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

(With NBA Accredited Programmes)

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Mandatory Disclosure

Part-III

August 2016

Shram Sadhana Bombay Trust's
COLLEGE OF ENGINEERING AND TECHNOLOGY
BAMBHORI, POST BOX NO. 94, JALGAON – 425001. (M.S.)
Included under section 2 (f) & 12 (B) of the UGC Act, 1956
ISO 9001: 2008 certified

ISO 9001:2008

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Ref. No. COET/ AICTE/MD/ / 16 **Date: 20/08/2016**

C E R T I F I C A T E

Certified that all enclosures contained in PART-I, PART-II & PART-III bearing page no. **01** to page no. **2035** are pertaining to our institution which are being submitted in two separate above mentioned bound booklets/box file of Mandatory Disclosure. All xerox copies may be treated as original.

PRINCIPAL

NORTH MAHARASHTRA UNIVERSITY,
JALGAON (M.S.)

Second Year Engineering
(E&TC/E&C/Elex/IE)
Faculty of Engineering and Technology

COURSE OUTLINE

Semester – III

W.E.F 2013 – 2014

SE Semester - III

Name of the Course	Group	Teaching Scheme				Evaluation Scheme					Credits
						Theory			Practical	Total	
		Theory Hrs / week	Tutorial Hrs / week	Practical Hrs / week	Total	ISE	ESE	ICA	ESE		
Solid State Devices & Circuits-I (TH)	D	3	1	---	4	20	80	---	---	100	4
Electrical Circuits and Machines (TH)	B	3	---	---	3	20	80	---	---	100	3
Digital Techniques & Applications (TH)	D	3	1	---	4	20	80	---	---	100	4
Component Devices & Instrumentation Technology (TH)	D	3	---	---	3	20	80	---	---	100	3
Communication Systems-I (TH)	D	3	---	---	3	20	80	---	---	100	3
Soft Skills – III	C	1	---	2	3	---	---	50	---	50	2
Electrical Circuits and Machines (LAB)	B	---	---	2	2	---	---	50	---	50	1
Solid State Devices & Circuits-I (LAB)	D	---	---	2	2	---	---	25	25(PR)	50	1
Communication Systems-I (LAB)	D	---	---	2	2	---	---	25	25(PR)	50	1
Digital Techniques & Applications (LAB)	D	---	---	2	2	---	---	25	25(PR)	50	1
Total		**16**	**2**	**10**	**28**	**100**	**400**	**175**	**75**	**750**	**23**

ISE: Internal Sessional Examination **ESE:** End Semester Examination **ICA:** Internal Continuous Assessment

SE Semester - IV

Name of the Course	Group	Teaching Scheme				Evaluation Scheme					Credits
						Theory		Practical		Total	
		Theory Hrs / week	Tutorial Hrs / week	Practical Hrs / week	Total	ISE	ESE	ICA	ESE		
Engineering Mathematics-III (TH)	A	3	1	---	4	20	80	---	---	100	4
Solid State Devices & Circuits-II (TH)	D	3	1	---	4	20	80	---	---	100	4
Microprocessors (TH)	D	3	---	---	3	20	80	---	---	100	3
Linear Integrated Circuits (TH)	D	3	---	---	3	20	80	---	---	100	3
Network Analysis & Synthesis (TH)	D	3	---	---	3	20	80	---	---	100	3
Computer Programming-II (LAB)	B	1	---	2	3	---	---	50	---	50	2
Linear Integrated Circuits (LAB)	D	---	---	2	2	---	---	50	---	50	1
Solid State Devices & Circuits-II (LAB)	D	---	---	2	2	---	---	25	25(PR)	50	1
Network Analysis & Synthesis (LAB)	D	---	---	2	2	---	---	25	25(PR)	50	1
Microprocessors (LAB)	D	---	---	2	2	---	---	25	25(PR)	50	1
Total		**16**	**2**	**10**	**28**	**100**	**400**	**175**	**75**	**750**	**23**

ISE: Internal Sessional Examination **ESE:** End Semester Examination **ICA:** Internal Continuous Assessment

Solid State Devices & Circuits- I

COURSE OUTLINE

Course Title	Short Title	Course Code
Solid State Devices & Circuits- I	**SSDC-I**	

Course Description:

This course includes semiconductor-based devices such as diodes, bipolar transistors, FETs, and related components. This course is designed to introduce to the students to the basic principles and applications of semiconductor devices. It includes semiconductor physics and semiconductor diodes, fundamentals, BJT, FET, MOSFET (operation & characteristics), frequency response of BJT and FET. This course provides instruction in the theory and application of solid state devices in the electronics industry. Emphasis is placed on the physical characteristics and uses of solid state devices.

	Hours / Week	No. of Weeks	Total Hours	Semester Credits
Lecture	03	14	42	04
Tutorial	01	14	14	

Prerequisite Course(s): Knowledge of Elements of Electronics Engineering

COURSE CONTENT

Solid state Devices and Circuits-I **Semester-I**

Teaching Scheme	**Examination Scheme**	
Lecture: 3 hours / week	**End Semester Examination (ESE)**	**: 80 Marks**
Tutorial: 1 hour / week	**Paper Duration (ESE)**	**: 03 Hours**
	Internal Sessional Exam (ISE)	**: 20 Marks**

Unit-I: Introduction to Semiconductor **No of Lect. – 9, Marks: 16**

a) Intrinsic and Extrinsic Semiconductor - Concept of Doping, N type Semiconductor, P type semiconductor.
b) Conduction Mechanism - Drift and Diffusion Current, Carrier Concentration after doping (N and P type material).
c) Law of mass action.
d) Introduction to Diode application – Voltage Multiplier circuit, Analysis of half wave rectifier & full wave rectifier. Analysis of Full wave rectifier with capacitor filter.

Unit-II: Introduction to BJT Biasing **No of Lect. – 9, Marks: 16**

a) Concept of DC and AC Load line.
b) Introduction to biasing, Need of biasing, Different biasing circuit (Fixed bias, collector- base bias, Voltage divider bias), Stability factor.

c) Bias Compensation technique - Bias Compensation technique using Diode and Thermistor.
d) Small Signal model of BJT- Hybrid parameter model of BJT for Low frequency analysis, Derivation for Av, Ai, Ri, & Ro using Exact and Approximate analysis in terms of H parameter for CE amplifier.
e) Exact and Approximate analysis for all Configurations, Conversion formulae for CE, CC.
f) Millers Theorem and its Dual.

Unit-III: Introduction to FET **No of Lect. – 8, Marks: 16**

a) Symbol, Construction Principle of operation, V-I and Transfer Characteristics for N & P channel FET.
b) FET Parameter.
c) Biasing of FET, Different biasing methods.
d) Analysis of Voltage divider biasing method (Analytical and Graphical method).
e) Small Signal model of FET, CS, CG& CD amplifier.
f) FET as an amplifier CS (Bypass and Un bypassed excluding rd).

Unit-IV: Introduction to MOSFET **No of Lect. – 8, Marks: 16**

a) MOSFET - Symbol, Types of MOSFET - Depletion and Enhancement type MOSFET (N channel & P channel).
b) Construction, Operation, & V-I characteristics of MOSFET.
c) MOSFET biasing - Types of Depletion & enhancement MOSFET biasing.
d) MOSFET as amplifier.

Unit-V: Cascade Amplifier and Frequency response of BJT **No of Lect. – 8, Marks: 16**

a) Multistage amplifier - Need of multistage amplifier, multistage amplifier with combination of different configuration (CE-CE, CE-CB).
b) Concept of frequency response of BJT, B.W. of Single stage and cascaded amplifier.
c) Square wave Testing **-** Derivation for F_L & F_H of Square wave testing of an amplifier.
d) Concept of Capacitor in Frequency response - Effect of coupling, bypass capacitor and junction capacitor on frequency response of BJT.

Reference Books:

1. R. Boylestad, L. Nashelsky "Electronics Devices and Circuit Theory", 10th Edition, Pearson, 2009.
2. S. Salivahanan, N. Sureshkumar and A. Vallavaraj, "Electronics Devices and Circuits", Tata McGraw Hill, 3rd Edition, 2009.
3. S. C. Sarkar, "Electronics Devices and Circuits-I" Everest Publishing House, The Millennium 12th enlarged and revised Edition, 2001.
4. T. Floyd, "Electronics Devices" conventional current version, 7th Edition, Pearson, 2008.
5. D. Cheruku, B. Krishna, "Electronics Devices and Circuits", 2nd Edition, Pearson, 2012.
6. J. Miillman, C. Halkias, "Integrated Electronics", Tata McGraw Hill, 1st Edition, 1991.

Electrical Circuits and Machines

COURSE OUTLINE

Course Title	Short Title	Course Code
Electrical Circuits and Machines	**ECM**	

Course Description:

The course considers the basic principles of electrical machines. In this course we will introduce some of the basic concepts and terminology that are used in modern electrical engineering. The students can use this knowledge to analyze electrical networks, D.C. machines, A.C. machines & transformer etc.

Lecture	Hours / Week	No. Of Weeks	Total Hours	Semester Credits
	03	14	42	03

Prerequisite Course(s): knowledge of Elements of Electrical and Electronics Engineering.

COURSE CONTENT

Electrical Circuits and Machines **Semester-III**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week

End Semester Examination (ESE): 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

Unit-I: Three phase circuits & A.C. circuits **No of Lect. – 9, Marks: 16**

a) Thevenin's, Norton's theorem's application for A.C. network.
b) Three phase circuit power measurement (Star and Delta load).
c) Single watt meter, two Watt meter method.
d) Active, reactive, apparent power and power factor.

Unit-II: DC Machines **No of Lect. – 9, Marks: 16**

a) DC machine construction.
b) EMF equation of Generator, working principle (series & shunt).
c) Motor working principle; back EMF (series & shunt).
d) Torque equation and speed equation of motor.
e) Characteristics, losses and power stages of generator & motor.
f) Necessity of starter (3-point starter).

Unit-III: Single phase & three phase transformers **No of Lect. – 8, Marks: 16**

a) Transformers construction, EMF equation, working Principle: 1ϕ and 3ϕ.
b) Transformer phasor diagram no load & on load.
c) C.T, P.T. & Auto-transformer.
d) Open circuit and short circuit tests, Efficiency and regulation.

Unit-IV: Synchronous Machines **No of Lect. – 8, Marks: 16**

a) Alternator construction, principle of operation and EMF equation.
b) Principle of operation of synchronous motor.
c) Synchronous Motors on load with different excitation.
d) Explain hunting in synchronous motor.

Unit-V: Induction Motors **No of Lect. – 8, Marks: 16**

a) Three phase I.M. construction.
b) Principle of working of three-phase I.M.
c) Slip, torque equation (T_{st} & T_{max}) & torque - slip characteristics.
d) Types of starters (DOL, star-delta, auto-transformer).
e) Single phase Induction motors
f) Special machines (stepper motor, servo motor, universal motors) working, data analysis and application.

Reference Books:

1. B. Theraja, A. Theraja, "A Text book of Electrical Technology- Vol-I",S. Chand, 1st Edition, 2010.
2. B. Theraja, A. Theraja, "A Text book of Electrical Technology- Vol-II", S. Chand, 1st Edition, 2010.
3. V N Mittle/ Arvind Mittal, "Basic Electrical Engineering", McGraw Hill Companies, 2nd Edition.
4. H. Cotton, "Electrical Technology", CBS Publication, 7th Edition.

Digital Techniques and Applications

COURSE OUTLINE

Course Title	Short Title	Course Code
Digital Techniques and Applications	**DTA**	

Course Description:

This course provides an introduction to digital electronics & its applications covering different types of codes, Boolean laws, SOP and POS form, k-map technique, arithmetic circuits such as adder, substractor, Multiplexer, Demultiplexer and their applications, different types of flip-flops and their applications, sequential circuits such as ripple counter, synchronous counter, Mod-n counter, shift resister and its applications. Logic families TTL, MOS and its interfacing. This course is designed to give a broad understanding of the principles of Digital Techniques and its applications.

	Hours / Week	No. of Weeks	Total Hours	Semester Credits
Lecture	03	14	42	04
Tutorial	01	14	14	

Prerequisite Course(s): Knowledge of Basic gates and semiconductor devices.

COURSE CONTENT

Digital Techniques and Applications **Semester-I**

Teaching Scheme	Examination Scheme	
Lecture: 3 hours / week	**End Semester Examination (ESE)**	**: 80 Marks**
Tutorial: 1 hour / week	**Paper Duration (ESE)**	**: 03 Hours**
	Internal Sessional Exam (ISE)	**: 20 Marks**

Unit-I: **Codes and Boolean algebra** **No of Lect. – 9, Marks: 16**

a) Introduction to Number Systems.
b) Representation of signed numbers.
c) Classification of Binary codes. BCD codes, Excess -3 codes, Gray codes, ASCII codes, Hamming code and pulsed operation of logic gates.
d) Boolean algebra, reducing Boolean expressions, SOP form, POS form, Minterm, Maxterm.
e) Simplification of Boolean function using K-map method and don't –care condition.

Unit-II: **Combinational Logic Circuits** **No of Lect. – 9, Marks: 16**

a) Half and Full adder/ Substractor Circuits.
b) IC 7483 parallel adder, BCD adder, 1bit / 2 bit's digital comparator.
c) Code converters: - binary to gray, BCD to Excess-3, BCD to 7 Segment
d) Multiplexer, De-multiplexer, decoder and their Applications.

Unit-III: **Sequential Circuits and Shift Register.** **No of Lect. –9, Marks: 16**

a) Classification of Sequential Circuits.
b) Latches and Edge triggered Flip-Flops:- SR, JK, T, D, Master Slave JK flip-flop and their application.
c) Excitation table, conversion of Flip- Flops.
d) Shift Register: - Definition, different types and their operation.
e) 4-bit bidirectional Shift register, 4-bit universal shift Register.
f) Application of shift Register: - ring counter, twisted ring counter.

Unit-IV: **Counters and Clocked sequential circuits.** **No of Lect. – 9, Marks: 16**

a) Design Ripple and MOD-N counters using Flip- Flops.
b) Design 4 bit UP/DOWN Ripple counter.
c) Design synchronous and MOD- N counters using Flip- Flops.
d) Synchronous sequential Machine.
e) Design Synchronous sequential circuits.

Unit- V: **Logic Families** **No of Lect. – 9, Marks: 16**

a) Characteristics of digital ICs.
b) Operation of TTL NAND gate, totem – pole, open collector output, wired AND, unconnected inputs.
c) CMOS inverter, NAND, NOR gate, unconnected inputs, wired logic, open drain output.
d) Interfacing of CMOS to TTL and TTL to CMOS.
e) Tri-State logic.
f) Comparison of different logic families.

Reference Books:

1. A. Kumar, "Fundamentals of Digital Circuits", PHI, 2nd Edition, 2011.
2. R. Jain, "Modern Digital Electronics", Tata McGraw Hill, 4th Edition, 2010.
3. Leach, Malvino, "Digital Principles and Applications", Tata McGraw Hill, 5th Edition, 2002.
4. J. Wakerly, "Digital Design Principles and Practices", Pearson 2nd Edition, 2009.
5. R. Tocci, "Digital Systems Principles and Applications", Pearson 2nd Edition, 2002.

Component Devices & Instrumentation Technology

COURSE OUTLINE

Course Title	Short Title	Course Code
Component Devices & Instrumentation Technology	**CDIT**	

Course Description:

This course provides an introduction to different devices used in instrumentation & electronics engineering covering types of errors in measurement, different analog and digital instruments such as voltmeter, current meter, ohm meter, recorders, instrumentation amplifier and function generator, AC and DC bridges, study of different transducers like temperature, humidity, flow, pyrometer, piezoelectric and phototransistor and basic of printed circuit board designing.

	Hours / Week	No. of Weeks	Total Hours	Semester Credits
Lecture	03	14	42	03

Prerequisite Course(s): Knowledge of Physics and Elements of Electrical & Electronics Engineering.

COURSE CONTENT

Component Devices & Instrumentation Technology **Semester-III**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week	**End Semester Examination (ESE)**	**: 80 Marks**
	Paper Duration (ESE)	**: 03 Hours**
	Internal Sessional Exam (ISE)	**: 20 Marks**

Unit-I: Measurement, Error and Display device **No of Lect. – 8, Marks: 16**

a) Definition of different term: Accuracy, precision, sensitivity, resolution, Significant figures.
b) Errors: gross error, systematic error, random error, limiting errors.
c) Statistical Analysis.
d) Permanent magnet moving coil mechanism (PMMC).
e) DC ammeter and DC volt meter.
f) Series and shunt type of ohmmeter.

Unit-II: Electronic instruments **No of Lect. – 8, Marks: 16**

a) Digital multi-meter.
b) Types of DVM: Linear Ramp type, Integration, Dual slope integration and successive approximation.
c) Recorders: Galvanometric, potentiometer, magnetic recorder.

d) Designing of Instrumentation amplifier.
e) Basic Standard Sine Wave Generator, Function generator block diagram.

Unit-III: Bridges and their applications **No of Lect. – 9, Marks: 16**

a) Wheatstone bridge.
b) Kelvin Bridge and Kelvin's double bridge.
c) General form of AC Bridge.
d) Maxwell Bridge, Hay Bridge.
e) Schering Bridge.
f) Wien Bridge & Wagner ground connection.

Unit-IV: Transducers and application **No of Lect. – 8, Marks: 16**

a) Thermometer and Thermocouple.
b) Integrated Circuit Temperature Transducers.
c) Measurement of Humidity by Hygrometer.
d) Flow transducer: - Turbine and Electromagnetic flow meter.
e) Pyrometer.
f) Piezoelectric Transducer, Phototransistor.

Unit-V: Printed Circuit Boards **No of Lect. – 9, Marks: 16**

a) Classification of PCBs, Manufacturing of basic printed circuit boards.
b) Artwork generation: Basic approach, general design guideline, Artwork generation guideline, film master preparations.
c) Copper clad laminates: properties and types.
d) Etching techniques, mass-soldering techniques.
e) Multilayered Boards.
f) Overview of Passive Components.

Reference Books:

1. H. Kalsi, "Electronic Instrumentation", TMH, 2nd Edition, 2007.
2. A. Helfric and W. Cooper, "Modern Electronics Instrumentation and Measurement Technique", Pearson LPE, 2005.
3. A. Sawhney, "Electrical and Electronics measurement and Instrumentation", Dhanpat Rai and company, 18th Edition, 2007.
4. K. Kishore, "Electronic Measurement and Instrumentation", Pearson 4th, Edition, 2012.
5. R. Khandpur, "Printed Circuit Boards Design Fabrication, Assembly and Testing", TMH, 1st Edition 2005.
6. A. Kalavar, "Electronic Materials Components and Devices Technology", Everest Publishing House, 10th Edition, 2004.

Communication Systems-I

COURSE OUTLINE

Course Title	Short Title	Course Code
Communication Systems-I	**CS-I**	

Course Description:

The course considers analog communication systems. In this course we will introduce some of the basic mathematical concepts that will allow us to think in the two "domains" of communications, the time domain and the frequency domain. We will cover the basic types of analog modulation (AM, FM, and phase modulation) from both a mathematical description and from a block-diagram system approach.

Lecture	**Hours / Week**	**No. Of Weeks**	**Total Hours**	**Semester Credits**
	03	14	42	03

Prerequisite Course(s): Analog signal and fundamentals.

COURSE CONTENT

Communication Systems-I **Semester-III**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week

End Semester Examination (ESE): 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

Unit-I: Introduction to Communications System & Noise **No of Lect. – 8, Marks: 16**

a) Communications Systems and need of modulation.
b) Introduction, External noise, internal noise.
c) Noise Calculations.
d) Noise Figure and noise Temperature.

Unit-II: Amplitude modulation & SSB Techniques **No of Lect. – 8, Marks: 16**

a) Amplitude Modulation Theory.
b) Generation of Amplitude Modulation.
c) Evolution and Description of Single Side Band Techniques (SSB).
d) Suppression of Carrier and Unwanted Side Band.
e) Extensions of SSB.

Unit-III: Frequency and Phase modulation concept **No of Lect. –8, Marks: 16**

a) Theory of Frequency and Phase Modulation.
b) Noise and Frequency Modulation.
c) Generation of Frequency Modulation.

Unit-IV: AM / FM receiver **No of Lect. – 8, Marks: 16**

a) Receiver Types.
b) A.M. Receivers.
c) F.M. Receivers.
d) Single and Independent Sideband Receivers.

Unit-V: Pulse Modulation

No of Lect. – 8, Marks: 16

a) Fourier Transform and properties.
b) Statement of Sampling theorem and types of Sampling.
c) Pulse amplitude Modulation and concept of TDM, FDM.
d) Pulse Width Modulation and Pulse Position Modulation.
e) PWM and PPM generation block diagram and wave form description.

Reference Books:

1. G. Kennedy, B. Davis, "Electronic Communication Systems", Tata McGraw Hill Edition, 4th Edition, 1999.
2. H. Taub, D. L. Schilling and G. Saha, "Principles of Communication Systems", Tata McGraw-Hill Edition, 3 rd Edition, 2012.
3. S. Kundu, "Analog and Digital Communication", Pearson, ISBN 978-81-317-3187-1.
4. D. Roddy, J. Coolen, "Electronic Communications", Pearson, 4th Edition, 2011.

Soft Skills – III

COURSE OUTLINE

Course Title	Short Title	Course Code
Soft Skills – III	**SK-III**	

Course Description: Through this course we have tried to prepare the students for the industry. Most companies test mathematical and logical ability through an aptitude test. This subject aims at working on these skills of a student through strategies formulae and practice exercises.

Lecture	Hours per Week	No. Of Weeks	Total Hours	Semester Credits
	1	14	14	2

Prerequisite Course(s): Fundamental knowledge of High School Mathematics.

