prof. P.J.Shah	VLSI(A&B) 08	4 * 2 = 8	02	__	18
04	Prof.V.M.Deshmukh	EME(A & B) 08 TUT(A&B) 02 EEE	--- --- 3 * 2 = 06	02	__	18
05	Prof. P.V. Thakre	DSP(A) 04 FOC(B) 04	3 * 2 = 06 ---	02	02	18
06	Prof. N.M.Kazi	CCN(A) 04 EEE(C) 04	--- 3 * 2 = 06	02	02	18
07	Prof. S.U.Nyati	DSP(A) 04 NAS(B) 03	3 * 2 = 06 2 * 2 = 04	02	__	19
08	Prof. A.H.Karode	EI(A,B) 08	4 * 2 = 08	02	__	18
09	Prof. A.C.Wani	SDC(A) 04 AE(A) 04	2 * 4 = 08 ---	02	__	18
10	Prof. P.H.Zope	MMS(A.B) 08	4 * 2 = 08	02	__	18
11	Prof. S.P.Ramteke	RMT(A) 04 DCLD(A) 04	4 * 2 =08 ---	02	__	18
12	Prof.S.K.Khode	DC(A,B) 08	6 * 2 = 12	__	__	20
13	Miss. Pooja Oza	EEE(F) 04 SDC(A) FCS(B) 04	--- 2 * 4 = 08 2 * 2 = 04	__	__	20

14	Miss. K.S. Mantri	AE(B) 04 RMT(B) 04 EEE	3 * 2 = 06 2 * 2 = 04 1 * 2= 02	__	__	20
15	Mr. A.R. Bari	EEE (D) 04 ECM(B) 04 ECM(A)	2* 2 = 04 3 * 2 = 06 1 * 2 = 02	__	__	20
16	Miss. A. A. Pande	EEE(B,I) 08	6 * 2 = 12	__	__	20
17	Miss K. R. Dahake	EEE(A) 04 DCLD(A) VLSI(B)	3 * 2 = 06 3 * 2 = 06 2 * 2= 04	__	__	20
18	Mrs M. J. Patil	EMC(A&B) 08 EWS(A&B)	--- 6 * 2 = 12	__	__	20
19	Miss.P.P.Kharul	EEE (E) 04 SDC(B) EI(B) NAS(B) 02	3 * 2 = 06 1 * 4 = 04 2 * 2 = 04 ---	__	__	20
20	Miss Priti Rajput	EEE(H) 04 AE(A) MMC(B)	2 * 2 = 04 4 * 2 = 08 2 * 2= 04	__	__	20
21	Miss.P.M.Shanbhag	EEE(G) 04 NAS	4 * 2 = 08 4 * 2= 08	__	__	20
22	Mrs. D. R. Patil	SA-II(B) FCS(A) 04 CCN(B) 04	2 * 2 = 04 4 * 2 = 08 ---	__	__	20
23	Mrs. M. R. Dhotre	NAS(A) 05 FOC(A) 04 FOC(B)	--- 3 * 2 = 06 3 * 2 =06	__	__	21

Total Teaching Load =444 Hrs.

S.E. (Electronics & Telecommunication)

First Term

Sr. No.	Subject
1	Electronics Materials and Components
2	Electronics Instrumentation
3	Digital Circuits and Logic Design
4	Electrical Circuits and Machines
5	Semiconductor Devices and Circuits
6	Electronics Workshop

T.E. (Electronics & Telecommunication)

Sr. No.	Subject
1	*Feedback Control System
2	#Electromagnetic Engineering
3	Digital Communication
4	*Microprocessor and Micro controller System
5	*Network Analysis and Synthesis
6	*Software Application-II

Theory **Practical**

B. E. (Electronics & Telecommunication)

Sr. No.	Subject
1	Radiation and Microwave Technology
2	Fiber Optic Communication
3	Digital Signal Processing and Processors
4	Computer Communication Networks
5	VLSI Design