COURSE CONTENT

Soft Skills – III **Semester-III**

Teaching Scheme **Examination Scheme**

Lecture: 1 hour / week **Internal Continuous Assessment (ICA): 50 Marks**

Unit-I: Arithmetic-1 **No. of Lect. – 3, Marks: 10**

a. Basic Formulae

i. Divisibility Rules.
ii. Speed Maths.
iii. Remainder Theorem.
iv. Different Types of Numbers.
v. Applications.

b. HCF, LCM and Linear Equations

i. HCF – Successive Division and Prime Factorization Methods.
ii. LCM – Successive Division and Prime Factorization Methods.
iii. Applications.
iv. Linear Equations – Elimination Method.
v. Substitution Method.
vi. Applications.

c. Averages and Mixtures

i. Concept of Average.

ii. Faster Ways of Finding It.
iii. The Allegation Method.
iv. Applications.

Unit-II: Arithmetic–II **No of Lect. – 3, Marks: 10**

a. Percentages

i. Concept of Percentage.
ii. Working with Percentages.
iii. Applications.

b. Profit and Loss

i. Difference between Cost and Selling Price.
ii. Concept of Profit Percentage and Loss Percentage.
iii. Applications.

c. Time and Work

i. Basic Time and Work Formula.
ii. Relation between Time and Work.
iii. Applications.

Unit-III: Arithmetic–III **No of Lect. –3, Marks: 10**

a. Permutations and Combinations

i. Sum Rule of Disjoint Counting.
ii. Product Rule of Counting.
iii. Concept of Factorial.
iv. Permutations.
v. Linear Permutations.
vi. Combinations.
vii. Circular Permutations.
viii. Applications.

b. Probability

i. Definition and Laws of Probability.
ii. Mutually Exclusive Events.
iii. Independent Events.
iv. Equally Likely Events.
v. Exhaustive Events.
vi. Cards.
vii. Dice.
viii. Applications.

c. Time and Distance

i. Speed.
ii. Conversion Factors for Speed.
iii. Average Speed.
iv. Moving Bodies – Passing, Crossing and Overtaking.
v. Relative Speed.
vi. Boats and Streams.
vii. Applications.

Unit-IV: Non-Verbal Reasoning No of Lect. 2, Marks: 10

a. Analogies

i. Examples.
ii. Applications.

b. Classification

i. Examples.
ii. Applications.

c. Sequences

i. Examples.
ii. Applications.

Unit-V: Analytical Reasoning No of Lect. – 3, Marks: 10

a. Analytical Puzzles

i. Classification Puzzles.
ii. Ordering Puzzles.
iii. Assignment Puzzles.
iv. Applications.

b. Letter and Number Series

i. Different Types of Letter Series.
ii. Different Types of Number Series.
iii. Mixed Series.

c. Coding and Decoding

i. Letter Coding.
ii. Number Coding.
iii. Mixed Coding.
iv. Odd Man Out.
v. Applications.

Guide lines for ICA:
ICA will be based on credit tests and assignments submitted by the student in the form of journal.

Reference Books:

1. R. S. Aggarwal, "Quantitative Aptitude", S. Chand Publication, New Delhi, 2012.
2. R. S. Aggarwal, "A Modern Approach to Verbal Reasoning", S. Chand Publication, New Delhi, 2012.
3. R. S. Aggarwal, "A Modern Approach to Non-Verbal Reasoning", S. Chand Publication, New Delhi, 2012.

Electrical Circuits and Machines

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Electrical Circuits and Machines	**ECM**	

Course Description:

In this laboratory course emphasis is on the understanding need of electrical engineering and their application.

Laboratory	Hours/Week	No. Of Weeks	Total Hours	Semester Credits
	2	14	28	1

Total Semester Credits: 1

Prerequisite Course(s): Elements of Electrical & Electronics Engineering

LAB COURSE CONTENT

(Note: Minimum FOUR Experiments from each group.)

Group A

1. **Two Wattmeter method of power measurement in three phase balanced load.**

   a. Measure the line Voltage for star / delta inductive load.
   b. Measure the line current for star / delta inductive load.
   c. Measure the power of watt-meters.
   d. Draw the phasor diagram for the star / delta inductive load.
   e. Calculate total power.

2. **Speed control of D.C. shunt motor by armature voltage and flux control method**.

   a. Measure armature voltages of D.C. shunt motor.
   b. Measure the field current of D.C. shunt motor.
   c. Plot graph for measure values voltages and field current.
   d. Verification of characteristics of motor.

3. **Load test on three phase induction motor.**

   a. Measure input Voltage and current of motor.
   b. Measure output speed of motor.
   c. Measure output torque of motor.
   d. Calculate the input power of motor.

e. Calculate the output power of motor.
f. Calculate the efficiency of motor.
g. Verification of performance characteristics of motor.

4. **O.C. and S.C. test of single phase transformer to determine regulation and efficiency.**

a. Measure the reading of ammeter.
b. Measure the reading of voltmeter.
c. Measure the reading of wattmeter.
d. Calculate no load resistance & reactance.
e. Calculate equivalent resistance, reactance and impedance.

5. **Load test on D.C. series motor**

a. Measure load current I_L.
b. Measure armature current I_a.
c. Verification of performance characteristics of motor.

Group B

1. **Study of specification & application single phase motors.**

a. Describe working and construction.
b. Selection criteria for application.
c. Use of datasheet for same.
d. Assembly & dissembling.

2. **Study of specification & application of stepper motor.**

a. Describe working and construction.
b. Selection criteria for application.
c. Use of datasheet for same.
d. Assembly & dissembling.

3. **Study of specification & application of servo motor.**

a. Describe working and construction.
b. Selection criteria for application.
c. Use of datasheet for same.
d. Assembly & dissembling.

4. **Study of specification & application of universal motors.**

a. Describe working and construction.
b. Selection criteria for application.
c. Use of datasheet for same.
d. Assembly & dissembling.

5. **Study of starter of three-point starter.**

    a. Identify and explain different parts of starter.
    b. Assembly & dissembling of starter.
    c. Connection of starter according to wiring diagram.

6. **Study of starter of star-delta starter.**

    a. Identify and explain different parts of starter.
    b. Assembly & dissembling of starter.
    c. Connection of starter according to wiring diagram.

7. **Study of starter of DOL starter.**

    a. Identify and explain different parts of starter.
    b. Assembly & dissembling of starter.
    c. Connection of starter according to wiring diagram.

Reference Books:

1. B. Theraja, A. Theraja, "A Text book of Electrical Technology- Vol-I",S. Chand, 1st Edition, 2010.
2. B. Theraja, A. Theraja, "A Text book of Electrical Technology- Vol-II", S. Chand, 1st Edition, 2010.
3. V N Mittle/ Arvind Mittal, "Basic Electrical Engineering", McGraw Hill Companies, 2nd Edition.
4. H. Cotton, "Electrical Technology", CBS Publication, 7th Edition.

Guide lines for ICA:

ICA shall be based on continuous evaluation of student performance throughout semester and practical assignment submitted by the student in the form of journal.

Solid State Devices & Circuits-I

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Solid State Devices & Circuits-I	**SSDC-I**	

Course Description:

In this laboratory course emphasis is on the understanding of semiconductor diodes, Transistor, Field effect transistor and other devices.

	Hours/Week	No. Of Weeks	Total Hours	Semester Credits
Laboratory	2	14	28	1

Total Semester Credits: 1

Prerequisite Course(s): Basics of Elements of Electronics engineering.

LAB COURSE CONTENT

Outline of Content:

(Note: Minimum FOUR Experiments from each group.)

Group A

1. **To find load regulation of full wave Bridge wave rectifier circuit with capacitor filter.**

   a. Calculate load regulation of full wave bridge rectifier circuit.

2. **Plot I/P and O/P characteristics of BJT.**

   a. Determine input & output resistance from the characteristics.

3. **To Plot DC Load Line for BJT (Voltage Divider biasing circuit).**

   a. D.C. analysis of Circuit (Theoretical Calculation of ICq , VCEq i.e. Q point)
   b. Calculation of ICq, VCEq i.e Q Point Practically.

4. **To plot regulation characteristics of Voltage doubler circuit**

   a. Calculation of Load regulation.
   b. Plot characteristics of Doubler circuit.

5. Plot frequency response of CE-CE Cascade amplifier.

h. Find voltage gain and bandwidth.
i. Plot frequency response.
j. Calculate Ri, Ro.

6. Study the effect of bypass capacitor on frequency response of single stage CE amplifier

a. Calculate Voltage gain and Bandwidth without bypass capacitor.
b. Calculate Voltage gain and Bandwidth with bypass capacitor.
c. Compare “a” and “b”.

Group B

1. To Plot DC Load Line for FET (Voltage Divider biasing circuit).

a. D.C. analysis of Circuit (Theoretical calculation of Idq , Vdsq i.e. Q point)
b. Calculation of Idq, Vdsq i.e. Q Point Practically.

2. Plot characteristics of CSFET.

a. Determine amplification factor, trans-conductance, and dynamic resistance.

3. Study the frequency response of CSFET.

a. Calculate Voltage gain and Bandwidth. Plot frequency response
b. Calculate of Ri, Ro.

4. Square wave testing of an amplifier.

a. Calculate Lower cutoff frequency and higher cutoff frequency.
b. Calculate bandwidth.

5. Plot frequency response of CE-CC Cascade amplifier.

a. Find voltage gain and bandwidth
b. Plot frequency response.
c. Calculate Ri, Ro

6. **To determine A_V, R_i, R_o of Darlington amplifier.**

a. Calculate A_v.
b. Calculate R_i, R_o.

Reference Books:

1. R. Boylestad, L. Nashelsky "Electronics Devices and Circuit Theory", 10th Edition, Pearson, 2009.
2. S. Salivahanan, N. Sureshkumar and A. Vallavaraj, "Electronics Devices and Circuits", Tata McGraw Hill, 3rd Edition, 2009.
3. S. C. Sarkar, "Electronics Devices and Circuits - I" Everest Publishing House, The Millennium 12th enlarged and revised Edition, 2001.
4. Thomas L. Floyd, "Electronics Devices" conventional current version, 7th Edition, Pearson, 2008.
5. D. Cheruku, B. Krishna, "Electronics Devices and Circuits", 2nd Edition, Pearson, 2012.
6. J. Miillman and C. Halkias, "Integrated Electronics", Tata McGraw Hill Edition, 1st Edition, 1991.

Guide lines for ICA:

ICA shall be based on continuous evaluation of student performance throughout semester and practical assignment submitted by the student in the form of journal.

Guide lines for ESE:

ESE will be based on practical assignment submitted by the student in the form of journal. In ESE the student may be asked to perform any one practical out of 8. Evaluation will be based on paper work and performance in the practical.

Communication Systems-I

LAB COURSE OUTLINE

Course Title	Short Title & Course Code
Communication Systems-I	**CS-I**

Course Description:

In this laboratory course emphasis is on the understanding of need of modulation and demodulation and their uses.

Laboratory	Hours/Week	No. Of Weeks	Total Hours	Semester Credits
	2	14	28	1

Total Semester Credits: 1

Prerequisite Course(s): Analog signal and its fundamentals.

LAB COURSE CONTENT

(Note: Minimum FOUR Experiments from each group.)

Group A

1. **Study of AM transmitter and calculate of modulation index of AM wave by envelope method.**

   a. Sketch and recognize the resulting waveforms for a sinusoidal carrier being amplitude modulated by a single frequency audio signal.

   b. Draw and analyze graphs to show the resulting waveform, and frequency spectrum for a sinusoidal carrier amplitude modulated by an audio signal, to a given depth of modulation, m;

   c. Select and use the formula:

   $$m = \frac{(V_{max} - V_{min})}{(V_{max} + V_{min})}$$

   To calculate the depth of modulation for given amplitude modulated RF signal.

2. **Analyze and generate A.M. Demodulation signal by diode detector.**

   a. Generate AM modulated wave form.

   b. Apply Modulated AM signal to demodulator.

   c. Observe clipping effect.

   d. Compare original modulating signal with demodulated output.

3. Study of FM and calculate of modulation index of FM wave.

a. Generate FM waveform.
b. Calculate Modulation Index.
c. Compare over with A.M. modulation.

4. F.M. Demodulation (Phase discriminator/Ratio detector method.)

a. Generate FM modulated wave form.
b. Apply Modulated FM signal to demodulator.
c. Compare original output with demodulated output.
d. Plot S-curve

5. To Construct and Verify Pre-emphasis and De-emphasis and Plot the Waveforms.

a. Apply the sinusoidal signal as input signal to pre emphasis circuit.
b. By increasing the input signal frequency observe the output voltage and calculate gain.
c. Plot the graph between gain Vs frequency.
d. Repeat same procedure for de-emphasis circuit.

6. Study of Amplitude limiter circuit.

a. Apply sinusoidal signal.
b. Find out limiting range of applied input signal.
c. Draw the graph for same and discussed about result.

Group B

1. Calculate gain for RF / IF stage with AGC and without AGC.

a. Explain concept regarding with and without AGC.
b. Calculate gain of RF/IF stages with AGC.
c. Calculate gain of RF/IF stages without AGC

2. DSB-SC signal generation using balanced modulator.

a. Observe that the output is double side band suppressed carrier.

3. Analyze voltage and waveform at various stages/points in A.M. radio receiver (i.e. Super-heterodyne Radio Receiver).

a. Identify the different stages and write down the information about the individual stage.
b. Observation may be any available information such as number, value, type or any other indication.
c. Observed and draw waveform of various stages.
d. Analyze signal each points.

4. **PAM modulator & demodulator.**

   a. Generate pulse amplitude modulated waveform.
   b. Observed waveform and made calculation.
   c. Detection of modulated waveform.
   d. Observed demodulated PAM waveform compute information.

5. **PWM modulator & demodulator.**
   a. Generate pulse width modulated waveform.
   b. Observed waveform and made calculation.
   c. Detection of modulated waveform.
   d. Observed demodulated PWM waveform compute information.

6. **PPM modulator & demodulator.**

   a. Generate pulse position modulated waveform.
   b. Observed waveform and made calculation.
   c. Detection of modulated waveform.
   d. Observed demodulated PPM waveform compute information.

Reference Books:

1. G. Kennedy, B. Davis, "Electronic Communication Systems", Tata McGraw Hill Edition, 4^{th} Edition, 1999.
2. H. Taub, D. L. Schilling and G. Saha, "Principles of Communication Systems", Tata McGraw Hill Edition, 3^{rd} Edition, 2012.
3. S. Kundu, "Analog and Digital Communication", Pearson, ISBN 978-81-317-3187-1.
4. D. Roddy, J. Coolen, "Electronic Communications", Pearson, 4th Edition, 2011.

Guide lines for ICA:

ICA shall be based on continuous evaluation of student performance throughout semester and practical assignment submitted by the student in the form of journal.

Guide lines for ESE:

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Digital Techniques and Applications

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Digital Techniques and Applications	**DTA**	

Course Description:
In this laboratory course emphasis is on the understanding of combinational and sequential circuit design.

	Hours/Week	No. Of Weeks	Total Hours	Semester Credits
Laboratory	2	14	28	1

Total Semester Credits: 1

Prerequisite Course(s): Knowledge of Basic gates and semiconductor devices.

LAB COURSE CONTENT

(Note: Minimum FOUR Experiments from each group)

Group A

1. **Realization of logic gates OR, AND, NOT, NOR, NAND gates using discrete components and verify their truth tables.**
    a. Apply different combinations of inputs and observe the outputs.
    b. Compare the outputs with the truth tables.
2. **Design of 4 bit Gray to binary Code Converter.**
    a. Prepare the truth table of Gray to binary code.
    b. All the 16 combinations of inputs are given at respective pins
    c. Verify the truth tables of Gray to binary code.
3. **Realization of IC7483 as parallel adder and substractor.**
    a. Apply the inputs toA3 to A0 and B0 to B3.
    b. Check the output sum S3 to S0 and also C4.
    c. For Subtraction, Apply B input through NOT gate, which gives compliment of B.
    d. Verify the truth table of adder/substractor.

4. Verification of Ex-3 to BCD code conversion using NAND gates.

a. Apply the logic inputs to A3 - A0 and B3- B0.
b. Check the output sum S3 to S0 and also C4.
c. For Subtraction, Apply B input through NOT gate, which gives compliment of B.
d. Verify the truth table of adder/substractor.

5. Verification of 4-Bit Magnitude Comparator using IC7485.

a. Feed the 4-bit binary input to A3-A0 and B3-B0.
b. Observe the output A>B, A=B, and A<B on logic indicators for different combinational input. The outputs must be 1 or 0 respectively.
c. Verify the truth table of 4-bit comparator.

6. Design and Implement BCD to 7 Segment display decoder using IC 447/7448.

a. Apply BCD Number to Decoder IC.
b. Observe the output on 7- segment display.

Group B

1. Verify the truth table of multiplexer and de-multiplexer using ICs.

a. Prepare the truth table of multiplexer.
b. Based on the select line one of the input will be selected at the output.
c. Observe the output of multiplexer and verify the truth table.

2. Verify the truth table of J-K, T, and D Flip-flops using ICs.

a. Prepare the truth table of flip-flops.
b. Examine the output of flip-flops and validate the truth table.
c. Check out the output for J-K flip-flops, when J and k both inputs are at logic “1”.

3. Design ring and Johnson counter using flip-flops.

a. Organize the truth table of ring and Johnson counters.
b. Apply clock pulses and note the outputs after each clock pulse
c. Verify the truth table of ring and Johnson counters.

4. Design decade ripple counter using flip-flops.

a. Prepare circuit diagram and make connection as per diagram.
b. Apply clock pulse.
c. Monitor the output after each clock pulse and note down the outputs Q_3, Q_2, Q_1, and Q_0.

5. **Realization of Decade counter using IC.**

   a. Apply clock pulse at the clock input
   b. Observe the output at Q_A, Q_B, Q_C, and Q_D.

6. **Design 4-bit UP/DOWN synchronous counter using IC.**

   a. Apply clock pulse at the clock input
   c. Observe the output at Q_A, Q_B, Q_C, and Q_D.

Reference Books:

1. A. Kumar, "Fundamentals of Digital Circuits", PHI, 2nd Edition, 2011.
2. R. Jain, "Modern Digital Electronics", TMH. 4th Edition, 2010.
3. Leach, Malvino, "Digital Principles and Applications", TMH 5th Edition, 2002.
4. J. Wakerly, "Digital Design Principles and Practices", Pearson 2nd Edition, 2009.
5. R. Tocci, "Digital Systems Principles and Applications", Pearson 2nd Edition, 2002.

Guide lines for ICA:

ICA shall be based on continuous evaluation of student performance throughout semester and practical assignment submitted by the student in the form of journal.

Guide lines for ESE:

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NORTH MAHARASHTRA UNIVERSITY, JALGAON (M.S.)

Second Year Engineering

(E&TC/E&C/Elex/IE)

Faculty of Engineering and Technology

Semester – IV

W.E.F 2013 – 2014

Engineering Mathematics-III

COURSE OUTLINE

Course Title	Short Title	Course Code
Engineering Mathematics-III	**EM-III**	

<table>
<tr><th rowspan="2">Lecture</th><th>Hours / Week</th><th>No. of Weeks</th><th>Total Hours</th><th>Semester Credits</th></tr>
<tr><td>03</td><td>14</td><td>42</td><td rowspan="2">04</td></tr>
<tr><th>Tutorial</th><td>01</td><td>14</td><td>14</td></tr>
</table>

Course Description:
This course provides the elementary level knowledge of n^{th} order Linear Differential Equations, Transforms, Complex Analysis and Vector Calculus. Course includes solution of n^{th} order linear differential equations, Laplace transform, Fourier Transforms, Z-Transform, and Vector Calculus.

Prerequisite Course(s): Engineering Mathematics-I, Engineering Mathematics-II

COURSE CONTENT

Engineering Mathematics-III **Semester-IV**

Teaching Scheme	**Examination Scheme**
Lecture: 3 hours / week	**End Semester Examination (ESE): 80 Marks**
Tutorial: 1 hour / week	**Paper Duration (ESE) : 03 Hours**
	Internal Sessional Exam (ISE) : 20 Marks

UNIT-I: Linear Differential Equations: No of Lect. – 8, Marks: 16

a. Solution of LDE of order n with constant coefficients.
b. Method of variation of parameters (Only second order).
c. Cauchy's linear equation.
d. Legendre's linear equation.
e. Applications of Linear differential equations to electrical circuits.

UNIT-II: Function of Complex Variable No of Lect. – 8, Marks: 16

a. Analytic functions, Cauchy-Riemann equations.
b. Cauchy's Residue theorem(Without proof)
c. Cauchy's Integral theorem and Cauchy's Integral formula (without proof).
d. Conformal mapping, bilinear transformations.

UNIT-III: Laplace Transform **No of Lect. – 8, Marks: 16**

a. Definition and Existence of Laplace transforms.
b. Laplace Transform of elementary/standard functions.
c. LT of some special functions viz, error, Periodic, Unit Step, Unit Impulse.
d. Theorems & Properties of Laplace Transform (without proof).
e. Inverse Laplace Transform.
f. Applications of LT for Network Analysis.
g. Applications of LT to solution of linear differential equation.

UNIT-IV: Fourier Transform and Z-Transform **No of Lect. – 8, Marks: 16**

A. Fourier Transform:

a. Introduction to Fourier Integral theorem.
b. Fourier Transforms, Fourier Cosine Transforms, Fourier Sine Transform and their inverse.

B. Z- Transform:

a. Definition and standard properties (without proof)
b. Region of Convergence.
c. Z-Transform of standard / elementary sequences.
d. Inverse Z-transform.

UNIT-V: Vector Differentiation **No of Lect. – 8, Marks: 16**

a. Definition, physical Meaning of vector differentiation.
b. Tangential and normal components of acceleration, Radial and transverse components of velocity and acceleration.
c. Vector differential operator (∇)
d. Gradient of Scalar point function.
e. Directional Derivatives of Scalar point function.
f. Divergence and Curl vector field.
g. Solenoidal and Irrotational vector fields.

Reference Books:

1. H. Dass, “Advanced Engineering Mathematics”,S. Chand Publication, New Delhi, 2008.
2. E. Kreyszig, “Advanced Engineering Mathematics”,Wiley Eastern Ltd, 10^{th} Edition.
3. B. Grewal, “Higher Engineering Mathematics”, Khanna Publication, Delhi, 42^{nd} Edition, 2012.
4. C. Wylie, Barrett, “Advanced Engineering Mathematics”, McGraw Hill, 6^{th} revised Edition, 1995.
5. B. Raman, “Engineering Mathematics”, Tata McGraw Hill, 2007.
6. N. Bali, “A Text Book of Engineering Mathematics”, Laxmi Publication, 2004.

Solid State Devices & circuits- II

COURSE OUTLINE

Course Title	Short Title	Course Code
Solid State Devices & circuits- II	**SSDC-II**	

Course Description:

This is an introductory graduate-level course on the various applications of Electronics Circuit. Basic Electronics is an interdisciplinary branch of Engineering and mathematics that deals with the behavior of Various Devices. The goals of the course are to understand the basic principle of various Devices and its application in different area.

	Hours / Week	No. of Weeks	Total Hours	Semester Credits
Lecture	03	14	42	04
Tutorial	01	14	14	

Prerequisite Course(s): Knowledge of Elements of Electronics Engineering and Solid state devices and circuit I.

COURSE CONTENT

Solid state devices and circuits-II **Semester-IV**

Teaching Scheme	**Examination Scheme**	
Lecture: 3 hours / week	**End Semester Examination (ESE)**	**: 80 Marks**
Tutorial: 1 hour / week	**Paper Duration (ESE)**	**: 03 Hours**
	Internal Sessional Exam (ISE)	**: 20 Marks**

Unit-I: **Waveshaping Circuit** **No of Lect. – 9, Marks: 16**

a) Different Types of Waveshaping circuit- Astable multivibrator, Bistable multivibrator and monostable multivibrator.
b) Analysis of different Time Base circuits – Miller integrator, Bootstraps sweep circuit.
c) Introduction of Differential amplifier, Different modes of Differential amplifier.
d) DC Analysis of Differential amplifier with Re, AC analysis of Differential amplifier.
e) Calculation of CMRR for Balanced & Unbalanced operation, Techniques to improve CMRR of Differential amplifier.
f) Schmitt trigger circuit.

Unit-II: **High frequency model of BJT** **No of Lect. – 8, Marks: 16**

a) Introduction High frequency model of BJT.
b) Behaviour of transistor at high frequency, high frequency CE amplifier π model
c) CE short circuit current gain for π model, Definition and derivation of F_α, F_β & F_T
d) Introduction to Tuned Circuit, Classification of Tuned amplifier.
e) Circuit diagram, Operation & characteristics of Single Tuned amplifier.
f) Circuit diagram, Operation & characteristics of Doubled Tuned amplifier and Stagger Tuned amplifier.

Unit-III: **Large signal amplifier** **No of Lect. – 8, Marks: 16**

a) Introduction of power amplifier.
b) Need of Power amplifier, Concept of Load Line, Performance parameter of Power amplifier.
c) Classification of power amplifier. DC and AC Analysis of Class A power amplifier with Resistive Load and efficiency calculation.
d) DC and AC Analysis of Transformer coupled Class A power amplifier and efficiency calculation.
e) DC and AC Analysis of Class B Push Pull power amplifier and efficiency calculation, calculation of Maximum output power, Maximum Power Dissipation
f) Working of Class B Complementary power amplifier, efficiency calculation
g) Concept of Crossover distortion, Elimination of Crossover distortion.
h) Analysis of Harmonic distortion (Five point method).

Unit-IV: **Feedback amplifier** **No of Lect. –9, Marks: 16**

a) Introduction of Feedback amplifier.
b) Concept of feedback amplifier, Types of feedback (Positive & Negative feedback), Basic amplifier types.
c) Derivation of gain with feedback. Topology used in feedback amplifier, Classification of Feedback amplifier.
d) Analysis of Voltage series and Current series Negative feedback amplifier with derivations of Ri and Ro.
e) Analysis of Voltage shunt and Current shunt Negative feedback amplifier with derivations of Ri and Ro.

Unit-V: **Voltage Regulator and Oscillator** **No of Lect. – 8, Marks: 16**

a) Introduction of voltage regulator.
b) Block diagram of Regulated power supply, concept of Line and Load regulation, Types of Voltage regulator.
c) Emitter Follower series voltage regulator, Transistorized series voltage regulator.
d) Short circuit protection circuit (Using Transistor and Diode), Fold back protection circuit.
e) Concept of Oscillator, classification of oscillator, Construction, working and Derivation of frequency and hfe of Phase shift, Wien Bridge oscillator.

f) Circuit diagram, working and Derivation of frequency and hfe of Hartley, Colpitts oscillator, Clap oscillator.
g) Crystal oscillator.

Reference Books:

1. R. Boylestad, L. Nashelsky, “Electronics Devices and Circuit Theory”, Pearson, 10th Edition, 2009.
2. S. Salivahanan, N Sureshkumar, “Electronics Devices and Circuits” Tata McGraw-Hill, 3rd Edition 2008.
3. B. Singh, R. singh, “Electronics Devices and Circuits”, Pearson, 2nd Edition.

4 D. Cheruku, B. Krishna, “Electronics Devices and Circuits”, 2nd Edition, Pearson, 2012.

5 Jacob Millman, “Electronis devices and circuits”, McGraw-Hill, 1967.

6 S. C. Sarkar, “Electronics Devices and Circuits-I” Everest Publishing House, The Millennium 12th enlarged and revised Edition, 2001.

Microprocessors

COURSE OUTLINE

Course Title	Short Title	Course Code
Microprocessors	**MP**	

Course Description:

Introduction to the basic concepts of microprocessor, assembly language programming and peripheral interface. Course includes instruction set, Machine cycles, assembly language programming, interrupts, sub-routine, stack, call and return for 8085 microprocessor and interfacing of memory Programmable Peripheral Interface, and Programmable Timer/Counter. This course is designed to give a broad understanding of the microprocessor, assembly language programming and peripheral interfaces.

	Hours / Week	No. of Weeks	Total Hours	Semester Credits
Lecture	03	14	42	03

Prerequisite Course(s): Digital Electronics.

COURSE CONTENT

Microprocessors **Semester-IV**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week

End Semester Examination (ESE): 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

Unit-I: 8085 microprocessor. **No of Lect. – 8, Marks: 16**

a) Block diagram and operation of microcomputer system.
b) 8085 Microprocessor architecture & operation.
c) Program Counter and Stack pointer and Pin diagram of 8085 microprocessor.
d) De-multiplexing of lower order address bus and generation of control signals.
e) Memory classification, Basic of memory interfacing and Address decoding techniques.
f) Interfacing of memory with 8085 microprocessor. (With interfacing Numerical).

Unit-II: **Instruction set of 8085 microprocessor.** **No of Lect. – 8, Marks: 16**

a) Instruction structure and classification (One/two/three Byte).
b) Machine cycles & Bus Timing: Opcode Fetch, Memory Read, and Memory Write.
c) Instruction Set: Instruction for Data transfer operations and Arithmetic operations.
d) Instruction for Logic operations and Branch operations.
e) Concept of sub-routine.
f) Unconditional Call and Return instruction.
g) Conditional Call and return instructions.

Unit-III: **Assembly Language Programming.** **No of Lect. – 9, Marks: 16**

a) Addressing modes of 8085 microprocessor.
b) Ideal steps for writing assembly language programs and basic of flowchart symbols.
c) Assembly Language Programming on: Data Transfer operations and, Accessing I/O devices.
d) Assembly language programming on Arithmetic operations, Logical operations and Branch operations.
e) Concept and designing of counters and time delay and their assembly language programming.
f) Assembly language programming on subroutines.

Unit-IV: **Stack, Interrupts and Serial I/O of 8085 microprocessor.** **No of Lect. –8, Marks: 16**

a) Stack and stack related instructions.
b) Assembly language programming on string/array related operations.
c) Introduction to Memory mapped I/O and I/O mapped I/O. (Difference Only).
d) The 8085 Interrupt and 8085 vectored Interrupts.
e) Serial I/O lines SID &SOD. Data transfer through SID and SOD lines.

Unit-V: **General Purpose Peripheral Devices.** **No of Lect. – 8, Marks: 16**

a) Internal architecture of 8255-Programmable Peripheral Interface. I/O and BSR Mode of 8255.
b) Interfacing of I/O device using 8255 - Programmable Peripheral Interface.
c) Programmable Interval Timer/ Counter 8254, block diagram, control word register, Modes of 8254.
d) Programming on counter and mode 0-3 (only) of 8254.

References Books:

1. R. Gaonkar, "Microprocessor, Architecture, Programming and Applications with 8085", Penram International Publication, 5th Edition, 2004.
2. B. Ram, "Fundamentals of Microprocessors and Microcomputers", Dhanpat Rai Publication, 6th Edition, 2011(reprinted).
3. Gilmore, "Microprocessors- Principles and application", Tata McGraw Hill.
4. M. Rafiquzzaman, "Microprocessors- Theory and applications: INTEL and MOTOROLA", Revised Edition.

Linear Integrated Circuits

COURSE OUTLINE

Course Title	Short Title	Course Code
Linear Integrated Circuits	**LIC**	

Course Description:

Introduce the basic concepts of operational amplifier, linear & non-linear application of OP-AMP. Course includes basics and designing of various comparator and signal generators using OP-AMP, various data convertors, active filters, PLL and its use for communication applications. This course is designed to give a broad understanding of the operational amplifier, its application in various fields.

Lecture	Hours / Week	No. of Weeks	Total Hours	Semester Credits
	03	14	42	03

Prerequisite Course(s): EEEE, SSDC-I.

COURSE CONTENT

Linear Integrated Circuits **Semester-II**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week

End Semester Examination (ESE): 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

Unit-I: **Operational amplifier:** **No of Lect. – 9, Marks: 16**

a) Ideal op-amp characteristics; schematic development stages of op-amp.
b) Current sources and active loads.
c) Difference, intermediate and output stages including Miller capacitors for frequency computation.
d) Internal circuit of op-amp IC μA741, operational amplifier parameters, offset null techniques of op-amp features.
e) Data sheet interpretation and data sheet study of op-amp IC 741.
f) Measurement of op-amp parameters, effects of real operational amplifier parameters on circuit performance.
g) Frequency response and stability, frequency and phase compensation techniques.

Unit-II: **OP-AMP Applications** **No of Lect. – 9, Marks: 16**

a) Non-inverting amplifier and voltage follower, inverting amplifier.
b) Peak amplifier, ac amplifier, AF amplifier IC LM380.
c) Analog adder, averaging amplifier, integrator, differentiator.
d) Analog computation, basic building blocks, basic linear differential equation.
e) Differential and instrumentation amplifiers using one, two and three op-amps, instrumentation amplifier IC μA725, bridge amplifier.
f) Voltage-to-current and current-to-voltage converters, Analog multipliers, dividers.
g) Log/antilog amplifiers.

Unit-III: **Active filters and Voltage regulators** **No of Lect. – 8, Marks: 16**

a) Active filters: types and response.
b) Analysis and synthesis of first, second and higher order active filters.
c) Butterworth filters all pass filter.
d) Voltage regulators: Series op-amp regulator, IC voltage regulator.
e) Voltage regulator IC μA723 and its applications as positive/negative and fixed/adjustable voltage regulators.
f) Three terminal voltage regulators: positive/negative and fixed/adjustable voltage regulators.
g) Dual tracking regulators; switching regulator: concept and schematic, IC MC1723and its application.

Unit-IV: **Comparators and waveform generation.** **No of Lect. –8, Marks: 16**

a) Comparators: introduction, parameters; op-amp as comparator, comparator IC 710, peak detectors.
b) Waveform generation: Schmitt's trigger, square-triangle wave oscillators, relaxation oscillators and pulse generators.
c) Timer IC 555 and its use as timer circuit and multi-vibrators.
d) Analysis and design of R-C (phase shift, wien bridge) oscillators.
e) Voltage controlled oscillator IC SE/NE566, function generator IC LM 8038.
f) Clippers and clampers; precision rectifiers.

Unit-V: **A/D interface circuits and PLL** **No of Lect. – 8, Marks: 16**

a) A/D interface circuits: Analog to digital (A/D) and digital to analog (D/A) converters.
b) Sample and hold circuits; analog multiplexers.
c) Phase lock loop (PLL): operating principles, lock and capture range.
d) PLL as amplitude and frequency modulation detection, frequency shift keying (FSK) decoder, frequency synthesiser.
e) PLL IC SE/NE565.

Reference Books:

1. D. Choudhari, S. Jain, "Linear Integrated Circuits", New Age International (P) limited,4th Edition, 2010.
2. R. Gayakwad, "Op-amps and Linear Integrated Circuits", Prentice Hall of India, 4th Edition, 2008.
3. K. Botkar, "Integrated Circuits", Khanna Publishers, 10th Edition, 2010.
4. S. Franco, "Design with operational amplifiers and analog integrated circuits", Tata McGraw Hill, 3rd Edition, 2002.
5. J. Wait, L. Huelsman and G. Korn, "Introduction to Operational Amplifier Theory and Applications", McGraw Hill, 2nd Edition, 1991.
6. J. Fiore, "Op-amp and Linear Integrated Circuits Theory and Applications", Delmar Thompson Learning, 1st Edition, 2001.
7. R. Coughlin, F. Driscoll, "Operational Amplifiers and Linear Integrated Circuits", PHI, 6th Edition, 2001.

Network Analysis and Synthesis

COURSE OUTLINE

Course Title	Short Title	Course Code
Network Analysis and Synthesis	**NAS**	

Course Description:

This course introduces the student to Network Analysis & Synthesis. The student will learn to analyze & Synthesize Electric circuits either one port & two port networks. Student will study the different techniques to analyze, synthesize and design of network, analysis of standard signals and learn new synthesis tools also analysis of two port networks using Z, Y, h, ABCD parameters. Student will also learn types of network function. Theory as well as tools for classical & modern filter design. Emphasis have given to the following topics related to network analysis and synthesis, complex frequency, frequency domain concept, properties of LC, RC, and RLC. Pole-zero concepts, design of different types of filters and attenuators.

Lecture	**Hours / Week**	**No. of Weeks**	**Total Hours**	**Semester Credits**
	03	14	42	03

Prerequisite Course(s): knowledge of basic Electrical and Electronics engineering and their concept.

COURSE CONTENT

Network Analysis and Synthesis **Semester-IV**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week

End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

Unit-I: **System and Network Functions.** **No of Lect. – 9, Marks: 16**

a. Definition and types of network function with their Numerical.
b. Concept of complex frequency and characteristics of standard signals.
c. Concept of Laplace transform and Laplace transform of basic R, L, and C Component.
d. Network Analysis using Laplace transform with initial condition, Numericals.
e. Concept of Pole and Zero, time-domain behavior from pole-zero plot, concept of residues.

Unit-II: **Frequency Selective Networks.** **No of Lect. – 8, Marks: 16**

a. Concept of resonance, types of resonance, Q-factor and their significance.
b. Series resonance, resonance frequency with derivation, variation of impedance, current with frequency, bandwidth and selectivity, examples.
c. Parallel resonance, resonance frequency, bandwidth and selectivity, examples.

Unit-III: **Two Port Networks Parameters.** **No of Lect. – 8, Marks: 16**

a. Introduction of two port network and their different parameters such as Z, Y, h, ABCD parameter with equivalent circuit
b. Concept of reciprocity and symmetry condition for two port network parameters.
c. Inter connection of two port networks in series, parallel, cascade connection and series-parallel connection.
d. Inter conversion of the parameters, examples on finding the different two port network parameters.

Unit-IV: **Attenuators and Filters**. **No of Lect. – 8, Marks: 16**

a. Concept of Neper and Decibel (dB).
b. Introduction of attenuator, types of attenuator, design of symmetrical 'T' and '**π**' attenuator, examples.
c. Filters fundamentals & Design of different types of filters such as constant K-type Low pass and high pass filter, examples.
d. Design of m-derived low pass and high pass filter, examples. Concept of band pass, band stop filter, terminating half section and concept of composite filter

Unit-V: **Synthesis of Networks**. **No of Lect. – 9, Marks: 16**

a. Hurwitz polynomial and its properties, check Hurwitz criteria by Routh array or continued fraction expansion method, examples.
b. Positive real function and its properties, procedure for testing of positive real function, examples.
c. Synthesis of one port network such as LC, RC, RL with their properties.
d. Synthesis of L-C, R-C, and R-L networks using Foster and Cauer forms, examples.

Reference Books:

1. D. Choudhary, "Network and system", New Age international Publication, 1st Edition, Reprint 2005.
2. A. Sudhakar, S. Palli, "Circuit & Networks Analysis and Synthesis", Tata MH 3rd Edition, 2009.
3. A. Chakraborti, "Circuit Theory (Analysis and synthesis)", Dhanpat Rai Publication, 6th Edition, .2012.
4. B. R. Gupta, "Network Analysis and synthesis", S. Chand and company Ltd., 2010.
5. G. K. Mithal, "Network Analysis", Khanna Publishers, 2000.

Computer Programming-II

LAB COURSE OUTLINE

Course Title | Short Title | Course Code

Computer Programming-II | **CP-II** |

Course Description:

This laboratory course emphasis is on the understanding of C programming and open source operating system.

<table>
<tr><td rowspan="2">Laboratory</td><td>Hours/Week</td><td>No. Of Weeks</td><td>Total Hours</td><td>Semester Credits</td></tr>
<tr><td>2</td><td>14</td><td>28</td><td rowspan="2">2</td></tr>
<tr><td>Lecture</td><td>1</td><td>14</td><td>14</td></tr>
</table>

Total Semester Credits: 2

Prerequisite Course(s): C Programming and its fundamentals.

LAB COURSE CONTENT

(Note: Group A is **mandatory** and Minimum **EIGHT** practical from B group.)

Group A

1. Installation of Linux (Ubuntu 10.04).with various essential packages
2. Study of basic commands in Linux terminal (Minimum 20 commands)

Group B

Note: Required software is Ubuntu 10.04, gcc

1. Program for sum of digits.
2. Program for reverse number.
3. Program for counting digits in a number.
4. Program for bubble sort.
5. Program for Matrix multiplication.
6. Program for stack operations using switch case.
7. Program for queue using arrays.
8. Program for string operations without using library functions.
9. Program to convert decimal to binary/hexadecimal.
10. Write a Program with Bit wise operations.
11. Write a Program with Right and left Shift Operation.
12. Program to swap two numbers using pointer.
13. Program for implementation of DOS copy/type command using FILE operations and command line arguments.

Reference Books:

1. E. Balagurusamy, “Programming in ANSIC C”, Tata McGraw Hill Publications, 4th Edition, 2007.
2. E. Balagurusamy, “Object Oriented Programming with C++”, Tata McGraw Hill Publications, 4th Edition, 2008.
3. Y. Kanetkar, “Let Us C”, BPB publication, 10th Edition, 2010.

Guide lines for ICA:

The Internal Continuous Assessment shall be based on practical record and knowledge/skill acquired. The performance shall be assessed experiment wise using continuous assessment format A&B.

Linear Integrated Circuits

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Linear Integrated Circuits	**LIC**	

Course Description:

In this laboratory course emphasis is on the understanding of operational amplifier, and its application for various.

	Hours/Week	No. Of Weeks	Total Hours	Semester Credits
Laboratory	2	14	28	1

Total Semester Credits: 1

Prerequisite Course(s): EEEE, SSDC-I

LAB COURSE CONTENT

(Note: Minimum EIGHT Experiments from below list.)

1. **Op-amp parameter measurement: input bias current, input offset current, Input offset voltage, slew rate of op-amp 741).**

   a. Calculation of input bias current, input offset current, input offset voltage, slew rate of op-amp Practically.

2. **Design and test active integrator and differentiator circuits for given Frequency.**

   b. Apply different I/P signals & observe the O/P waveform.
   c. Plot the frequency response.

3. **Study the operation of half wave and full wave precision rectifier**

   a. Observe the I/P & O/P waveforms for both the circuits.

4. **Design and test positive and negative clamper.**

   a. Observe the I/P & O/P waveforms for both the circuits.

5. Design and test Schmitt trigger circuit for given hysteresis.

a. Measure the hysteresis voltage.

6. Design and test of square wave and triangular and saw tooth wave generator using Op-amp for given frequency.

a. Observe the O/P waveforms
b. Measure the O/P frequency of the circuits.

7. Design and test timer using IC 555 in monostable and astable mode.

a. Observe the o/p waveforms.
b. Measure the o/p frequency of the circuits.

8. Design and test function generator using IC 8038.

a. Observe the o/p waveforms
b. Measure the o/p frequency of the different waveforms.

9. Design and test PLL using IC 565 PLL for given lock and capture range.

a. Observe the o/p waveforms.
b. Measure the lock & capture range.

10. Design and test audio amplifier using IC LM380 with and without positive feedback.

a. Measure the gain of amplifier.

11. Setup DAC circuit Using IC LM 741 and study its performance.

a. Apply the different i/p & measure the o/p voltage.

12. Setup ADC circuit Using IC LM 741 and study its performance.

a. Apply different i/p voltages & observe its digital equivalents.

13. Design and test second order Butterworth LP / HP filter.

a. Plot the frequency response.

14. Design and test BP Butterworth filter.

a. Plot the frequency response.

15. Design and test BR Butterworth filter.

a. Plot the frequency response.