(Batch*hrs)

COLLEGE OF ENGINEERING & TECHNOLOGY, BAMBHORI.
ELECTRONICS TELECOMMUNICATION DEPARTMENT
TEACHING LOAD SHEET Term- II (2009-2010)

Sr. No.	Name	Year and Branch	Subject	Theory (Hrs)	Practical (Batch*hrs)	Total
01	Prof. S.R.Suralkar	T.E E&TC (B)	EM Project	04 ---	2 * 2 = 04 04	12
02	Prof. P.J.Shah	T.E E&TC (A)	PE Project	04 ---	3 * 2 = 06 04	14
03	Prof.M.P.Deshmukh	S.E E&TC (A) S.E E&TC (B)	ECA ECA	04 04	2 * 4 = 08 ---	16
04	Prof.V.M.Deshmukh	S.E E&TC (A) S.E E&TC (A) FE (E) BE E & TC	NL TUT EEE Project	04 01 02 ---	3 * 2 = 06 --- --- 04	17
05	Prof. P.V. Thakre	BE E & TC T.E E&TC (B) TE ELECT BE E & TC	SAT COM PE PE Project	04 04 --- ---	--- 2 * 2 = 04 2 * 2 = 04 04	20
06	Prof. N.M.Kazi	BE E & TC TE E&TC (B) BE E & TC	TV/CE AICA Project	04 04 ---	2 * 4 = 08 --- 04	20
07	Prof. S.U.Nyati	T.E E&TC (A) T.E E&TC (A) BE E & TC BE E & TC BE E & TC	ITCT TUT TEM SAT COM Project	04 01 04 --- ---	--- --- 2 * 2 = 04 1 *2 = 02 04	19
08	Prof. A.H.Karode	TE E&TC (A) SE E&TC BE E&TC	EM ECA Project	04 ---	3 * 2 = 06 1 * 4 = 04 04	18
10	Prof. P.H.Zope	T.E E&TC BE E&TC BE E & TC	AICA EMB. SYS Project	04 04 ---	--- 3 * 2 = 06 04	18

11	Prof. S.P.Ramteke	S.E E&TC BE E & TC	A C (A, B) Project	08 ---	3 * 2 =06 04	18
12	Prof.S.K.Khode	SE E&TC (B) TE E &TC (B) TE E &TC (A)	NL ITCT AICA	04 05 ---	1 * 2 = 02 --- 3 * 2 = 06	18
13	Miss. Pooja Oza	FE (A,B,D) SE (E &TC)	EEE ECA	06 ---	--- 3 * 4 = 12	18
14	Miss. K.S. Mantri	SE E&TC TE E&TC (B) FE (A,B,D) FE (A,B,D) SE E&TC	MS (A) ECD EEE EEE SA I	04 --- --- ---	----- 2 * 2 = 04 4 * 2 = 08/2week 2 * 2 = 04/2week 2 * 2 = 04	18
15	Mr. A.R. Bari	FE (C, H, D) SE (E &TC) SE (E &TC)	EEE NL AC	04 --- --- ---	4 * 2 = 08/2week 2 * 2 = 04 3 * 2 = 06	18
16	Miss. A. A. Pande	FE (B, C) SE (E &TC) SE ELECT	EEE S.A. I A & D	--- --- 04	2 * 2 = 04/2week 4 * 2 = 08 2 * 2 = 04	18
17	Miss K. R. Dahake	FE (G,B) FE (E,H) FE (C,D) BE E&TC	EEE EEE IC SAT COM	02 --- --- ---	4 * 2 = 08/2week 2 * 2 = 04/2week 4 * 2 = 08 1 * 2 = 02	18
18	Miss P. P. Patil	FE (F,E,A) FE (C,D) BE E&TC BE E&TC TE E&TC	EEE IC SAT COM TEM AICA	02 --- --- --- ---	5 * 2 = 10/2week 2 * 2 = 04/2week 1 * 2 = 02 1 * 2 = 02 2 * 2 = 04	19
19	Miss P. R. Madhwani	SE E&TC (B) TE E&TC BE E&TC FE (D)	MS PT/MP TV/CE EEE	04 --- --- ---	--- 5 * 2 = 10 1 * 4 = 04 1 * 2 = 02/2week	19

Total Teaching Load =338 Hrs.

Electrical Engineering Department

Load Distribution 2009-10 Semester-I

Sr. No.	Name of Staff member	Year & Branch	Subject	Theory (Hrs.)	Practical Batch X Hrs.	Total
01	D.U.Adokar	TE Electrical BE Electrical	MPMC Sem Project	4 2 4	2X2=4	14
02	V.S.Pawar	BE Electrical	CMPS IEE Sem Project	4 4 2 4	--	14
03	M.M.Ansari	TE Electrical BE Electrical	EM/C-II PSOC IEE Project	4 4 4	2X2=4 2X2=4	20
04	S.M.Shembekar	SE Electrical TE Electrical	ACCT PS-II	4 4	2X3=6 2X2=4	18
05	D.S.Patil	SE Electrical	EEM EM-I EAC	4 4	2X3=6 2X2=4	18
06	T.F.More	SE Electrical	EM-I HV	4 4	2X4=8 2X2=4	20
07	S.A.Seragi	TE Electrical	EME EIED SA	4+1* 4	 2X2=4 2X2=4	17
	Total			69	52	121

*Tutorial

DEPARTMENT OF MEANICAL ENGG. (UNDERGRADUATE)
Load distribution
SEM.-I (2009-10)

Sr. no	Name	Year & Branch	Subject	Theory (Hrs)	Pract Hrs	Project/ Seminar	Total	Total Load
1	Dr. N. V. Halegowda	SE (Me) A,B	AT	08	--	--	08	
		BE (Me)			--	04	04	12
2	J. R. Chaudhari	SE(Me)A	MS	04	02x2=4	--	08	
		BE(Me)	--	--	--	04	04	
		FEI	EG-I	01=01	1x2=04	--	03	15
3	N. K. Patil	BE(Me)	OR	04	--	--	04	
		BE(Me)	--	--	--	04	04	
		FE(D)	EG-I	01	1x2=2	--	03	
		SE (Me)	CG	--	2x2=4	--	04	15
4	K. Shrivastava	T.E.()	HTMT	04	2x2=4	--	08	
		BE	RAC	04	2x1=2	04	10	18
5	S. P. Shekhawat	BE(Me)	AE-I	04	--	--	04	
		BE(Me)	MTX	02	2x3=6		08	16
		TE(Me)	TOM-II		2x2=4	--	04	
6	P. G. Damle	TE(Me)	MD-I	04	2x3=6	--	10	
		FE(F)	EG-I	01	1x2=2	--	03	
		BE(Me)	--	--	--	04	04	17
7	M. S. Murthy	BE (Me)	RAC	04	2x2=4	04	12	
		TE (Me)	HTMT	04	2x1=2	--	06	18
8	D. B. Sadaphale	SE(Me)	MS	04	2x2=4	--	08	
		SE(Ele)	AT	02	2x2=4	--	06	16
9	P. N. Ulhe	SE(Me)	SOM	04	--	--	04	
		SE(Me)	CG	--	2x2=4	--	04	18
		TE(Me)	CP	--	2x5=10	--	10	
10	M. V. Ravlani	SE (Me)	MS	--	2x1=2	--	02	
		FE(E)	EG-I	01	4x2=8	--	09	19
		BE(Me)	OR	04		04	08	
11	C. K. Mukhrjee	SE(Me)B	SOM	04		--	04	
		SE(Me)B	MD	--	2x2=4	--	04	18
		TE	NACM	04	3x2=6		10	
12	P. M. Solanki	BE(Me)	CAD	04	3x2=6	--	10	