Reference Books:

1. D. Choudhari, S. Jain, "Linear Integrated Circuits", New Age International (P) limited, 4^{th} Edition, 2010.
2. R. Gayakwad, "Op-amps and Linear Integrated Circuits", Prentice Hall of India, 4^{th} Edition, 2008.
3. K. Botkar, "Integrated Circuits", Khanna Publishers, 10^{th} Edition, 2010.
4. S. Franco, "Design with operational amplifiers and analog integrated circuits", Tata McGraw Hill, 3^{rd} Edition, 2002.
5. J. Wait, L. Huelsman and G. Korn, "Introduction to Operational Amplifier Theory and Applications", Tata McGraw Hill, 2^{nd} Edition, 1991.
6. J. Fiore, "Op-amp and Linear Integrated Circuits Theory and Applications", Delmar Thompson Learning, 1^{st} Edition, 2001.
7. R. Coughlin, F. Driscoll, "Operational Amplifiers and Linear Integrated Circuits", PHI, 6^{th} Edition, 2001.

Guide lines for ICA:

ICA shall be based on continuous evaluation of student performance throughout semester and practical assignment submitted by the student in the form of journal.

Solid State Devices & circuits -II

LAB-COURSE OUTLINE

Course Title | Short Title & Course Code

Solid State Devices & circuits -II | **SSDC- II**

Course Description:
In this laboratory course emphasis is on the understanding of combinational and sequential circuit design.

	Hours/Week	No. Of Weeks	Total Hours	Semester Credits
Laboratory	2	14	28	1

Total Semester Credits: 1

Prerequisite Course(s): Solid State Devices

LAB COURSE CONTENT

(Note: Minimum FOUR Experiments from each group.)

Group A

1. **Calculation of CMRR of Emitter coupled differential amplifier using Emitter resistance and Compare it with Constant current source circuit.**
   a. Calculate Avd in differential mode operation.
   b. Calculate Avc in Common mode operation.
   c. Compare CMRR in above two methods.

2. **Observe the response of Miller integrator for given i/p.**
   a. Draw input and output waveform of miller integrator.

3. **Measure response of Schmitt trigger circuit for sine wave input.**
   a. Calculation of UTP and LTP.
   b. Observe Hysteresis characteristics.
   c. Draw input and output waveform.

4. **Determine the period and frequency of oscillation for Astable/Monostable Multivibrator**.

a. Draw output waveforms at base and collector of Q1 and Q2.

5. Class B Push Pull amplifier efficiency calculation.

a. Calculate A.C. output power Pac.
b. Calculate D.C. i/p Power Pdc.
c. Calculate efficiency.

6. Class B Complementary Symmetry efficiency calculation and elimination of crossover distortion.

a. Calculate A.C. output power Pac.
b. Calculate D.C. I/P Power Pdc.
c. Calculate efficiency.
d. Observe how to eliminate crossover distortion.

Group B

1. Plot regulation characteristics of Series voltage regulator circuit.

a. Calculate Line regulation.
b. Calculate Load regulation.

2 Plot frequency response of Voltage series/ Voltage shunt feedback amplifier.

a. Compare Voltage gain and Bandwidth for with and without feedback.

3. Calculate Voltage gain Av, input impedance Ri, and output impedance Ro for current series/ voltage series negative feedback amplifier

a. Compare Voltage gain Av, input impedance Ri, and output impedance Ro for current series/voltage series amplifier in with and without feedback.

4. Plot frequency response of Single tuned amplifier.

a. Calculate of resonant frequency and bandwidth.

5. Study of Phase shift, Wien Bridge, Hartley, Colpitts.(Any Two)

a. Calculate theoretical frequency of oscillator using formula.
b. Compare theoretical frequency with fundamental frequency.

6. **Determination of frequency and output voltage of Crystal Oscillator.**

   a. Calculate frequency of oscillator and compare with fundamental frequency of Crystal.

Reference Books:

1. R. Boylestad, L. Nashelsky, "Electronics Devices and Circuit Theory", Pearson, 10th Edition, 2009.
2. S Salivahanan, N Sureshkumar, "Electronics Devices and Circuits" Tata McGraw Hill, 3rd Edition 2008.
3. B.Singh, R. Singh, "Electronics Devices and Circuits", Pearson, 2nd Edition.
4. D. Cheruku, B. Krishna, "Electronics Devices and Circuits", 2nd Edition, Pearson, 2012.
5. Jacob Millman, "Electronis devices and circuits", McGraw-Hill, 1967.

Guide lines for ICA:

ICA shall be based on continuous evaluation of student performance throughout semester and practical assignment submitted by the student in the form of journal.

Guide lines for ESE:

ESE will be based on practical assignment submitted by the student in the form of journal. In ESE the student may be asked to perform any one practical out of 8. Evaluation will be based on paper work and performance in the practical.

Network Analysis and synthesis Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Network Analysis and synthesis Lab	**NAS**	

Course Description:

In this laboratory course emphasis is on the understanding of basic electrical circuits. The students can use this knowledge to analyze and synthesize Electrical networks and Design of different filters and attenuators.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	2	14	28	1

Total Semester Credits: 1

Prerequisite Course(s): Course on Basic Electrical and Electronics Engineering..

LAB COURSE CONTENT

(Note: Minimum EIGHT practical's are to be performed.)

1. **Determine transfer / driving point Impedance function of given two port reactive network.**

    a. Measure electrical quantity such as Voltages and currents at different ports of the two ports the network.
    b. Find the Driving point impedance or transfer impedance of given network.
    c. Compare analytical and the practical values.

2. **Determine Pole-Zero plot of given one port reactive network.**

    a. Measure the output current of the one port reactive network with frequency variation.
    b. Calculate impedance by taking ratio of input voltage and measured currents for each frequency value.
    c. Draw the graph of impedance and frequency and find practical values of poles and zeros
    d. Compare analytical and practical values of poles and zeros.

3. **Study of Series and parallel resonance, find BW and Q- factor.**

    a. Measure the current of Series RLC and Parallel RLC resonance circuit with varying frequency.

b. Draw the graph of frequency and currents and find out resonance frequency, bandwidth, and quality factor.
c. Compare the analytical and measured values of the Resonance frequency and Bandwidth.

4. **Determine Z parameter of networks connected in series.**

   a. Determine the open circuit impedance parameters by connecting 2 two ports network in series combination.
   b. Measure the voltage and current in network by taking any one port open circuited and take a ratio of voltage to current of different ports of the networks.
   c. Compare the analytical and practical values of Open circuit impedance parameters i.e. Z_{11}, Z_{12}, Z_{21}, Z_{22}.

5. **Determine Y parameter of networks connected in parallel.**

   a. Determine the short circuit admittance parameters by connecting 2 two ports networks in parallel combination.

   b. Measure the voltage and current in network by taking any one port short circuited and take a ratio of current to voltage of different ports of the networks.
   c. Compare the analytical and practical values of short circuit admittance parameters i.e. Y_{11}, Y_{12}, Y_{21}, Y_{22}.

6. **Determine transmission parameter of networks connected in cascaded form.**

   a. Determine the ABCD / Transmission parameters by connecting 2 two ports networks in Cascade combination.
   b. Measure the voltage and current in network by taking output one port open circuited and similarly measure the voltage and current by taking output port short circuited take a ratio of voltage to current and current to voltage of different condition i.e. short circuit and open circuit of the networks.
   c. Compare the analytical and practical values of ABCD / transmission parameters i.e. $A= V_1/ V_2$, $B=V_1/ I_2$, $C=I_1/ V_2$, $D=I_1/ I_2$.

7. **Frequency response of constant k- low pass filters and find out cut of frequency.**

   a. Design constant K-Low Pass filter with given cut off frequency and given design impedance.
   b. Take different readings of V_O for varying frequency from function generator.
   c. Calculate attenuation (α) in dB for each frequency.

d. Plot the graph of attenuation in dB Vs Frequency and determine the cut-off frequency from graph. Compare this practical cut-off frequency with the design value.

8. **Frequency response of constant k- high pass filters and find out cut of frequency.**

   a. Design constant K-High Pass filter with given cut off frequency and given design impedance.
   b. Take different readings of V_0 for varying frequency from function generator.
   c. Calculate attenuation (α) in db for each frequency.
   d. Plot the graph of attenuation in db Vs Frequency and determine the cut-off frequency from graph. Compare this practical cut-off frequency with the design value.

9. **Frequency response of m- derived filters and find out cut of frequency.**

   a. Design m- derived filter with given cut off frequency and given frequency of maximum attenuation, with given design impedance.
   b. Take different readings of V_0 for varying frequency from function generator.
   c. Calculate attenuation (α) in dB for each frequency.
   d. Plot the graph of attenuation in dB Vs frequency and determine the cut-off frequency from graph. Compare this practical cut-off frequency with the design value.

10. **Frequency response of band pass filter.**

   a. Take different readings of V_0 for varying frequency from function generator.
   b. Calculate attenuation α in dB for each frequency.
   c. Plot the graph of attenuation in dB Vs frequency and determine the cut-off frequency from graph. Compare this practical cut-off frequency with the design value.

11. **Design build and test symmetrical T or Π attenuator (plot attenuation Vs RL).**

   a. Design a symmetrical 'T' attenuator to given attenuation (In dB) to work into a use of given impedance.
   b. Apply variable DC input voltage at input with respect to ground, Measure voltage 'Vs' & Measure voltage 'V_R', and calculate value of $N= V_S/ V_R$.
   c. Calculate attenuation in dB for each input voltage.
   d. Compare measured values and Theoretical values of attenuation.

Reference Books:

1. D. Choudhary, “Network and system”, New Age international Publication.
2. A. Sudhakar, S. Palli, “Circuit & Networks Analysis and Synthesis”, Tata MH 3rd Edition, 2009.
3. A. Chakraborti, “Circuit Theory (Analysis and synthesis)”,Dhanpat Rai Publication,2012.
4. B. R. Gupta, “Network Analysis and synthesis”, S. Chand and company Ltd., 2010.
5. G. K. Mithal, “Network Analysis”, Khanna Publishers, 2000.

Guide lines for ICA:

ICA shall be based on continuous evaluation of student performance throughout semester and practical assignment submitted by the student in the form of journal.

Guide lines for ESE:

ESE will be based on practical assignment submitted by the student in the form of journal. In ESE the student may be asked to perform any one practical out of 8. Evaluation will be based on paper work and performance in the practical.

Microprocessors Lab

LAB COURSE OUTLINE

Course Title	Short Title & Course Code
Microprocessors Lab	**MP LAB**

Course Description:

This course is designed to teach students the practical aspects of principles, interfacing and applications of microprocessor architecture, including both hardware and basic assembly language programming using the 8085 Microprocessor.

	Hours per Week	No. Of Weeks	Total Hours	Semester Credits
Laboratory	2	14	28	1

Total Semester Credits: 1

Prerequisite Course(s): Digital Electronics.

LAB COURSE CONTENT

(Note: Minimum Eight from List)

1. **Addition of two 8 bit numbers.**
   Performing simple arithmetic operations of addition using 8085 Microprocessor.
2. **Subtraction of two 8 bit numbers.**
   Performing simple arithmetic operations of subtraction using 8085 Microprocessor.
3. **Addition of two 16 bit numbers.**
   Performing simple arithmetic operations of addition using 8085 Microprocessor.
4. **Subtraction of two 16 bit numbers.**
   Performing simple arithmetic operations of subtraction using 8085 Microprocessor.
5. **Multiplication of two 8 bit numbers.**
   Performing simple arithmetic operations of multiplication using 8085 Microprocessor.
6. **Division of two 8 bit numbers.**
   Performing simple arithmetic operations of division using 8085 Microprocessor.
7. **Program for block transfer of data bytes.**
   Perform block transfer of data.
8. **To find square of a number using look-up table.**
9. **To find largest/smallest number in array of data.**
10. **Arrange an array of data in ascending/descending order.**
11. **Program to implement decimal up/down counter.**
12. **BCD to Hex / Hex to BCD Conversion.**

13 **Interfacing of 8253/54 Timer with 8085 Microprocessor and generate the square wave.**

14 **Case study of Microprocessor controlled temperature system / microprocessor controlled manufacturing process/ traffic signal controller. (Study only)**

References Books:

1. R. Gaonkar, "Microprocessor, Architecture, Programming and Applications with 8085", Penram International Publication, 5th Edition, 2004.
2. B. Ram, "Fundamentals of Microprocessors and Microcomputers", Dhanpat Rai Publication, 6th Edition, 2011(reprinted).
3. Gilmore, "Microprocessors- Principles and application", Tata McGraw Hill.
4. M. Rafiquzzaman, "Microprocessors- Theory and applications: INTEL and MOTOROLA", Revised Edition.

Guide lines for ICA:

ICA shall be based on continuous evaluation of student performance throughout semester and practical assignment submitted by the student in the form of journal.

Guide lines for ESE:

ESE will be based on practical assignment submitted by the student in the form of journal. In ESE the student may be asked to perform any one practical out of 8. Evaluation will be based on paper work and performance in the practical.

NORTH MAHARASHTRA UNIVERSITY, JALGAON (M.S.)

Third Year Engineering

(E&TC/E&C)

Faculty of Engineering and Technology

COURSE OUTLINE

Semester – V

W.E.F 2014 – 2015

TE Semester – V

Name of the Course	Group	Teaching Scheme				Evaluation Scheme					Credits
						Theory		Practical		Total	
		Theory Hrs / week	Tutorial Hrs / week	Practical Hrs / week	Total	ISE	ESE	ICA	ESE		
Electronic Circuit Design (TH)	D	3	---	---	3	20	80	---	---	100	3
Communication System-II (TH)	D	3	---	---	3	20	80	---	---	100	3
Microcontrollers & Peripheral Interface Controller (TH)	D	3	---	---	3	20	80	---	---	100	3
Feedback Control System (TH)	D	3	---	---	3	20	80	---	---	100	3
Electromagnetic Engineering (TH)	D	3	--	---	3	20	80	---	---	100	3
Electronic Circuit Design (LAB)	D	---	---	2	2	---	---	25	25(PR)	50	1
Feedback Control System (LAB)	D	---	---	2	2	---	---	25	---	25	1
Communication System-II (LAB)	D	---	---	2	2	---	---	25	25(PR)	50	1
Microcontrollers & Peripheral Interface Controller (LAB)	D	---	---	2	2	---	---	25	25(PR)	50	1
Computer Programming-III (LAB)	B	1	---	2	3	---	---	50	---	50	2
Industrial Training / EDP / Special Study	D	---	---	---	---	---	---	25	---	25	2
Total		**16**	**---**	**10**	**26**	**100**	**400**	**175**	**75**	**750**	**23**

ISE: Internal Sessional Examination **ESE: End Semester Examination** **ICA: Internal Continuous Assessment**

Note 1: Out of 3 practical ESE heads, at least 1 head should be practical.

TE Semester – VI

Name of the Course	Group	Teaching Scheme				Evaluation Scheme					Credits
						Theory		Practical		Total	
		Theory Hrs / week	Tutorial Hrs / week	Practical Hrs / week	Total	ISE	ESE	ICA	ESE		
Industrial Economics & Telecom Regulation (TH)	C	3	---	---	3	20	80	---	---	100	3
Power Electronics (TH)	D	3	---	---	3	20	80	---	---	100	3
Electronic Measurement (TH)	D	3	---	---	3	20	80	---	---	100	3
Audio Video Engineering (TH)	D	3	---	---	3	20	80	---	---	100	3
Industrial Management (TH)	C	3	---	---	3	20	80	---	---	100	3
Power Electronics (LAB)	D	---	---	2	2	---	---	25	25(PR)	50	1
Electronic Measurement (LAB)	D	---	---	2	2	---	---	25	25(PR)	50	1
Audio Video Engineering (LAB)	D	---	---	2	2	---	---	25	25(PR)	50	1
Application Software (LAB)	B	---	---	2	2	---	---	25	---	25	1
Minor Project	D	---	---	2	2	---	---	50	---	50	2
Seminar - I	D	---	---	2	2	---	---	25	---	25	2
Total		**15**	**---**	**12**	**27**	**100**	**400**	**175**	**75**	**750**	**23**

ISE: Internal Sessional Examination **ESE: End Semester Examination** **ICA: Internal Continuous Assessment**

Note 1: Out of 3 practical ESE heads, at least 1 head should be practical.

Electronic Circuit Design

COURSE OUTLINE

Electronic Circuit Design	**ECD**	
Course Title	Short Title	Course Code

Course Description:

This course presents the actual concepts of several electronic devices and circuits and the design details, in order to meet a given system specification.

	Hours / Week	No. Of Weeks	Total Hours	Semester Credits
Lecture	**03**	**14**	**42**	**03**

Prerequisite Course(s): A background in basic electronics and circuit theory.

COURSE CONTENT

Electronic Circuit Design **Semester-V**

Teaching Scheme	**Examination Scheme**	
Lecture: 3 hours / week	**End Semester Examination (ESE)**	**: 80 Marks**
	Paper Duration (ESE)	**: 03 Hours**
	Internal Sessional Exam (ISE)	**: 20 Marks**

Unit-I: Design of Power Supplies **No of Lect. – 8, Marks: 16**

a) Design of unregulated power supply (half wave and full wave bridge rectifier with only Capacitor filters)
b) Design of Series Voltage Regulator (with error amplifier), fold back protection circuit. Improvement of Stabilization factor by using Darlington pair for regulator.
c) Design of IC LM317/337 based only adjustable voltage regulator circuits, design of dual tracking power supply using LM317/LM337 with unregulated power supply.
d) Design of switching regulators using IC LM 2575 / 2577 (buck and boost regulators – fixed and adjustable output voltage)

Unit-II: Design of Small Signal Amplifiers using BJT / FET **No of Lect. – 8, Marks: 16**

a) Design of single stage CE / CS amplifier with biasing circuit.
b) Design of single stage CB / CG amplifier with biasing circuit.
c) Design of Single stage CC/ CD amplifier with biasing circuit.
d) Design of current series negative feedback amplifier using BJT / JFET.

Unit-III: Power and Tuned Amplifiers **No of Lect. – 8, Marks: 16**

a) Design of Class A Amplifier (resistive load and transformer coupled load)
b) Design of Class B amplifier.
c) Design of Class AB amplifier.
d) Design of single tuned amplifier BJT / FET

Unit-IV: Design of Oscillators **No of Lect. – 8, Marks: 16**

a) Design RC and LC Oscillators – RC Phase shift oscillator, Hartley, Colpitts and Clapp oscillator
b) Design of multivibrator - Design of collector coupled Astable multivibrator and collector coupled Monostable multivibrator using BJT
c) Design of UJT relaxation Oscillator, Design of Schmitt trigger using BJT.

Unit-V: Design using Analog Integrated Circuits **No of Lect. – 8, Marks: 16**

a) Design of single supply ac inverting and non-inverting amplifier using IC324.
b) Design of FSK modulator using IC555, Design of ramp generator using IC555
c) Design of V/F and F/V convertors using TC9400
d) Study of different ICs available for digital modulation techniques (PAM, PWM, PPI, ASK, FSK).

Reference Books:

1) Bell - Electronics Devices and Circuits, PHI or Pearson 4/e
2) Goyal, Khetan - Monograph on Electronics Design Principles, Khanna Pub.
3) Rashid – Microelectronics Circuits Analysis and Design, Cenage Learning, 2/e
4) M.M. Shah - Design of Electronics Circuits and Computer Aided Design, New Age Int.
5) Bell – Solid State Pulse Circuits, PHI 4/e
6) Michael Jacob - Application and Design with Analog Integrated Circuits, PHI 2/e
7) Sergio Franco – Design with OP-AMP and Analog Integrated Circuits, TMH, 3/e
8) IC datasheets.

Communication System-II

COURSE OUTLINE

Communication System-II **CS-II**

Course Title Short Title Course Code

Course Description:

This course is aimed at introducing the fundamentals of digital communication to undergraduate students. The background expected includes a prior knowledge of second year course in Communication System-I. The goals of the course are to understand the basic principle of digital communication and application in different era.

Lecture	Hours / Week	No. Of Weeks	Total Hours	Semester Credits
	03	14	42	03

Prerequisite Course(s): Communication System-I.

COURSE CONTENT

Communication System-II **Semester-V**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week **End Semester Examination (ESE): 80 Marks**
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

Unit-I: Spectra, Probability and Random Variables **No of Lect. –9, Marks: 16**

a) Basic Signal Processing Operation in digital communication
b) Power density spectrum, Energy spectral density
c) Parseval's theorem, Rayleigh Energy theorem
d) Probability and sample space,
e) Random Variables, Random process and Probability Function.
f) Probability Models.

Unit-II: Waveform Coding and Baseband Shaping for Data Transmission **No of Lect. – 8, Marks: 16**

a) Pulse Code Modulation (PCM) & PCM with Noise.
b) Delta Modulation
c) Digital Multiplexing.
d) Discrete PAM Signals and Power Spectra of Discrete PAM Signals.
e) ISI & Nyquist's Criterion for Distortion less Baseband Binary Transmission.
f) Eye Pattern.

Unit-III: Digital Modulation Techniques **No of Lect. –9, Marks: 16**

a) Digital Modulation Formats
b) Coherent Binary Modulation Techniques
c) Coherent Quadrature Modulation Techniques
d) Noncoherent Binary Modulation Techniques
e) M-ary Modulation Techniques
f) Bit Vs symbol Error Probability and Synchronization

Unit-IV: Information and Detection Theory **No of Lect. – 8, Marks: 16**

a) Uncertainty, Information and Entropy
b) Source coding Theory
c) Huffman coding and Discrete Memory less Channels
d) Mutual Information, Channel Capacity and Channel Coding Theory
e) Differential Entropy and Mutual Information
f) Channel Capacity Theorem

Unit-V: Channel Coding **No of Lect. – 8, Marks: 16**

a) Coding introduction, Error probability with repetition in the binary symmetric channel.
b) Linear Block Codes
c) Algebraic Codes
d) Automatic repeat request

Reference Books:

1) S. Haykin, "Digital Communications", Wiley Student Edition, ISBN 9971-51-205-X.
2) A. Carlson, P. Crilly and J. Rutledge, "Communication Systems- An Introduction to Signals and Noise in Electrical Communication", McGraw Hill International Edition, 4th Edition, ISBN 0-07-121028-8.
3) H. Taub, D. Schilling, "Principles of Communication Systems", Tata McGraw Hill, 2nd Edition, 2005, ISBN 0-07-462456-3.