		SE(Me)B	CG	--	2x2=4	--	04	
		FE(F)	EG-I	01	1x2=2	--	03	17
13	A. B. Bharadwaj	SE(Me)A	ME-I	04	--	--	04	
		SE(Me)B	ME-I	04	--	--	04	18
		FE	EG-I		2x5=10		10	
14	S. M. Sarange	TE(Me)	TOM-II	04	2x3=6		10	
		BE(Me)	MTX	04	2x3=6		10	20
15	P. D. Patil	BE(Me)	CAD	04	2x3=6		10	
		SE (Me)B	AT		3x2=6		06	19
		FE	EG-I	01	2x1=2		03	
16	A. I. Shiekh	TE(Me)	NACM	04	3x2=6		10	
		TE(Me)	ICE	04	2x2=4		08	18
17	P. P. Bornare	SE	AT		2x3=6		06	
		SE (Me)	MD		2x2=4		04	20
		TE(Me)	ICE	04	3x2=6		10	
18	R. A. Chopde	FE	EG-I	01	2x4=08		09	19
		TE (Me)	MD-I	04	2x3=06		10	
19	D. R. Lohar	FE	EG-I		2x1=02		02	
		TE (Me)	TOM-II	04			04	
		SE (Me)	MD		2x2=4		04	18
		TE (Me)	CPP		2x2=4		04	
		BE	FM	04			04	
20	D. D. Bagle	TE (Me)	HTMT		3x2=6		06	
		BE	RAC		3x2=6		06	
		SE (Ele)	AT	02	2x1=2		04	19
		FE	EG-I	01	2x1=2		03	
21	Sy. Mudasar Ali	BE (Me)	MTX	02			02	
		SE (Me)B	MS		2x2=04	--	04	18
		FE	EG-I		2x5=10		10	
		TE	ICE		2x1=2		02	

SSBT'S COLLEGE OF ENGG. AND TECH.BAMBHORI,JALGAON

DEPARTMENT OF BUSINESS ADMINISTRATION

Teaching Load Distribution for M.B.A.(2009-10)

SR.NO	NAME	SUB CODE	SUBJECT	MBA I L	MBA I T	MBA I P	MBA II L	MBA II T	MBA II P	TOTAL
1	Er.N.K.Patil	105	Operations Management	2						**2**
2	Er.J.R.Chaudhari	101	Management Science	2						**2**
3	Er.M.V.Rawlani	103	Managerial Economics	2						**2**
4	Er.S.A.Thakur	303	Business Regulatory Systems				2	1		**3**
5	Mr.S.R.Vasishtha	105	Operations Management	2						
		306(A)	Promotion Management				4	1		
		307(B)	Labour Economics & Costing				4	1		
		302	M.I.S. & E.R.P.					1		
		303	Business Regulatory System					1		
		304	Human Resourse Management					1		
		101	Management Science	2						**17**
6	Mr.H.A.Salunkhe	107	Corporate Social Responsibility	2						
		305(C)	Financial Management				4	1		
		307(C)	Financial Management				4	1		
		303	Business Regulatory Systems					1		**13**
7	Mr.Vishal S.Rana	106	Organisational Behaviour	4						
		107	Corporate Social Responsibility	2						
		306(B)	Ind.Relations and Trade Union				4	1		
		301	Computer Applications					1		
		307(A)	Strategic Marketing				2	1		**15**
8	Mr.P.A.Anawade	302	M.I.S. & E.R.P.					1		
		108	Managerial Communications	4						
		305(A)	Advanced Marketing Research				4	1		
			and Consumer Behaviour							
		303	Business Regulatory Systems				2	1		
		304	Human Resource Management					1		
		307(A)	Strategic Marketing				2			**16**
9	Ms.R.A.Modiyani	102	Accountancy for Managers	4						
		103	Managerial Economics	2						
		306(C)	Financial Management				4	1		
		301	Computer Applications					1		**12**
10	Ms.Faroza Kazi	304	Human Resource Management				4	1		
		305(B)	Personal Administration and Labour Welfare				4	1		
			Labour Welfare							**10**
11	Ms.Rashmi Rathi	104	Info. Technology for Managers	4		4				
		301	Computer Applications				4	1		**13**
12	Mr.M.A.Sanap	302	M.I.S. & E.R.P.				4	1		**5**
										110