Microcontrollers & Peripheral Interface Controller (PIC)

COURSE OUTLINE

Microcontrollers & PIC	**MC&PIC**	
Course Title	Short Title	Course Code

Course Description:

This course provides an Extensive knowledge about 8051 microcontroller, its programming, interfacing, applications and introduction to PIC.

	Hours / Week	No. Of Weeks	Total Hours	Semester Credits
Lecture	03	14	42	03

Prerequisite Course(s): Course on 8085 Microprocessor and Digital Electronics.

COURSE CONTENT

Microcontrollers & PIC **Semester-V**

Teaching Scheme

Lecture: 3 hours / week

Examination Scheme

End Semester Examination (ESE) :80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

Unit-I: The 8051 Microcontroller **No of Lect. – 8, Marks: 16**

a) Overview of the microcontroller Family, Block diagram description of 8051.
b) Memory and Register organization.
c) Stack and operation of stack. Stack related instructions.
d) Looping, Conditional and Unconditional Jumps, Subroutines, Time delay calculations, CALL and RET Instruction.
e) 8051 pin diagram, understanding the function of each pin.
f) I/O port structure and I/O port programming.

Unit-II: 8051 Programming **No of Lect. – 8, Marks: 16**

a) Addressing Modes in 8051.
b) Instruction set of 8051 microcontroller.
c) Programs based on instructions.

Unit-III: Timer, Serial port and Interrupt programming **No of Lect. – 8, Marks: 16**

a) Structure of Timer mode control register (TMOD register), Mode 1 programming.
b) Generation of large delay, Mode 2 programming
c) Counter programming, Timer control register (TCON register) structure.
d) Serial communication basics, 8051 Serial Port Programming.
e) 8051 interrupts, Interrupts Programming.

Unit-IV: Interfacing **No of Lect. – 9, Marks: 16**

a) Switch interfacing, LED interfacing, LCD interfacing,
b) ADC interfacing, DAC interfacing, Sensors interfacing,
c) Stepper motor, Relay interfacing.
d) DS12887 Real Time Clock (RTC) Interfacing
e) Serial communication protocols Inter Integrated Circuit (I^2C), Serial Peripheral Interface (SPI), MODBUS.

Unit-V: PIC microcontrollers **No of Lect. – 9, Marks: 16**

a) PIC microcontrollers overview and features, PIC 16C6X/7X, PIC 16C6X/7X ALU, CPU registers, status register, File selection register (FSR).
b) Pin Diagram, PIC reset actions, PIC oscillator connections.
c) PIC memory organization
d) PIC 16C6X/7X instructions, Addressing modes, I/O ports, interrupt in PIC 16C61/71, PIC 16C61/71 timers
e) PIC 16C61/71 ADC
f) Introduction to PIC 16F8XX Flash microcontrollers.

Reference Books:

1) M.A. Mazidi, J.C. Mazidi, R.D. McKinlay, The 8051 Microcontroller and Embedded Systems using Assembly and C, Second Edition, Pearson
2) Kenneth Ayala, The 8051 Microcontroller, Third Edition, Delmar Learning, a part of Cengage Learning (India Edition)
3) Ajay Deshmukh, Microcontrollers [Theory and Applications], Tata McGraw hill, New Delhi
4) Mike Predko - Programming and Customizing 8051 micro controller, TMH.
5) N Senthil Kumar, M Saravanan, S Jeevananthan, and Satish Shah- Microprocessors and Interfacing (Series - Oxford Higher Education)

Feedback Control System

COURSE OUTLINE

Feedback Control System	**FCS**	
Course Title	Short Title	Course Code

Course Description:

This course provides an introduction to feedback control system covering: basic concept of open loop and close loop system, types of control system and their components, modeling of physical system, transfer function methods. Time response of different order system. Stability method and frequency method such as bode plot, polar plot, Nyquist criterion analysis of state variables and controllers.

Lecture	Hours / Week	No. Of Weeks	Total Hours	Semester Credits
	03	**14**	**42**	**03**

Prerequisite Course(s): Knowledge of Mathematics at FE and SE level.

COURSE CONTENT

Feedback Control System **Semester-V**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week

End Semester Examination (ESE) :80 Marks
Paper Duration (ESE) :03 Hours
Internal Sessional Exam (ISE) :20 Marks

Unit-I: Introduction to control system **No of Lect. – 8, Marks: 16**

a) History and development of Automatic control system.
b) Types of control system & open loop and closed loop system.
c) Transfer function of Block diagram algebra.
d) Masons gain formula and transfer function of signal flow graph.
e) Conversion of Block diagram algebra to Signal flow graph.
f) Conversion of electrical system to Signal flow graph.

Unit-II: Time response and stability of control system **No. of Lect. - 8, Marks: 16**

a) Standard test signals
b) Time response of first and second order system.
c) Steady state error and error constant.
d) Design specifications of second order system.
e) Transient response & its specifications.
f) The concept of stability & Necessary condition of stability
g) Hurwitz stability criterion.
h) Routh stability criterion, Relative stability analysis.

Unit-III: The concepts of Root locus **No of Lect. – 8, Marks: 16**

a) General rule to draw root locus.
b) Construction of root locus.
c) Root counter.
d) Effect of addition of open loop poles.
e) Effect of addition of open loops zeros.
f) Design of lead and lag compensator using root locus.

Unit-IV: Frequency domain analysis **No of Lect. – 8, Marks: 16**

a) Correlation between Time and frequency response.
b) Basics of Magnitude and phase plot.
c) Construction of bode plot.
d) Concept of lead and lag compensator using bode plot.
e) Polar plot.
f) Nyquist stability criterion.
g) Assesment of Relative stability using Nyquist criterion.

Unit-V: state space analysis and controllers. **No of Lect. – 8, Marks: 16**

a) Concept of state (State variable and state model).
b) State model of linear system.
c) Solution of state equation
d) Controllability and observability.
e) Introduction to controller PI, PD and PID.
f) Stepper motor. Servo motor and synchronous motor.

Reference Books:

1) I.J. Nagrath and M. Gopal – Control system Engineering- New age 4th edition.
2) I.J. Nagrath and M. Gopal – Control system Engineering- New age 5h edition
3) Katsuhiko Ogata- Modern Control engineering- Pearson 4th edition.
4) Ashok Kumar- Control system- Tata McGraw Hill Publishing Company.
5) R. Amanda and P. Ramesh Babu- Control system Engineering- SciTech.
6) Smarajit Ghosh – Control systems second edition – PEARSON publishers.

Electromagnetic Engineering

COURSE OUTLINE

Electromagnetic Engineering	**EME**	
Course Title	Short Title	Course Code

Course Description:

This course covers the Basics of Electric field & Magnetic field, properties of conductor, properties of dielectric material & concept of capacitor with various structures. Electromagnetic waves as a UPW, Maxwell's equation in static, time varying & free space. This course deals with basics of antenna & parameters.

	Hours / Week	No. Of Weeks	Total Hours	Semester Credits
Lecture	**03**	**14**	**42**	**03**

Prerequisite Course(s): Knowledge of Mathematics at FE and SE level.

COURSE CONTENT

Electromagnetic Engineering **Semester-V**

Teaching Scheme

Lecture: 3 hours / week

Examination Scheme

End Semester Examination (ESE) :80 Marks
Paper Duration (ESE) :03 Hours
Internal Sessional Exam (ISE) :20 Marks

UNIT-I **No. of Lect. – 8, Marks: 16**

Coulomb's law and electric field intensity: –

a) Review of vector Analysis and coordinate systems.
b) Coulomb's force law & Numerical based on force law.
c) Concept of electric field intensity.
d) Volume charge density, surface charge density, Line charge density
e) Electric field due to point charge, line charge, surface charge, Volume charge. Numerical based on different configuration of charges.
f) Concept of Electric Flux. Relation between flux density & electric field intensity.

UNIT-II **No. of Lect. – 8, Marks: 16**

Gauss's law, Energy and Potential:-

a) Gauss's law, Application of Gauss's law to symmetrical charge distribution.
b) Divergence Theorem.(Statement & Proof)

c) Maxwell's first equation in electrostatics.
d) Work Done, Concept of Potential & Potential Difference.
e) Potential difference in field of point, Line, Surface, Volume charge.
f) Potential gradient, Relation between Potential gradient & Electric filed intensity.
g) Dipole and its electric field, Dipole movement.
h) Energy density in electrostatic field.

UNIT-III **No. of Lect. – 9, Marks: 16**

Conductor, Dielectrics and Capacitance:-

a) Current and current density. Current continuity equation.
b) Properties of conductors.
c) The nature of Dielectric materials.
d) Boundary Condition for perfect Dielectric materials, free space, conductor.
e) Capacitance, Parallel plate capacitor.
f) Calculation of capacitance of various configurations.
g) Poisson's and Laplace's equations.

UNIT-IV **No. of Lect. – 8, Marks: 16**

Magneto statics:-

a) Biot-Savarts law and its vector form.
b) Magnetic field due to finite, infinitely and circular loop long current carrying conductor.
c) Ampere's Circuital law, Point form of Ampere's circuital Law/Curl operator.
d) Stokes theorem.
e) Magnetic flux & Magnetic flux density.
f) Scalar and Vector magnetic potential.
g) Lorentz's Force equation. Energy stored in magnetic field.

UNIT-V **No. of Lect. – 8, Marks: 16**

Time Varying Fields & Uniform Plane Waves:-

a) Maxwell's equations (Differential, Integral and Phasor forms) for time varying, Static & free space.
b) Uniform plane waves, Transformation of UPW from time varying form into Phasor, Vice versa.
c) Representation of wave motion in free space. (Wave equations).
d) Representation of wave motion in perfect dielectrics and Lossy dielectrics.
e) Poynting's theorem & Wave power.
f) Propagation in good conductor and Skin effect.
g) Introduction to antenna basic parameter-Patterns, Beam area, radiation intensity, Beam efficiency, directivity & gain, antenna aperture, Effective height.

Reference Books:

1) Engineering Electromagnetic-William H. Hayt, J A Buck, Tata McGraw Hill Publication. 7thEdition.
2) K. D. Prasad - Antenna and Wave Propagation, Satya Prakashan.
3) Electromagnetics- Schaum's outline series, 2nd edition, Joseph A Edminister, Tata Mc Graw Hill edition.
4) R K Shevgaonkar, "Electromagnetic Waves", 1st Edition, Tata McGraw Hill.

Electronic Circuit Design Lab

LAB COURSE OUTLINE

Electronic Circuit Design Lab	**ECD LAB**	
Course Title	Short Title	Course Code

Course Description:

In this laboratory course emphasis is on the hand on design practice and implementation and testing of various circuits (discrete and IC based) in laboratory.

Laboratory	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	2	15	30	1

Total Semester Credits: 1

Prerequisite Course(s): A background in basic electronics and circuit theory.

LAB COURSE CONTENT

(Note: Minimum five experiments to be perform)

1. **Design and test discrete series voltage regulator (with error amplifier) with unregulated power supply.**

   a. Design and test of series voltage regulator (using error amplifier).
   b. Using step down transformer, full wave rectifier (using diodes) and capacitor filter, design and test unregulated power supply required for series voltage regulator.
      [Design of series voltage regulator is without protection circuit and max output current 500mA- do not use Darlington pair]

2. **Design and test Inverting /Noninverting amplifier.**

   a. Design and test single stage BJT CE / CC amplifier for given Av, S, Ri, Ro, F_L, Vcc, Q points, R_{LW}, Source resis.
   b. Perform DC and AC analysis find theoretical values and compare it with designed circuit values.
      [Design of single stage (use self-biasing) without feedback CE / CC BJT amplifier]

3. **Design and test of single tuned amplifier using BJT for given center frequency.**

   a. Design of biasing circuit (self bias)
   b. Designing of tuned circuit.
   c. Calculation and verification of f_0 and bandwidth.

4. Design of Astable Multivibrator using BJT

a. Selection of transistor and external components.
b. Calculation and verification of desired output frequency and amplitude of output signal.

OR

4. Design and test Schmitt trigger using BJT.

a. Selection of transistor and external components for given UTP and LTP.
b. Calculation and verification of desired UTP and LTP

5. Design and fabricate any one circuit from Syllabus

a. Select the circuit from syllabus (only from Electronic Circuit Design and other than laboratory experiments).
b. Design the circuit.
c. Implement and test the designed circuit on Printed Circuit Board. [Maximum group size to conduct this experiment is Four. Implementation must be on PCB. Students have to write report (design, fabrication method and testing results) in their regular Laboratory manual]

All experiments (except Expt No 5), must perform using breadboard only.

Guide lines for ESE:-

ESE will be based on practical assignment submitted by the student in the form of journal. Evaluation will be based on paper work and performance in the practical.

Feedback Control System Lab

LAB COURSE OUTLINE

Feedback Control System Lab	**FCS LAB**	
Course Title	Short Title	Course Code

Course Description:

In this laboratory course student will be familiar with electrical network, motor and lead and lag controller. Also simultaneously student will be familiar about how to find out the Bode, polar & Nyquist plot with the help of MATLAB.

Laboratory	**Hours per Week**	**No. of Weeks**	**Total Hours**	**Semester Credits**
	2	**15**	**30**	**1**

Total Semester Credits: 1

Prerequisite Course(s): Knowledge of Basic Electronics

LAB COURSE CONTENT

(Note: Minimum FOUR Experiments from each group.)

Group A

1) To Plot the magnitude & phase plot of lead electrical network.
2) To Plot the magnitude & phase plot of lag electrical network.
3) To determine the transient response of RLC electrical network
4) Study of flow control using PID controller.
5) Study of synchronous to observe angular displacement.
6) Study of stepper motor.

Group B

1) Obtain the unit step response of a second order system

a) Zeta= 0.5 and ω_n= 6 rad/sec.
   $(S^2+9s+19)/(s^3+7S^2+14S+8)$

2) Sketch the polar plot of (Unity f/b system)

a) G(s) = 20s/(s+10(s+10)
b) G(s) = 10/s(s+1)(s+2)

3) Sketch the Bode plot for the transfer function (Unity f/b system)

a) G(s) = 1000/s(1+0.1s)(1+0.001s)

b) $G(s)= 10/s(s+1)(s+2)$

4) Sketch the Nyquist plot for the system

a) $G(s)\ H(s) = 60/(s+1)(s+2)(s+5)$

b) $G(s)H(s) = 1/(s^2+0.8s+1)$

5) The open loop transfer function of a servo system with unity feedback is given by $G(s) = 10/(s+2)\ (s+5)$. Determine the damping ratio, undamped natural frequency of oscillation. What is the percentage overshoot of the response to a unit step input?

6)

a) A system has $G(s) = 0.035/s(1+0.5s)(1+0.04s)$ Design a suitable lag compensator to give velocity error constant 27.3 s^{-1} and phase margin $=45^\circ$

b) The open loop transfer function of a unity feedback system $G(s) = K/s(s+1)(s+2)$ Design suitable lag-lead compensator to achieve the following:
Static velocity error constant = 10 s^{-1}. Phase margin = 50° and Gain margin less than Or equal to 10dB.

Guide lines for ESE:-

ESE will be based on practical assignment submitted by the student in the form of journal. In ESE the student may be asked to perform any one practical out of Group A and Group B. Evaluation will be based on paper work and performance in the practical.

Communication System-II Lab

LAB COURSE OUTLINE

Communication System-II Lab	**CS-II LAB**	
Course Title	Short Title	Course Code

Course Description:

This laboratory course is an introduction to the most common techniques that are used to build both analog and digital communication systems using a modern digital signal processing approach. Communication systems are introduced by looking first at baseband transmission methods such as pulse amplitude modulation (PAM) signaling, and pulse code modulation (PCM). The combination of AM, FM, PM and PAM or PCM finally leads to the most commonly used digital modulation systems such as frequency shift keying (FSK), phase shift keying (PSK) and more general 2-dimensional signal constellations using quadrature amplitude modulation (QAM). In the majority of cases the goal of a communication system is to transmit information reliably as fast as possible within a given channel bandwidth and power constraint.

Laboratory	**Hours per Week**	**No. of Weeks**	**Total Hours**	**Semester Credits**
	2	**14**	**28**	**1**

Total Semester Credits: 1

Prerequisite Course(s): Communication System-I.

LAB COURSE CONTENT

(Note: Minimum FOUR Experiments from each group.)

Group A

1. **To generate and detect PCM signal.**
    a. Draw input and output waveform.
    b. From sampled output measure quantization level.
    c. Reconstruct PCM waveform from modulated signal.

2. **To understand waveform of Delta Modulation and Demodulation.**
    a. Observation of effect of slope overload.
    b. Observation of Granular noise and SNR.

3. **To understand waveform of Adaptive Delta Modulation and Demodulation.**
   a. Observation of decreasing effect of slope overload.
   b. Observation of Granular noise and SNR.

4. **To generation and detection of FSK input and output waveform.**
   a. Find the FSK frequency when applied logic ‘1’ and ‘0’.
   b. Reconstruct same signal at receiving side.
   c. Draw detected input and output waveform on graph.

5. **To generation and detection of PSK input and output waveform.**
   a. Find the PSK phase changing when applied logic ‘1’ and ‘0’.
   b. Reconstruct same signal at receiving side.
   c. Draw detected input and output waveform on graph.

6. **To generation and detection of ASK input and output waveform.**
   a. Find the ASK measure amplitude when applied logic ‘1’ and ‘0’.
   b. Reconstruct same signal at receiving side.
   c. Draw detected input and output waveform on graph.

Group B

7. **To generation and detection of QPSK/QAM input and output waveform.**
   a. Observed the OPSK/QAM input and output waveform.
   b. Reconstruct same signal at receiving side.
   c. Draw detected input and output waveform on graph.

8. **To Study different line codes (NRZ, RZ, polar RZ, bipolar(AMI),Manchester)**
   a. Describe representation of each code.
   b. Compare each code and made observation.
   c. Draw given input and output waveform on graph.

9. Noise analysis using any software tool (use of any discrete distribution).Find response by changing parameters. (use any open source software)

10. Noise analysis using any software tool (use of any continuous distribution).Find response by changing parameters. (use any open source software)

11. Execute Shannon Fannon algorithm by using any software tool. .(use any open source software)

12. Execute Huffman coding by using any software tool. (use any open source software)

Guide lines for ESE:-

ESE will be based on practical assignment submitted by the student in the form of journal. In ESE the student may be asked to perform any one practical out of Group A and Group B. Evaluation will be based on paper work and performance in the practical.

Microcontrollers & Peripheral Interface Controller Lab

COURSE OUTLINE

Microcontrollers & PIC	**MC&PIC LAB**	
Course Title	Short Title	Course Code

Course Description:

In this laboratory course emphasis is on the understanding the instruction set of 8051 microcontroller and PIC. It provides comprehensive treatment of 8051 microcontroller along with technical knowhow about PIC family. The students can use this knowledge to analyze and build the embedded system for different applications.

Laboratory	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	2	14	28	1

Total Semester Credits: 1

Prerequisite Course(s): Course on 8085 Microprocessor and Digital Electronics.

LAB COURSE CONTENT

(Note: Minimum SIX Experiments from group A and TWO experiments from group B.)

Group A

1. Study of 8051 / 8085 assembler and Simulator by writing program for addition and Subtraction.
2. Write and Execute program for multiplication and division.
3. Write and Execute program for Calculation of factorial.
4. Write and Execute program to flash LED.
5. Write and Execute program to interface a switch.
6. Write and Execute program to display 0 to 9 continuously on 7-Segment display.
7. Write and Execute program to demonstrate interfacing of Relay.
8. Write and Execute program to demonstrate interfacing of DAC.
9. Write and Execute program to demonstrate interfacing of ADC.

Group B

10. Write and Execute program to demonstrate interfacing of Stepper Motor.
11. Write and Execute program to demonstrate interfacing of LCD.

12. Two experiments based On PIC 16C6X/7X.
13. Two Experiments to understand the working of serial protocols.

Guide lines for ESE:-

ESE will be based on practical assignment submitted by the student in the form of journal. In ESE the student may be asked to perform any one practical out of Group A and Group B. Evaluation will be based on paper work and performance in the practical.

Computer Programming-III Lab

COURSE OUTLINE

Computer Programming-III Lab	**CP-III Lab**	
Course Title	Short Title	Course Code

Course Description:

This course provides an introduction to computer programming Language MATLAB/Scilab covering: Introduction to MATLAB/Scilab; Handling Arrays and Matrices; Programming in MATLAB/Scilab, M-File Scripts; MATLAB/Scilab Functions and Two-Dimensional Plots; Graphical User Interface and Applications of MATLAB/Scilab.

	Hours / Week	**No. Of Weeks**	**Total Hours**	**Semester Credits**
Lecture	**01**	**14**	**14**	**02**
Lab	**02**	**14**	**28**	

Prerequisite Course(s): Knowledge of C Language and logical reasoning.

THEORY COURSE CONTENT

Computer Programming-III Lab **Semester-V**

Teaching Scheme
Lecture: 1 hours / week

Examination Scheme
Internal Continuous Assessment (ICA): 50 Marks

Unit-I: Introduction to MATLAB/Scilab **No of Lect. – 2**

a) Getting Started with MATLAB/Scilab. Command Window, Editor Window, Figure Window, Help Window, Command History Window, Current Directory Window, Workspace Window.
b) Data Types in MATLAB/Scilab, Variables, Keywords, Assignment Statement, MATLAB/Scilab System Variables, Semicolon, and Percentage Sign.
c) Commonly Used System MATLAB/Scilab Commands.

Unit-II: Handling of Arrays and Matrices **No of Lect. – 4**

a) Creating an Array, Accessing Elements of an Array, Regular Arrays, Expanding and Reducing an Array, the Length and Size functions.
b) Array Sorting, Mathematical Operations on Arrays (Addition, Substraction, Multiplication by Scalar, and Multiplication of two arrays).

c) Division of Two Polynomials, Relational and Logical operators on Arrays.
d) Creating a Matrix, Accessing Element of a Matrix, Length and Size of a Matrix.
e) Expanding and reducing the size of a Matrix, Shifting and sorting Matrices.
f) Creating Special Matrices (Identity Matrix, Anti-Identity Matrix, 0's Matrix, 1's Matrix, and Magic Square), Transpose, Determinant and Inverse of a Matrix.
g) Mathematical Operations on Matrices.

Unit-III: Programming in MATLAB/Scilab, M-FILE Scripts **No of Lect. – 4**

a) String Operations, String MATLAB/Scilab Functions, Time and Date Functions.
b) Introduction to M-file scripts, Creating, Saving and Running an M-file.
c) Variables of a Script File, disp function, fprintf function, Reading Input from keyboard, sscanf function.
d) The Conditional Control Statements, Nested Conditional Control Statements.
e) The Loop Control Statements, for loop, while loop.
f) Break, continue and return statement.

Unit-IV: MATLAB/Scilab Functions and Two-Dimensional Plots **No of Lect. – 3**

a) Creating MATLAB/Scilab function file, local and global variable, saving and using function file, Inline functions, Comparison between script files and function files.
b) The plot Command, fplot command, Plotting Multiple Graphs in the same plot.
c) Formatting a plot, plot with Logarithmic axis, histograms, and polar plots.
d) Plotting multiple plots on the same page, Examples of MATLAB/Scilab Applications on plots.

Unit-V: Graphical User Interface and Applications of MATLAB/Scilab **No of Lect. – 3**

a) Introduction to GUI, GUI Development Environment, Creating a Simple GUI.
b) GUI Components: textbox, pushbuttons, toggle button, checkbox, radio button, popup Menus, List box and Slider.
c) Dialog Boxes: Error and warning Dialog Boxes, Input Dialog Box, Question Dialog Box, List Dialog Box, and File Dialog Box.
d) Application: Linear Algebra, Curve Fitting and Interpolation, Numerical Integration, Digital Image Processing, etc.

Reference Books:

1) Stephen J. Chapman, "MATLAB Programming for Engineers", Thomsan Learning, 3rd Edition, 2007
2) Y. Kirani Singh and B.B. Chaudhari, "MATLAB Programming", PHI, 1st Edition, 2010
3) Amos Gilat, "MATLAB An Introduction with Applications", Wiley India, 1st Edition, 2010
4) Rudra Pratap, " Getting Started with MATLAB 7", OXFORD, 1st Indian Edition, 2006
5) www.scilab.org

LAB COURSE CONTENT

(NOTE: minimum 6 practical from group A and 2 practicals from group B)

GROUP A (MATLAB/Scilab)

1. **Study of creation of arrays.**
   a. Create a row vector that has different elements
   b. Create a column vector that has different elements
   c. Create a matrix for given elements.

2. **Study of various operations on matrices**
   a. Create two matrices
   b. Perform arithmetic operations like addition, subtraction, multiplication & division on any two matrices
   c. Prove addition of matrices is commutative and associative
   d. Show matrix multiplication is distributive

3. **To plot sinusoidal, triangular and square signal**
   a. Plot all signals in a given range on same figure with suitable naming.

4. **Compute sampling of continuous time signal.**
   a. Plot continuous time signal
   b. Plot signals for different conditions of sampling and verify sampling theorem
   c. All signals plot on one figure.

5. **To find the pole zero plot of the given network.**

   a. Obtain Transfer function
   b. Calculate poles & zeros of given system
   c. Plot the Plot -Zero plot for given function.

6. **To find the Polar /Nyquist plot of the given network.**
   a. Obtain transfer function
   b. Plot Polar/Nyquist plot for given system

7. **Modeling of any one differential equation**
   a. Select any one differential equation and implement it with the help of simulation

GROUP B (MATLAB/Scilab)

Applications of MATLAB/ Scilab to Electronics Engineering subjects (4 Practicals)

Reference Books:

1) Rudra Pratap, "Getting Started With MATLAB 7: A Quick Introduction For Scientists and Engineers".
2) Amos Gilat , " MATLAB : An introduction with applications, 4th edition.
3) Stephen Chapman - MATLAB programming for Engineer, Thomson.
4) www.scilab.org

Guide lines for ICA:

ICA shall be based on continuous evaluation of student performance throughout semester and practical assignment submitted by the student in the form of journal.

Industrial Training / EDP / Special Study

COURSE CONTENT

Industrial Training / EDP / Special Study	**IT/EDP/SS**	
Course Title	Short Title	Course Code

Semester-V
Total Semester Credits: 02

Examination Scheme
Internal Continuous Assessment (ICA): 25 Marks

Industrial Training

- Student shall undergo industrial training for a minimum period of **two weeks** during summer vacations between fourth semester and fifth semester.
- The industry in which industrial training is taken should be a medium or large scale industry
- The paper bound report on training must be submitted by the student in the beginning of Fifth semester along with a certificate from the company where the student took training.
- Every student should write the report separately.
- Institute / Department/T&P Cell have to assist the students for finding Industries for the training.
- Students must take prior permission from Department before joining for Industrial Training.

OR

EDP (Entrepreneurship Development Program)

- Student has to participate in Entrepreneurship Development Program for a minimum period of **One week** during summer vacations between fourth semester and fifth semester.
- Every student must submit the paper bound report based on the program in the beginning of Fifth semester along with a certificate (Course / Program completion) from the program organizers.
- Every student should write the report separately.
- Institute / Department may arrange Entrepreneurship Development Program at their campus.
- Students must take prior permission from Department before attending any Entrepreneurship Development Program.

OR

Special Study

- Student has to submit name of three topics of his interest to the department.
- Special study in a group shall not be allowed.
- The three-member committee appointed by Head of Department shall allot one topic out of the three topics submitted by the student.
- Every student must submit the paper bound report based on special study at the end of Firth semester.

- Department should allot guide to all such students, for monitoring their progress and guide them for literature survey / report writing etc.
- Evaluation of special study shall be done based on presentation made by student, followed by brief question answer session.

Evaluation of Industrial Training / EDP / Special Study

ICA: The Internal Continuous Assessment shall be based on the active participation of the students in the training / EDP / Special study and based on knowledge / skill acquired by the student. The three-member committee appointed by Head of Department shall assess the reports and award marks based on following:

(a) Report		10 marks.
(b) Presentation		10 marks.
(c) Viva-voce at the time of presentation		05 marks.
	Total:	**25 marks.**

NORTH MAHARASHTRA UNIVERSITY, JALGAON (M.S.)

Third Year Engineering

(E&TC/E&C)

Faculty of Engineering and Technology

COURSE OUTLINE

Semester – VI

W.E.F 2014 – 2015

Industrial Economics & Telecom Regulation

COURSE OUTLINE

Industrial Economics & Telecom Regulation	**IETR**	
Course Title	Short Title	Course Code

Course Description:

This course includes material from courses in economics, business, and public policy at the graduate level. Additionally, this course has been supplemented with material from investigations and consulting studies at the international level. A wide spectrum of material has been selected, with the purpose of introducing the participants to the important changes that are happening in the telecommunications industry, and the techniques usually used for cost estimations, prices, rates and other elements related to the regulation of telecommunications industry.

	Hours / Week	No. Of Weeks	Total Hours	Semester Credits
Lecture	**03**	**15**	**45**	**03**

Prerequisite Course(s): General understanding of economics and management.

COURSE CONTENT

Industrial Economics & Telecom Regulation **Semester-VI**

Teaching Scheme	**Examination Scheme**	
Lecture: 3 hours / week	**End Semester Examination (ESE)**	**:80 Marks**
	Paper Duration (ESE)	**:03 Hours**
	Internal Sessional Exam (ISE)	**: 20 Marks**

Unit-I: Basic concepts in economics **No of Lect. – 9, Marks: 16**

Demand, supply, elasticity of demand and supply, competition, monopoly, oligopoly, monopolistic competition, causes creating categories of monopoly organization, price determination under perfect competition and monopoly, price discrimination, equilibrium of firm under competition and monopoly. Functions of money, supply and demand for money, money price level and inflation, black money, consequences, Meaning, magnitude.

Unit-II: Banking and Taxation system of Country. **No of Lect. –9, Marks: 16**

Function of commercial banks, multiple credit creation, banking system in India, shortcomings and improvement. Central banking: Function of central banking illustrated with reference to RBI, monitory policy meaning, objectives and features. Sources of public revenue: principles of taxation, direct and indirect taxes, distribution of incidence, tax structure, reform of tax system.

Unit-III: **No of Lect. – 9, Marks: 16**

International Trade and economic crises of 2008, Theory of international trade, balance of trade and payment, theory of protection, tariffs and subsidies, foreign exchange control, devaluation.
Basic concept of management- Planning, organization, communication, Leadership & motivation.
Marketing management and marketing Mix-Product, Place, price and promotion

Unit-IV: Telecommunications Regulation. **No of Lect. – 9, Marks: 16**

-The Task of Regulation, Markets and market failure, The rules of regulation.
-The Framework for Regulation, Legal frameworks, Instruments of regulation, Enforcement, Dangers of regulation and operational aspects.
-Regulatory Strategy and Price Controls, Market strategies/ structures, Engineering and technology.
-Regulation and the Future (John Buckley, Telecommunications Regulation)

Unit-V: **No of Lect. – 9, Marks: 16**

National Telecom Policy 1994,New Telecom Policy 1999, Guidelines For Up linking From India, Broadband Policy 2004, Guidelines For Obtaining License For Providing Direct-To-Home(DTH) Broadcasting Service In India. TRAI Act 1997, Cable Network Act, TRAI Regulation.
ITU's role in global communications.
(http://www.trai.gov.in/Default.asp
http://www.itu.int/net/home/index.aspx
http://www.itu.int/net/about/index.aspx
Black, Telecommunications Law in the Internet Age, 2002, Elsevier)

Reference Books:

1) R Jayaram, Namita R Kotwani, "Industrial Economics and Telecommunication Regulations", PHI
2) John Buckley, Telecommunications Regulation, Institution of Electrical Engineers © 2003, Published by: The Institution of Electrical Engineers, London, United Kingdom. (ISBN:0852964447)
3) John R McNamara, "The economics of innovation in the telecommunications industry", Quorum Books, Newyork.
4) Hank Intven, McCarthy Tetrault, "Telecommunication Handbook"
5) Indian Economy: A.N Agrawal

Power Electronics

COURSE OUTLINE

Power Electronics	**PE**	
Course Title	Short Title	Course Code

Course Description:

This course includes power semiconductor-based devices such as SCR, IGBT and related applications. This course is designed to introduce to the students to the basic principles and applications of power semiconductor devices. It includes fundamentals, operation & characteristics of the power devices. This course provides instruction in the theory and application of power devices in the electronics and electrical industry. Emphasis is placed on the physical characteristics and uses of power devices.

Lecture	Hours / Week	No. Of Weeks	Total Hours	Semester Credits
	03	14	42	03

Prerequisite Course(s): A background in basic electronics and circuit theory.

COURSE CONTENT

Power Electronics **Semester-VI**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week

End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

Unit-I: Introduction to Power Devices **No of Lect. – 9, Marks: 16**

a) **Silicon Controlled Rectifier (SCR):** Structure, symbolic representation, working principle, two transistor Analogy of SCR, characteristics (Static and Dynamic), Turn-ON methods, Gate triggering circuits of SCR (R,RC,UJT).
b) **Commutation Methods:** Class A, B, C, D, E, F commutation (Circuit diagram, working principle and waveforms)
c) **Protection circuits of SCR:** di/dt and dv/dt protection and Snubber circuit
d) **IGBT, GTO, DIAC, TRIAC:** Structure, symbolic representation, Working principle, characteristics.

Unit-II: Line Frequency Controlled Converters / Rectifiers No of Lect. – 9, Marks: 16

a) **Single phase Half Controlled Bridge Rectifier (R & RL Load)-** Circuit diagram, waveforms, average load voltage, RMS load voltage, average load power, active power, reactive power, current distortion factor, displacement factor, input power factor, efficiency, Ripple factor, Form factor.
b) **Single phase Full Controlled Bridge Rectifier (R&RL Load) -** Circuit diagram, waveforms, average load voltage, RMS load voltage, average load power, active power, reactive power, current distortion factor, displacement factor, input power factor, efficiency, Ripple factor, Form factor.
c) **Three phase half and full controlled converter (R & RL load)** - Circuit diagram, waveforms, average load voltage, RMS load voltage, Average load current, Operating Modes.
d) **Effect of Source Inductance:** 1-Phase and 3-Phase Fully controlled Rectifier

Unit-III: DC – DC Converter No of Lect. – 7, Marks: 16

a) Classification of Choppers, Control strategies of dc - dc- converter
b) **Step down and Step up dc-dc converter**- Circuit diagram, waveform, and output voltage calculations. Continuous conduction mode, Boundary between continuous and discontinuous conduction Mode and Discontinuous Conduction Mode.
c) **Full Bridge dc-dc converter**: PWM with Bipolar voltage switching (Derivation of output voltage.)
d) **Switch mode power supply**: Block diagram and explanation.

Unit-IV: Inverters No of Lect. – 8, Marks: 16

a) **Inverters:** Basic Series and Parallel inverters, construction and principle of operation,
b) **Square and PWM Bridge Inverters:** Single phase half bridge and full bridge inverters with R and R-L load, output voltage calculations. Square wave, quasi-square wave and sinusoidal PWM switching, selection of frequency modulation ratio and amplitude modulation ratio.
c) **Harmonic reduction Techniques**.
d) **Three phase Bridge inverter**: with balanced star resistive load, 120 degree and 180 degree conduction mode for line and phase voltages.

UNIT V: AC Controllers, UPS and simulation of converters No of Lect. – 9, Marks: 16

a) **AC controllers**: Principle of On-Off control or integral cycle and phase angle control**.**
b) 1-Phase Half wave and full wave AC control with R and R -L load, derivation of output Voltage.
c) UPS- Basic principle, Different configurations/ types of UPS – Off-line On-line, Line Interactive, their comparison. , Battery- Ah, back up time and battery charger rating calculations.
d) Simulation of single phase full converter, single phase semi converter, single phase full bridge inverter, single phase AC voltage controller.

Reference Books:

1) Ned Mohan, T. M. Undeland and W. P. Robbins- Power Electronics, converters , Application, and Design, John Wiley and sons , (3rd Edition)
2) M. D. Singh , K. B. Khanchandani - Power Electronics, TMH (3rd Edition)
3) M. H. Rashid - Power Electronics circuits, devices and applications, PHI, 3/e. Or Pearson.
4) Dr. Shailendra Jain, Modeling and simulation using MATLAB-Simulink, Wiley India pvt.Ltd.
5) P. C. Sen Power Electronics Tata Mc-Graw-Hill Publishing Company Limited.
6) Dr. P. S. Bimbhra, Power Electronics, Khanna Publication.
7) M Ramamurthy - An Introduction to Thyristor and their application, Second Edition,
8) M. S. Jamil Asgar, - Power Electronics, PHI, 2004, New Delhi.
9) S. K. Bhattacharya - Industrial Electronics and control , Tata Mc-Graw-Hill (TMH)
10) Deodatta Shingare, Industrial and Power Electronics, Electrotech Pub.
11) MATLAB-SimPowerSystem manuals.

Electronic Measurement

COURSE OUTLINE

Electronic Measurement **EM**
Course Title Short Title Course Code

Course Description:

The main objective of this course is to introduce and expose the students to various measuring instrument, their block diagram, specifications and applications. It includes analog instruments, digital instruments, generators, analyzers, and C.R.O. & data acquisition system.

	Hours / Week	No. of Weeks	Total Hours	Semester Credits
Lecture	03	14	42	04

Prerequisite Course(s): Knowledge of Elements of Electrical & Electronics Engineering and Component Devices and Instrumentation Technology.

COURSE CONTENT

Electronic Measurement **Semester-VI**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week **End Semester Examination(ESE) : 80 Marks**
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

Unit-I: Analog instruments: **No of Lect. – 8, Marks: 16**

a) Q-meter.
b) True RMS responding voltmeter.
c) Vector voltmeter.
d) Vector impedance meter.
e) Bolometer -Measurement of power.
f) Field strength meter.
g) Automatic bridges.

Unit-II: Digital Instruments **No of Lect. – 8, Marks: 16**

a) Digital Frequency Meter.
b) Digital measurement of time.
c) Universal Counter , Electronic Counter.
d) Digital tachometer, Digital PH meter.
e) Phase meter, Capacitance meter.
f) Automation in digital instruments.

Unit-III: Signal Generators and Analyzers **No of Lect. – 9, Marks: 16**

a) Frequency synthesized signal generator,
b) Random noise generator,
c) Sweep generator, TV Sweep generator, Marker generator, WobbIuscope.
d) Vectroscope,
e) Optical Time-Domain Reflectometer.
f) Frequency selective wave analyzer, Heterodyne wave analyzer.
g) Harmonic distortion analyzer.
h) Spectrum analyzer and its applications.

Unit-IV: Oscilloscope **No of Lect. – 9, Marks: 16**

a) Block diagram of CRO, vertical amplifier, horizontal deflecting systems, triggered sweep and trigger pulse circuit.
b) Delay line and its types.
c) Dual beams CRO, dual trace CRO.
d) Sampling (VHF) oscilloscope, storage oscilloscope and digital read out oscilloscope.
e) Probes for CRO
f) Digital storage oscilloscope

Unit-V: Data Acquisition, Conversion and Transmission **No of Lect. – 8, Marks: 16**

a) Generalized Data Acquisition System, Objectives of DAS, single channel and multi channel DAS.
b) Data loggers.
c) Digital Transducer
d) Data transmission systems, advantages and disadvantages of digital over analog transmitter, TDM.
e) The IEEE 488 bus.
f) Testing of audio amplifier and radio receiver.

Reference Books:

1) H. S. Kalsi, "Electronic Instrumentation", TMH, 2nd Edition, 2007.
2) A. D. Helfric and W. D. Cooper, "Modern Electronic Instrumentation and Measurement Technique", Pearson LPE, 3rd Edition, 2005.
3) A. K. Sawhney, "Electrical and Electronics measurement and Instrumentation", Dhanpat Rai and company, 18th Edition, 2007.
4) K. Lal Kishore, "Electronic Measurement and Instrumentation", Pearson 4th, Edition, 2012.

Audio Video Engineering
COURSE OUTLINE

Audio Video Engineering	**AVE**	
Course Title	Short Title	Course Code

Course Description:

This course introducing the fundamentals of Television and Consumer Electronic to undergraduate students. As the follow-up to this course, the reader is advised to the access to this course "Colour television –principal and practices" for further information on CTV principles, detailed coverage of integrated circuits used in color receiver and for alignment and servicing of such receivers.

	Hours / Week	No. Of Weeks	Total Hours	Semester Credits
Lecture	03	15	45	03

Prerequisite Course(s): Physics, Analog Communication, Digital Communication, Electromagnetic Engineering.

COURSE CONTENT

Audio Video Engineering **Semester-VI**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week

End Semester Examination (ESE) :80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

Unit-I: Methods of sound recording and reproduction **No of Lect. – 9, Marks: 16**

a) Introduction to Disc recording, Magnetic recording, optical recording-CD and DVD.
b) Monophony, stereophony, Hi-Fi (High Fidelity) System.
c) PA system-Basics of aquatics, Block diagram, requirement, Characteristics, its planning for various uses.
d) Introduction to satellite radio reception (word space).
e) Introduction to blue ray disc format.

Unit-II: Basic concept of Television. **No of Lect. – 9, Marks: 16**

a) Scanning methods, Horizontal and vertical synchronization.
b) Camera Tubes-Image Orthicon, Vidicon, Plumbicon, Saticon, Silicon Diode array.
c) Aspect ratio, Kell factor.
d) Horizontal and vertical resolution.
e) Video bandwidth, Positive and negative modulation, Composite video signal.
f) Television Transmission-VSB transmission, TV Channels, TV Standard, TV Channels bands.
g) Basic block diagram of Monochrome TV receiver.

Unit-III: Colour Television receiver **No of Lect. – 9, Marks: 16**

a) Colour fundamental, compatibility, frequency interleaving.
b) Colour mixing, color camera tube. Colour purity.
c) Picture tubes-Static and dynamic convergence.
d) Encoder and decoder and colour different signals comparison.
e) Different system concepts-PAL, SECAM, NTSC system.
f) Colour TV transmitter and receiver block diagram.

Unit-IV: Advanced TV system and techniques **No of Lect. – 9, Marks: 16**

a) Introduction to digital compression techniques.
b) Introduction to JPEG, MPEG techniques.
c) Block diagram of Digital TV-transmitter and receiver.
d) Introduction to Advanced Display, Plasma, LCD, LED, Organic LED.
e) Introduction to HDTV (high-definition TV) transmitter and receiver.

Unit-V: Advanced Broadcasting systems **No of Lect. – 9, Marks: 16**

a) Introduction to digital cable TV conditional access system (CAS).
b) DTH system, Video on demand.
c) Introduction to 3D DTV system, CCTV, digital terrestrial TV (DTV).
d) Introduction to IPTV and mobile TV.
e) Block diagram and working of FAX Machine.