L

Teaching Load of Applied Science (2009-2010)- Term-I

Sr No	Name of faculty	FE									SE									
		A	B	C	D	E	F	G	H	I	Comp		C H-B T	Mech		IT	Civil		EL	Total
											M-III		M-III	M-III		M-III	M-III		M-III	
											A	B		A	B		A			
1	Dr.K.S.Parihar (Maths)	L_1		L_1	L_2	L_2		L_1		L_2										12
		T1		T1				T1												
2	K.S.Patil (PHY)	L1	L1	L1	L1	L1	L1													16
			P2	P2		P2			P2	P2										
3	Sunita S. Patil (Maths)		L2			L1	L1				L2		L2	L2		L2	L2			16
						T1	T1													
4	M.V. Deshpande (Maths)	L2		L2				L2			L2	L2			L2	L2				16
											T1					T1				
5	C.U.Nikam(PHY)	L1	L1	L1	L1	L1	L1	L2	L2	L2										22
		P2	P1	P1			P2	P2	P1	P1										
6	Jayashri Mourya (Che)	L2		L2			L2		L2	L1										18
			P1	P2	P1	P1	P1	P2	P1											
7	Deepmala Desai (Che)		L2		L2	L2		L2		L1										18
		P1	P2	P1	P1	P2	P1		P1											
8	Paresh Patil (Chem)																			09
		P2			P1		P1	P1	P1	P3										
9	Y.K. Chitte (PC)				L2		L2	L2	L2											13
		T1			T1		T1		T1	T1										
10	Sewta pawar (PC)	L2	L2	L2		L2				L2										14
			T1	T1		T1		T1												
11	Mr. J J Patil				L1				L1			L1	L2	L2	L2		L2		L4	19
									T1	T1							T1		T1	
12	Mrs. Pooja Bhandarkar		L1				L2		L2	L1		L1								10
			T1		T1							T1								
13	J B Patil	P1			P3	P1	P1	P1												07
Total		17	17	17	17	17	17	17	17	17	05	05	04	04	04	05	05		05	190

Internal Continuous Evaluation System in place

The internal continuous evaluation system in place at this college level is done as per University guidelines currently enforce/ received before the start of term. The schedule for performance of practicals is notified on the departmental lab notice board. This schedule is batchwise and it also indicates the completion/ submission date of practical, drawing and assignment sheets. It is meant for those subjects for which term work marks are to be sent to the University.

The weekly record of the attendance of the students is maintained in the register meant for this purpose. This register also evaluates the performance of the students under the following headings :

a) Attendance in class/practical
b) Performance in class/practical
c) Class tests/ viva voce
d) Assignment/ Journal

The above are quantified and marks are awarded in the next week, displayed and consolidated at the end of term. At term end the term work assessment programme is displayed and the work is evaluated by two faculty members who are appointed by the Principal and the term work marks are forwarded to the University under the signature of both the examiners.

Students' assessment of Faculty, System in place.

During the 5th week of the term the feedback by the students is taken subject wise for the staff who teach them. A set of questionnaire is circulated them and feedback is obtained. This feedback is taken by academic monitoring committee comprising of three HOD's and Coordinator of Academic and Research and Development. The feedback is submitted to the Principal and he apprises the faculty member about their weak points and they are given the opportunity to improve upon their deficiencies and their weak points during the term itself.

Also during the term, students are free to pass on the difficulties through suggestion boxes kept at various location and if they are related to their academic difficulties, their difficulties are solved and the concerned faculty is advised by the Principal with sole aim of improvement in academics. Personal hearing are given by Coordinator of Academics and Research and Development and the Principal.