Reference Books:

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) R.Gulati - Monochrome and colour TV 4th edition , New Age
6) Bernard Grobb, Charles E - Basic TV and Video system, TMH (6Th Ed.)
7) Philips handbooks on audio ,video and consumer electronics application notes
8) Olson-High Quality Sound recording and reproduction

Industrial Management

COURSE OUTLINE

Industrial Management	**IM**	
Course Title	Short Title	Course Code

Course Description:

This course provides an introduction to: basics of management their organizational structures with man power development, financial management, quality management & industrial acts.

Lecture	**Hours / Week**	**No. Of Weeks**	**Total Hours**	**Semester Credits**
	03	**15**	**45**	**03**

Prerequisite Course(s): General understanding of trade and management

COURSE CONTENT

Industrial Management **Semester-VI**

Teaching Scheme

Lecture: 3 hours / week

Examination Scheme

End Semester Examination (ESE):80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

Unit-I: Basics of Managements **No of Lect. – 9, Marks: 16**

a) Introduction, definition of management,
b) Scientific management.
c) Function of management.
d) Principles of managements.
e) Level of management, managerial skill/roles.
f) Relation between administration, management and organization.

Unit-II: Organizational Structures **No of Lect. – 9, Marks: 16**

a) Principles of organization. Design of organization.
b) Forms of organization-Line, Lines and staff.
c) Types of ownerships-Partnership, proprietorship
d) Joint stock Company, private limited, Govt. ltd, public limited.
e) Cooperative organization.
f) Public sector and joint ventures.

Unit-III: Personal Management **No of Lect. – 9, Marks: 16**

a) Factors affecting man power planning.
b) Sources of recruitment. Talent acquisition.
c) Education & training methods of training workers.
d) Labor welfare, communication in Industries
e) Suggestion system, discipline in industries.
f) e-business& e-governances.

Unit-IV: Financial management **No of Lect. – 9, Marks: 16**

a) Definition & function of Financial Management
b) Capital Structure. Fixed & working capital. Role of SEBI (Securities & exchange Board of India).
c) Sources of Finance. Loans from Banks. Trade credit. Public deposits.
d) Wants, utility, Demand.
e) Supply, Elasticity of demand & Supply.

Unit-V: Quality management & Industrial Acts. **No of Lect. – 9, Marks: 16**

a) Definition of quality, quality control.
b) Process control. Total quality concepts
c) ISO 9001-2000.
d) Factories Act, industrial accidents, industrial safety.
e) Rights patents, trademarks, copy rights.

Text Book: 1) M. Mahajan: Industrial Engineering & Production Management, Dhanpat Rai& company.

Reference Books:

2) O. P. Khanna: Industrial Engineering & Management, Dhanpat Rai& company.
3) Koontz: Essential of Management, TMH6/e.
4) M.Y.Khan&P.K.Jain : Financial Management, TMH.

Power Electronics Lab

LAB COURSE OUTLINE

Power Electronics Lab	**PE LAB**	
Course Title	Short Title	Course Code

Course Description:

In this laboratory course emphasis is on the understanding of different Power semiconductor devices and their applications like controlled rectifiers, choppers, inverters and ac regulators.

Laboratory	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	2	**14**	**28**	**1**

Total Semester Credits: 1

Prerequisite Course(s): Knowledge of Elements of Electrical & Electronics Engineering.

LAB COURSE CONTENT

(Note: Minimum TWO Experiments from each group.)

Group A

1. Study of R, RC triggering circuits of SCR to plot waveforms for various values of firing angle.
2. Study of UJT triggering circuits of SCR to plot waveforms for various values of firing angle.
3. Study and design of Class A, B, C, D, E and F commutation circuits of SCR.(Any two)

Group B

1. 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.
2. Study of 1- ϕ full controlled converter with R and R-L load, plot input and output voltage waveforms, average load voltage v/s firing angle.
3. 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.

Group C

1. Study of circuit and waveforms of step-up dc –dc converter and plot output voltage v/s duty ratio and switching frequency.
2. Study of circuit and waveforms of step-down dc –dc converter and plot output voltage v/s duty ratio and switching frequency.
3. Study of SMPS.

Group D

1. Study of Series Inverter and find efficiency.
2. Study of Parallel Inverter and find efficiency.
3. Simulation of single phase full converter, development of model, plotting the waveform on figure and FFT analysis (use MATLAB/Scilab - SimPowerSystem Software).
4. Simulation of single phase full bridge inverter, development of model, obtain frequency spectrum using powergui block (use MATLAB/Scilab - SimPowerSystem Software).

Group E

1. Study and plot V-I characteristics of Diac/Triac/GTO/IGBT(any one).
2. Study of 1- ϕ AC controller with R load and measure load voltage and plot waveforms for different firing angles.
3. Study of UPS.

Guide lines for ESE:

ESE will be based on practical assignment submitted by the student in the form of journal. In ESE the student may be asked to perform any one practical out of 10. Evaluation will be based on paper work and performance in the practical.

Electronic Measurement Lab

LAB COURSE OUTLINE

Electronic Measurement Lab	**EM LAB**	
Course Title	Short Title	Course Code

Course Description:

In this laboratory course emphasis is on the understanding of different instruments front panel of Q meter, true RMS meter, Universal Counter, CRO, DSO, Data logger and Distortion factor meter etc. The students can perform different measurements using these instruments.

Laboratory	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	2	14	28	1

Total Semester Credits: 1

Prerequisite Course(s): Knowledge of Elements of Electrical & Electronics Engineering and Component Devices and Instrumentation Technology.

LAB COURSE CONTENT

(Note: Minimum FOUR Experiments from each group.)

Group A

1. Measurement of reactive and resistive components with LCR-Q meter.
2. Measurement of Vrms signal with true RMS meter / DMM.
3. Measurement of frequency and Time with the help of frequency counter.
4. Measurement of motor speed using Digital Tacho meter.
5. Measurement of various parameters with DATA logger.
6. Measurement of Phase angle with the help of Digital Phase Meter.

Group B

7. Measurement of frequency and phase shift using Lissajous pattern and testing of different components using CRO.
8. Measure and store the frequency and amplitude with the help of DSO.
9. Measurement of distortion and nature of distortion by Harmonic distortion analyzer.

10. Computerized analysis of radio receiver and measurement of power with it.
11. Analysis of test signal with the help of Spectrum analyzer.
12. Measurement of distance with OTDR meter.

Guide lines for ESE:

ESE will be based on practical assignment submitted by the student in the form of journal. In ESE the student may be asked to perform any one practical out of 8. Evaluation will be based on paper work and performance in the practical.

Audio Video Engineering Lab

LAB COURSE OUTLINE

Audio Video Engineering Lab	**AVE LAB**	
Course Title	Short Title	Course Code

Course Description:

This course introducing the fundamentals of Audio Video Engineering to undergraduate students. As the follow-up to this course, the reader is advised to the access to this course "Colour television –principal and practices" for further information on CTV principles, detailed coverage of integrated circuits used in colour receiver and for alignment and servicing of such receivers.

Laboratory	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	2	**8**	**16**	**1**

Total Semester Credits: 1

Prerequisite Course(s): Physics, Analog Communication, Digital Communication, Electromagnetic Engineering.

LAB COURSE CONTENT

(Note: Minimum FOUR Experiments from each group.)

Group A

1. Study of colour TV receiver.
2. Voltage and waveform analysis for colour TV.
3. Alignment and fault finding of colour TV using pattern generator (2 expts.).
4. Study of HDTV .
5. Study of digital TV.
6. Practical visit to TV transmitter/Studio.

Group B

1. Study of DTH and set of box.
2. Study of CD/DVD players.
3. Study of PA system with cordless microphone .
4. Study of audio system ,MP3 player ,satellite radio(Tone controlled).
5. Study of tape recorder.
6. Web page designing.

Guide lines for ESE:-

ESE will be based on practical assignment submitted by the student in the form of journal. In ESE the student may be asked to perform any one practical out of Group A and Group B. Evaluation will be based on paper work and performance in the practical.

Application Software Lab

COURSE OUTLINE

Application Software Lab **AS LAB**
Course Title Short Title Course Code

Course Description:

This laboratory course emphasis is on the understanding of the open source Electronics Design Automation (EDA) tool like gEDA, KiCad, Ngspice and Oscad. But only Oscad is capable of doing circuit design, simulation and layout design together. Oscad is free and open source EDA tool and that can be i installed on Ubuntu 12.04 / 12.10 or windows operating system. Using Oscad student can create circuit schematic, analyze the result using simulation, and design PCB layout.

Laboratory	Hours per	No. of Weeks	Total Hours	Semester Credits
	2	10	20	1

Total Semester Credits: 1

Prerequisite Course(s): Basic of analog and digital electronics.

LAB COURSE CONTENT

(Note: Minimum FOUR Experiments from each group.)

Group A

1. **Installation of Oscad on Ubuntu 12.04 /12.10 and windows.**

    a. Compare open source, free version and license version operating system.
    b. Find the steps to install Open source Oscad on Ubuntu 12.04 / 12.10 and windows operating system.

2. **Study of Architecture of Oscad.**

    a. Describe the meaning of Electronic Design Automation (EDA) tool.
    b. Describe the advantages and disadvantages of Oscad.
    c. Use of Oscad in circuit making, simulation and PCB design.

3. **Study of schematic creation, simulation and PCB design.**

a. Describe the steps to use Oscad in schematic creation, simulation and PCB design on Ubuntu or on windows operating system.
b. Describe the procedure of AC and DC analysis.

4. **Simulation of typical circuit using a) R C b) Diode.**

a. Develop circuit consist of RC network.
b. Find voltage and current at each node of circuit and compare with the theoretical calculated value.
c. Develop circuit consist of diode. Measure voltage and current of diode.
d. Compare simulated result with the theoretical calculated values.

5. **Simulation of typical circuit using a) Transistor b) MOSFET**

a. Describe operation and construction simple transistor amplifier.
b. Simulate the circuit and find I_B, I_C, I_E, and V_{CE}.
c. Compare simulated result with theoretical calculated values.
d. Describe operation and construction of simple MOSFET based circuit.
e. Compares all simulated node voltage and current with theoretical calculated values.

Group B

6. **Simulation and PCB design of typical circuit using IC 555.**

a. Identify the timer 555 IC pin configuration and its use.
b. Draw the typical circuit using timer 555 IC.
c. Find out the time when output is high using RC combination.
d. Find out the steps to create PCB layout.

7. **Simulation and PCB design of typical circuit using Op-Amp 741 IC.**

a. Identify the Op-Amp 741 pin configuration and its use.
b. Draw Inverting or Non-Inverting amplifier using IC 741.
c. Find out the output voltage and gain of Op-Amp.
d. Compare the simulated and theoretical calculated values.
e. Create PCB layout.

8. **Simulation and PCB design of typical circuit using 74xx series IC.**

a. Describe various IC available in 74xx series
b. Draw the circuit using 74xx series and verify the truth table.
c. Create PCB layout.

9. Simulation and PCB design of typical circuit using two stage amplifiers.

a. Describe operation and construction of simple two stage transistor amplifier circuit.
b. Simulate the circuit and find I_B, I_C, I_E, and V_{CE}.
c. Find the AC analysis and compare input and output wave form.
d. Compare simulated result of I_B, I_C, I_E, and V_{CE} of each transistor with theoretical calculated values.
e. Create PCB layout.

10. Simulation and PCB design of simple DC power supply. (DC power supply circuit include transformer- rectifier-filter- regulator.)

a. Draw and describe circuit diagram of simple DC power supply.
b. Describe the use of DC power supply.
c. Measure the voltage and current at each stage of circuit.
d. Create PCB layout.
e. (**Optional**- Implement DC power supply circuit on single side copper clad PCB and compare the all node voltage and current with simulated results).

Reference book-

1) **Oscad**- An open source EDA tool for circuit design, simulation, analysis and PCB design. By "**Kannan M. Moudgalya , IIT Bombay**", Shroff Publication and distributors Pvt. Ltd.
2) **http://oscad.in**

Guide lines for ESE:-

ESE will be based on practical assignment submitted by the student in the form of journal. In ESE the student may be asked to perform any one practical out of Group A or Group B. Evaluation will be based on paper work and performance in the practical.

Minor Project

COURSE CONTENT

Minor Project	**MIP**	
Course Title	Short Title	Course Code

Semester-VI

	Hours per	No. of Weeks	Total Hours	Semester Credits
Laboratory	**2**	**10**	**20**	**2**

Examination Scheme
Internal Continuous Assessment (ICA): 50 Marks

- Every student shall undertake the Minor Project in semester VI.
- Each student shall work on an approved project, a group of **05 students (maximum)** shall be allotted for the each minor project.
- Minor project may involve fabrication, design or investigation of a technical problem that may take design, experimental or analytical character or combine element of these areas. The project work shall involve sufficient work so that students get acquainted with different aspects of fabrication, design or analysis.
- Each student is required to maintain separate log book for documenting various activities of minor project.
- The three-member committee appointed by Head of the department shall be constituted for finalizing the topics of minor project. Maximum four minor project groups shall be assigned to one teaching staff.
- Assessment of the project for award of ICA marks shall be done jointly by the guide and departmental committee as per the guidelines given in **Table-A.**
- Before the end of semester, student shall deliver a seminar and submit the seminar report (paper bound copy)in following format:
    - Size of report shall be of minimum 25 pages.
    - Student should preferably refer minimum five reference books / magazines/standard research papers.
    - Format of report
        - Introduction.
        - Literature survey.
        - Theory (Implementation, Methodology, Applications, Advantages, Disadvantages. etc)
        - Future scope.
        - Conclusion.

Assessment of Minor Project

Name of the Project: ____

Name of the Guide: ____

Table-A

SN	Exam Seat No	Name of Student	Project Selection	Documentation	Design /Simulation/Logic	PCB/hardware/programming	Result Verification	Presentation	Total
			5	10	10	10	10	5	50

Seminar-I

COURSE CONTENT

Seminar-I	**S-I**	
Course Title	Short Title	Course Code

Semester-VI

Laboratory	**Hours per Week**	**No. of Weeks**	**Total Hours**	**Semester Credits**
	2	**10**	**20**	**2**

Examination Scheme
Internal Continuous Assessment (ICA): 25 Marks

1. For Seminar-I 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 during the term.
2. The three-member committee appointed by Head of the department shall be constituted for finalizing the topics of Seminar-I. Seminar shall be related state of the art topic of his choice approved by the committee.
3. Seminar topic should not be repeated and registration of the same shall be done on first come first serve basis.
4. Topic of Seminar shall be registered within a two week from commencement of VI Semester and shall be approved by the committee.
5. Maximum six seminar supervision shall be allotted to each teacher.
6. Before the end of semester, student shall deliver a seminar and submit the seminar report (paper bound copy).

7. ASSESSMENT OF SEMINAR-I

Assessment of the Seminar-I for award of ICA marks shall be done by the guide and a departmental committee jointly, as per the guidelines given in **Table- B**

Title of Seminar: ______________________________

Name of Guide: ______________________________

Table-B

SN	**Exam Seat No**	**Name of Student**	**Topic Selection**	**Literature survey**	**Report writing**	**Depth of understanding**	**Presentation**	**Total**
			5	5	5	5	5	25

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.

NORTH MAHARASHTRA UNIVERSITY JALGAON
B.E. (ELECTRONICS, ELECTRONICS AND COMMUNICATION, ELECTRONICS AND TELECOMMUNICATION)

W.E.F : 2008- 09

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)

NORTH MAHARASHTRA UNIVERSITY JALGAON
B.E. (ELECTRONICS AND COMMUNICATION, ELECTRONICS AND TELECOMMUNICATION)

W.E.F : 2008- 09

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

NORTH MAHARASHTRA UNIVERSITY JALGAON
B.E. (ELECTRONICS, ELECTRONICS AND COMMUNICATION, ELECTRONICS AND TELECOMMUNICATION)

W.E.F : 2008- 09

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

NORTH MAHARASHTRA UNIVERSITY JALGAON
B.E. (ELECTRONICS AND COMMUNICATION, ELECTRONICS AND TELECOMMUNICATION)

W.E.F : 2008- 09

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

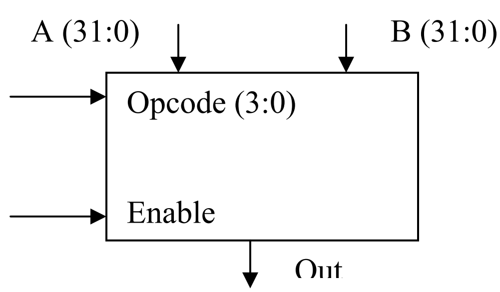
Group B. Sequential logic: (At least THREE of the following must be covered)

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:	**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
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:	**Examination scheme:**
Practicals: 2 hrs / week	**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:	**Examination scheme:**
Lectures: 4 hrs / week	**Theory Paper: 100 Marks (3 Hours)**
Practical: 2 hrs / week	**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 (6Th 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.**

NORTH MAHARASHTRA UNIVERSITY JALGAON
B.E. (ELECTRONICS, ELECTRONICS AND COMMUNICATION, ELECTRONICS AND TELECOMMUNICATION)

W.E.F : 2008- 09

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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W.E.F : 2008- 09

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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W.E.F : 2008- 09

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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B.E. (ELECTRONICS, ELECTRONICS AND COMMUNICATION, ELECTRONICS AND TELECOMMUNICATION)

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 Electronics or in Electronics and telecommunication Engineering branch.

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B.E. (ELECTRONICS, ELECTRONICS AND COMMUNICATION, ELECTRONICS AND TELECOMMUNICATION)

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 (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	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 (M.S.)

Second Year Engineering
(Information Technology)
Faculty of Engineering and Technology

COURSE OUTLINE

Semester – III

W.E.F 2013 – 2014

Annexure - I

SE Semester - III

Name of the Course	Group	Teaching Scheme				Evaluation Scheme					Credits
						Theory			Practical	Total	
		Theory Hrs / week	Tutorial Hrs / week	Practical Hrs / week	Total	ISE	ESE	ICA	ESE		
Engineering Mathematics-III	D	3	1	---	4	20	80	---	---	100	4
Information Theory	B	3	---	---	3	20	80	---	---	100	3
Discrete Structure & Graph Theory	D	3	1	---	4	20	80	---	---	100	4
Digital System & Microprocessor	D	3	---	---	3	20	80	---	---	100	3
Object Oriented Technology	D	3	---	---	3	20	80	---	---	100	3
Soft Skills – III	C	1	---	2	3	---	---	50	---	50	2
Information Theory Lab	B	---	---	2	2	---	---	50	---	50	1
Discrete Structure & Graph Theory Lab	D	---	---	2	2	---	---	25	25 **(PR)**	50	1
Digital System & Microprocessor Lab	D	---	---	2	2	---	---	25	25 **(PR)**	50	1
Object Oriented Technology Lab	D	---	---	2	2	---	---	25	25 **(PR)**	50	1
Total		**16**	**2**	**10**	**28**	**100**	**400**	**175**	**75**	**750**	**23**

ISE: Internal Sessional Examination **ESE: End Semester Examination** **ICA: Internal Continuous Assessment**

SE Semester - IV

Name of the Course	Group	Teaching Scheme				Evaluation Scheme					Credits
						Theory		Practical		Total	
		Theory Hrs / week	Tutorial Hrs / week	Practical Hrs / week	Total	ISE	ESE	ICA	ESE		
Data Communication	D	3	---	---	3	20	80	---	---	100	3
Microprocessor & Microcontroller Interfacing	D	3	1	---	4	20	80	---	---	100	4
Data Structures	D	3	1	---	4	20	80	---	---	100	4
Computer Organization	D	3	---	---	3	20	80	---	---	100	3
Computer Graphics & Multimedia	D	3	---	---	3	20	80	---	---	100	3
Application Development Lab	B	1	---	2	3	---	---	50	---	50	2
Data Communication Lab	D	---	---	2	2	---	---	50	---	50	1
Microprocessor & Microcontroller Interfacing Lab	D	---	---	2	2	---	---	25	25 **(PR)**	50	1
Data Structures Lab	D	---	---	2	2	---	---	25	25 **(PR)**	50	1
Computer Graphics & Multimedia Lab	D	---	---	2	2	---	---	25	25 **(PR)**	50	1
Total		**16**	**2**	**10**	**28**	**100**	**400**	**175**	**75**	**750**	**23**

ISE: Internal Sessional Examination **ESE: End Semester Examination** **ICA: Internal Continuous Assessment**

Engineering Mathematics –III

COURSE OUTLINE

Course Title	Short Title	Course Code
Engineering Mathematics -III	**EM-III**	

Course Description:

This course is aimed at introducing the fundamentals of basic Mathematics to undergraduate students. The background expected includes a prior knowledge of Mathematics from first year engineering or diploma and familiarity with various laws, principles and theories. The goals of the course are to understand the basic principle of Mathematics and its application in different area.

	Hours / Week	No. of Weeks	Total Hours	Semester Credits
Lecture	**03**	**15**	**40**	**04**
Tutorial	**01**	**15**	**13**	

Prerequisite Course(s): Engineering Mathematics-I, Engineering Mathematics-I / Diploma Mathematics.

COURSE CONTENT

Engineering Mathematics -III **Semester- III**

Teaching Scheme

Lecture: 3 hours / week
Tutorial: 1 hour / week

Examination Scheme

End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

1. Laplace Transform (08 Hours, 16 marks)

- Definition and Existence of Laplace transforms.
- Laplace Transform of elementary/standard functions.
- Theorems and Properties of Laplace Transform (without proof).
- Inverse Laplace Transform.
- Laplace Transform of Unit step function.
- Solution of differential equations using LT.

2. Fourier Transform and Z-Transform (08 Hours, 16 marks)

A) Fourier Transform:

- Introduction to Fourier Integral theorem.
- Fourier Transforms, Fourier Cosine Transforms, Fourier Sine Transform and their inverse.

B) Z- Transform:

- Definition and standard properties (without proof)
- Region of Convergence.
- Z-Transform of standard / elementary sequences.
- Inverse Z-transform.

3. Statistics and Probability distributions (08 Hours, 16 marks)

- Introduction to Mean, Mode, Median standard deviation, Variance, Coefficient of Variation.
- Moments, Skewness and kurtosis.
- Correlation and Regression.
- Binominal Distribution.
- Poisson distribution.
- Normal distribution.

4. Testing of Hypothesis and Significance (08 Hours, 16 marks)

- Introduction to population parameters and statistics.
- Testing of Hypothesis, Null Hypothesis and Alternative Hypothesis.
- Level of Significance.
- Test of Significance of large sample.
- Chi-Square test.

5. Fuzzy Sets and System (08 Hours, 16 marks)

- Introduction to Fuzzy sets.
- Standard Fuzzy sets operations.
- Crisp sets, Crisp sets verses Fuzzy sets.
- Fuzzy arithmetic.
- Constructing Fuzzy sets and operations on Fuzzy sets and systems
- Applications of Fuzzy sets.

Text Book:

1. Debashis Dutta, “Textbook of Engineering Mathematics”, New Age International Publishers.
2. Witold Pedrycz and Fernando Gomide, “An Introduction to Fuzzy Sets: Analysis and Design”, Prentice Hall of India, New Delhi.

Reference Books:

1. H.K. Dass, “Advanced Engineering Mathematics”, S. Chand Publication, New Delhi.
2. Erwin Kreyszig, “ Advanced Engineering Mathematics”, Wiley Eastern Ltd.
3. B.S. Grewal, “Higher Engineering Mathematics” , Khanna Publication, Delhi.
4. Wylie C.R. & Barrett , “ Advanced Engineering Mathematics”, Mc Graw Hill.
5. B.V. Raman, “Engineering Mathematics”, Tata Mc Graw Hill.
6. N. P. Bali , “A Text Book of Engineering Mathematics”, Laxmi Publication.
7. George J. Klir and Bo Yuan, ‘‘Fuzzy Sets and Fuzzy Logic: Theory and Applications”.

Information Theory

COURSE OUTLINE

Course Title	Short Title	Course Code
Information Theory	**IT**	

Course Description:

This subject imparts the fundamentals of both information theory and data compression. The subject details how programmers and electronic communications professionals can use cryptography-the technique of enciphering and deciphering messages-to maintain the privacy of computer data. It describes dozens of cryptography algorithms, gives practical advice on how to implement them into cryptographic software, and shows how they can be used to solve security problems.

Lecture	**Hours per Week**	**No. of Weeks**	**Total Hours**	**Semester Credits**
	03	**15**	**45**	**03**

Prerequisite Course(s): Fundamental knowledge of Computer.

COURSE CONTENT

Information Theory **Semester-III**

Teaching Scheme

Lecture: 3 hours / week

Examination Scheme

End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

1. Introduction **(08 Hours, 16 marks)**

a) Computer security concepts
b) Security attacks
c) Security services and Security mechanism.

Classical Encryption Techniques

a) Symmetric cipher model
b) Substitution techniques
c) Transposition techniques
d) Rotor machines
e) Steganography
f) Cryptographic Protocols

Block Ciphers and DES

a) Block cipher principles
b) Data Encryption Standard
c) Differential and Linear cryptanalysis

2. Block Cipher Operation **(08 Hours, 16 marks)**

a) Multiple encryption and Triple DES
b) Electronic code book
c) Cipher block chaining mode
d) Cipher feedback mode
e) Output feedback mode
f) Counter mode

Introduction to Number Theory

a) Prime numbers
b) Fermat's and Euler's Theorems
c) Testing for primality
d) Chinese remainder theorem

Public-key Cryptosystem and RSA:

a) Principles
b) RSA algorithm

3. Cryptographic Hash Functions **(08 Hours, 16 marks)**

a) Applications of hash functions
b) Simple hash functions
c) Requirements and security
d) Secure Hash Algorithm (SHA)

Digital Signatures

a) Introduction to Digital Signatures
b) ElGamal and Schnorr digital signature scheme
c) Digital signature standard

Key Management and Distribution

a) Symmetric key distribution using symmetric and asymmetric encryption
b) Distribution of public keys
c) X.509 certificates
d) Public key infrastructure

4. Data Compression **(08 Hours, 16 marks)**

a) Introduction
b) Coding and Modeling
c) Shannon-Fano algorithm
d) Huffman algorithm, Adaptive Huffman coding
e) Arithmetic coding
f) Statistical modeling

5. Graphics and Speech Compression **(08 Hours, 16 marks)**

a) Dictionary based compression
b) Sliding window compression
c) LZ78 compression, Speech compression
d) Lossy graphics compression

Text Books:

1. William Stallings, “Cryptography and Network Security”, Fifth edition, Pearson, 2011
2. Mark Nelson and Jean-Loup Gailly, “The Data Compression Book”, Second edition, BPB Publications

Reference Books:

1. Bruce Schneider, “Applied cryptography: Protocols, Algorithms and sources code in C”, Second edition, Willey, 2008.
2. Atul Kahate, “Cryptography and Network Security”, Second edition, TMH, 2007.
3. D.C. Hankerson , Greg A. Harris and Peter D. Johnson Jr., “Introduction to Information Theory and Data Compression”, Second edition, CRC Press, 2003.
4. Alfred J. Menezes, Paul C. van Oorschot and Scott A. Vanstone, “Handbook of Applied Cryptography”, CRC Press, 1996.
5. Forouzan, “Cryptography & Network Security”, Second edition, TMH, 2010.

Discrete Structure and Graph Theory

COURSE OUTLINE

Course Title	Short Title	Course Code
Discrete Structure and Graph Theory	**DSGT**	

Course Description:

The objective of this course is to introduce the students to the fundamentals of Discrete Structures and also with Graph Theory with concepts of the C programming language and enable them to apply these concepts for solving real world problems.

	Hours / Week	No. of Weeks	Total Hours	Semester Credits
Lecture	03	15	45	04
Tutorial	01	15	15	

Prerequisite Course(s): Fundamental knowledge of C

COURSE CONTENT

Discrete Structure and Graph Theory **Semester-III**

Teaching Scheme	Examination Scheme	
Lecture: 3 hours / week	**End Semester Examination (ESE)**	**: 80 Marks**
Tutorial: 1 hour / week	**Paper Duration (ESE)**	**: 03 Hours**
	Internal Sessional Exam (ISE)	**: 20 Marks**

1. Propositions, Sets, Probability (08 Hours, 16 marks)

a Propositions, compound proposition, basic logical operations, truth tables, tautology, contradiction.
b Quantifiers: universal and existential quantifiers.
c Theory: Set, Combinations of Sets, Mathematical Induction Principle.
d Cardinality of finite Sets, Rule of sum, Rule of product.
e Permutations, Combinations.
f Discrete Probability.

2. Relations and Functions: (08 Hours, 16 marks)

a Definitions, properties of Binary relations.

b Equivalence Relations and partitions, Partial ordering relations.

c Lattice, chains and antichains.

d Transitive Closure and Warshall's Algorithm.

e Functions Definitions, Composition of Functions, Types of Function.

f Recursive Functions, Pigeonhole principle.

3. Recurrence Relation and Analysis of Algorithms (08 Hours, 16 marks)

a Recurrence Relation, Linear Recurrence Relations with constant Coefficients.

b Homogeneous Solutions, Particular Solutions, total solutions, Solution by the method of generating functions.

c Introduction, Largest number algorithm, sorting algorithms: Bubble sort.

d Divide and conquer algorithms: binary search algorithm.

e strassens matrix multiplication, Time Complexity of Algorithms.

f Complexity of Problems, Tractable and Intractable Problems.

4. Graphs and Trees (08 Hours, 16 marks)

a Basic terminology, multigraphs and weighted graph , paths and circuits.

b Dijkstra's shortest path algorithms.

c Euler and Hamiltonian Paths and circuits .

d factors of a graph, Planner graph.

e Trees, rooted trees, path length in rooted trees.

f prefix code, binary search trees.

g spanning trees and cut set, minimum spanning trees.

h kruskal's and prim's algorithms for minimum spanning tree.

5. Algebraic system Boolean algebra (08 Hours, 16 marks)

a Semigroup, Subsemigroup, Monoid, Submonid.

b Abelian Group, Subgroups.

c Isomorphism, Automorphism,Homomorphism .

d Ring, Integral domain ,field .

e Lattice and Algebraic systems, Principle of duality.

f basic properties of lattice defined by lattices, distributive and complemented lattices.

g Boolean lattices and Boolean algebras, Boolean functions and Boolean Expressions.

h Number system and Interconversion of number systems.

Text Books:

1. C.L. Liu , " Elements of Discrete Mathematics", Second edition, TMH.
2. Seymour Lipschutz, Marc Lipson, " Discrete Mathematics", Second edition, TMH.

Reference Books:

1. Kenneth H. Rosen, Discrete Mathematics and its Application, Fifth edition, TMH.
2. V. K. Balakrishnan, " Graph Theory", TMH.
3. B. Kolman , R. Busby and S. Ross, "Discrete Mathematical Structures" Fourth edition, Pearson .
4. J. Treamblay , R. Manohar ," Discrete Mathematical structures with application to computer science" , TMH.
5. Sukhendu dey, "Graph theory and its applications", Shroff publications.
6. John Dossey,Otto,Spence,Eynden, "Discrete Mathematics", Pearson publications, Fifth edition.

Digital System and Microprocessor

COURSE OUTLINE

Course Title	Short Title	Course Code
Digital system and Microprocessor	**DSM**	

Course Description:

The objective of this course is to introduce the students with a comprehensive study of the digital system covering basic concepts of digital system and microprocessors.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	03	15	45	03

Prerequisite Course(s): Fundamental knowledge of digital system and microprocessors.

COURSE CONTENT

Digital System and Microprocessor **Semester-III**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week

End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

1. **Review of fundamental concepts of digital electronics**
   (08 Hours, 16 marks)
   a. Logic Gates
   b. Implementation of logic gates using universal gates
   c. Digital Signal: Positive & Negative logic
   d. Boolean Algebra
   e. Kmap representation (2, 3 and 4 variable)
   f. Grouping in the Kmap
   g. Don't Care condition in Kmap

2. **Combination logic design** **(08 Hours, 16 marks)**
   a. Kmap representation (5 and 6 variable)
   b. Grouping in the Kmap

c. Don't Care condition in Kmap
d. Design of adder and subtractor
e. Design of BCD adder and BCD subtractor
f. Combination logic design examples
g. Design of multiplexer & its examples
h. Demultiplexer & its examples
i. Design of comparator

3. Sequential logic design (08 Hours, 16 marks)

a. Sequential Logic Design
b. One bit memory cell
c. SR and JK flip flop
d. D and T flip flop
e. Design of synchronous and asynchronous counter
f. Sequence generator & detector

4. 8086 Microprocessor (08 Hours, 16 marks)

a. 8086 Architecture & Register Organisation
b. 8086 Memory Segmentation
c. 8086 Addressing Modes
d. 8086 Signal Descriptions
e. 8086 Instruction Set

5. 8086 assembly programming (08 Hours, 16 marks)

a. Assembler directives
b. DOS and BIOS interrupts
c. Macros and Procedures
d. Assembly language programming of 8086

Text Books:

1. R.P. Jain, "Modern Digital Electronics", Tata McGraw Hill, Fourth edition.
2. A. K. Ray and K.M. Bhurchandi, "Advanced Microprocessors and Peripherals", Tata McGraw Hill, Third edition.

Reference Books:

1. M. Morris Mano, "Digital Logic and Computer Design", Pearson, 1979.
2. V.K.Puri, "Digital Electronic Circuit and System", Tata McGraw Hill, 1997.
3. F.J. Hill, "Digital Logic and Microprocessor", John Willy & sons.

4. Anandkumar, “Fundamentals of Digital Circuits”, Pearson.
5. John Wiley and Sons, “Introduction to Switching Theory and Logic Design”, Hill and Peterson, Third edition.
6. Douglas V Hall, “Microprocessor and Interfacing, Programming and Hardware”, Tata McGraw Hill, Second edition.
7. Soumitra Kumar Mandal, “Microprocessor and Microcontroller: Architecture, Programming and Interfacing using 8085, 8086 and 8051”, Tata McGraw Hill.
8. B Ram, “Advanced Microprocessors and Interfacing”, Tata McGraw Hill.
9. Peter Abel, “IBM PC Assembly Language and Programming”, Pearson, Fifth edition.

Object Oriented Technology

COURSE OUTLINE

Course Title	Short Title	Course Code
Object Oriented Technology	**OOT**	

Course Description:

The objective of this course is to introduce the students to the concepts of C++ programming language and enable them to apply these concepts for solving real world problems.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	03	15	45	03

Prerequisite Course(s): C Programming.

COURSE CONTENT

Object Oriented Technology **Semester-III**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week

End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

1. Introduction to Object Oriented Programming

(08 Hours, 16 marks)

a. Introduction to procedural, modular and object-oriented programming techniques.
b. Limitations of procedural programming.
c. Need of object-oriented programming. Advantages, disadvantages and applications of OOP.
d. Class, objects, abstraction, encapsulation, data hiding, inheritance, polymorphism and message passing.
e. The basics of C++
f. Expressions

2. Classes and Objects, Function and Operator Overloading

(08 Hours, 16 marks)

a. Class and objects
b. Constructors and destructors:
c. Functions in C++
d. Function Overloading
e. Operator overloading

3. Pointers and Arrays (08 Hours, 16 marks)

a. Introduction, pointer declaration, voids pointers.
b. Pointers to class objects, this pointer.
c. Pointers to members, accessing private members with pointers.
d. Characteristics of arrays, initialization of arrays.
e. Arrays within a class, arrays of objects.
f. Dynamic memory allocation using new and delete operators.
g. One dimensional and two dimensional arrays using pointers.

4. Inheritance, Virtual functions and Polymorphism

(08 Hours, 16 marks)

a. Introduction, base and derived classes. Inheritance types, access modifiers.
b. Single inheritance, multiple and multilevel inheritance, hybrid, hierarchical, multipath inheritance and virtual base classes.
c. Overriding base class members. Constructors and inheritance, calling base class constructor.
d. Static and dynamic binding. Pointers to base and derived classes.
e. Virtual functions, rules for virtual functions, working of virtual functions, pure virtual functions.
f. Virtual base classes.

5. Files and Streams, Managing Console I/O Operations and Templates

(08 Hours, 16 marks)

a. Concept of a file, file stream operations.
b. Opening a file using constructor and open function, closing a file, detecting end-of-file, file modes, file pointers.
c. Introduction to C++ streams, stream classes, unformatted and formatted I/O.
d. ios class functions and flags, manipulators.
e. Introduction to function template and class template.
f. Overloading of templates functions.

g. Member function templates and template arguments.

h.

Text Books:

1. E. Balagurusamy, “Object Oriented Programming with C++”, Fifth Edition, Tata McGraw Hill, 2011.
2. Robert Lafore, “Object Oriented Programming in C++”, Fourth Edition, Pearson Education, 2002.

Reference Books:

1. Ashok N. Kamthane, “Object-Oriented Programming with ANSI and Turbo C++”, Pearson Education, 2006.
2. Rajesh K. Shukla, “Object-Oriented Programming in C++”, Wiley India, 2008.
3. Bjarne Stroustrup, “C++ Programming Language”, Third Edition, Addison Wesley, 2002.
4. Yashavant P. Kanetkar, “Let Us C++”, Second Edition, BPB Publications, 2003.
5. Venugopal K.R., “Mastering C++”, First Edition, TMH, 1999.
6. Mahesh Bhave, Sunil Patekar, “Object Oriented Programming with C++”, Second Edition, 2012.
7. Herbert Schildt, “The Complete Reference C++”, Fourth Edition, TMH, 2003.

Soft Skills – III

COURSE OUTLINE

Course Title	Short Title	Course Code
Soft Skills – III	**SK-III**	

Course Description:

Through this course we have tried to prepare the students for the industry. Most companies test mathematical and logical ability through an aptitude test. This subject aims at working on these skills of a student through strategies formulae and practice exercises.

Lecture	**Hours per Week**	**No. of Weeks**	**Total Hours**	**Semester Credits**
	1	**14**	**14**	**2**

Prerequisite Course(s): Fundamental knowledge of High School Mathematics.

COURSE CONTENT

Soft Skills – III **Semester-III**

Teaching Scheme **Examination Scheme**

Lecture: 1 hour / week **Internal Continuous Assessment (ICA): 50 Marks**

Unit-I: Arithmetic-1 **(03 Hours, 10 marks)**

a. Basic Formulae

i. Divisibility Rules
ii. Speed Maths
iii. Remainder Theorem
iv. Different Types of Numbers
v. Applications

b. HCF, LCM and Linear Equations

i. HCF – Successive Division and Prime Factorization Methods
ii. LCM – Successive Division and Prime Factorization Methods
iii. Applications

iv. Linear Equations – Elimination Method
v. Substitution Method
vi. Applications

c. Averages and Mixtures

i. Concept of Average
ii. Faster Ways of Finding It
iii. The Allegation Method
iv. Applications

Unit-II: Arithmetic–II (03 Hours, 10 marks)

a. Percentages

i. Concept of Percentage
ii. Working with Percentages
iii. Applications

b. Profit and Loss

i. Difference between Cost and Selling Price
ii. Concept of Profit Percentage and Loss Percentage
iii. Applications

c. Time and Work

i. Basic Time and Work Formula
ii. Relation between Time and Work
iii. Applications

Unit-III: Arithmetic–III (03 Hours, 10 marks)

a. Permutations and Combinations

i. Sum Rule of Disjoint Counting
ii. Product Rule of Counting
iii. Concept of Factorial
iv. Permutations
v. Linear Permutations
vi. Combinations
vii. Circular Permutations
viii. Applications

b. Probability

i. Definition and Laws of Probability
ii. Mutually Exclusive Events
iii. Independent Events
iv. Equally Likely Events
v. Exhaustive Events
vi. Cards
vii. Dice
viii. Applications

c. Time and Distance

i. Speed
ii. Conversion Factors for Speed
iii. Average Speed
iv. Moving Bodies – Passing, Crossing and Overtaking
v. Relative Speed
vi. Boats and Streams
vii. Applications

Unit-IV: Non-Verbal Reasoning (02 Hours, 10 marks)

a. Analogies

i. Examples
ii. Applications

b. Classification

i. Examples
ii. Applications

c. Sequences

i. Examples
ii. Applications

Unit-V: Analytical Reasoning (03 Hours, 10 marks)

a. Analytical Puzzles

i. Classification Puzzles
ii. Ordering Puzzles
iii. Assignment Puzzles
iv. Applications

b. Letter and Number Series

i. Different Types of Letter Series
ii. Different Types of Number Series
iii. Mixed Series

c. Coding and Decoding

i. Letter Coding
ii. Number Coding
iii. Mixed Coding
iv. Odd Man Out
v. Applications

Guide lines for ICA:
ICA will be based on credit tests and assignments submitted by the student in the form of journal.

Reference Books:

1. R. S. Aggarwal, “Quantitative Aptitude”, S. Chand Publication, New Delhi, 2012.
2. R. S. Aggarwal, “A Modern Approach to Verbal Reasoning”, S. Chand Publication, New Delhi, 2012.
3. R. S. Aggarwal, “A Modern Approach to Non-Verbal Reasoning”, S. Chand Publication, New Delhi, 2012.

Information Theory Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Information Theory	**IT**	

Course Description:

This laboratory provides students with a comprehensive study of the basic concepts of cryptography and data compression. It will helps the students to understand how programmers and electronic communications professionals can use cryptography-the technique of enciphering and deciphering messages-to maintain the privacy of computer data and also shows how they can be used to solve security problems.

	Hours / Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	**02**	**15**	**30**	**01**

Total Semester Credits: 1

Prerequisite Course(s): Fundamental knowledge of Computers and any programming language (Ex. C language).

LAB COURSE CONTENT

Outline of Content:

(Note: Minimum SIX Experiments from group A and FOUR from group B.)

Group A

1. **Program for simple encryption and decryption of the message**
   - A simple encryption and decryption of a message can be implemented by using any programming language
   - The program should consist of two modules: Encryption and Decryption
2. **Program for Vernam Cipher (One-time Pad)**
   - Program should consist of encryption and decryption module
3. **Program for Simple Transposition Technique**

- A simple transposition technique such as 'Rail Fence' technique can be implemented
- In this technique plain text is written in zig - zag form to obtain cipher text

4. **Program for Electronic Code Book (ECB) Mode**
   - Algorithmic mode ECB can be implemented
   - Program must exhibits the working of ECB i.e. block-by-block encryption and decryption

5. **Program for Cipher Block Chaining (CBC) Mode**
   - Algorithmic mode CBC can be implemented
   - Program must exhibits the working of CBC

6. **Program for Chinese Remainder Theorem**
   - A simple program is written to show the working of Chinese remainder theorem

7. **Program for Diffie-Hellman Key Exchange Algorithm**
   - Key exchange is a big problem in symmetric key and it can be resolved by using Diffie-Hellman key exchange algorithm

8. **Program for RSA algorithm**
   - Public key algorithm (RSA) can be implemented for simple input
   - Program must consist of three modules: Key generation, Encryption and Decryption

9. **Study of Digital Signature**
   - A digital signature is a mechanism that enables the creator of a message to attach a code that acts as a signature.

Group B

1. **Program for Caesar Cipher**
   - A simple program on Caesar cipher can be implemented
   - It should consists of two modules: encryption and decryption
   - Encryption: Cipher text=Plain text + (Key=3)
   - Decryption: Plain text= Cipher text - (Key=3)

2. **Program for Simple Stream Cipher**
   - Stream ciphers works on bit-by-bit basis
   - It should consists of two modules: encryption and decryption
   - Encryption: Cipher text bit=Plain text bit XOR Key bit
   - Decryption: Plain text bit = Cipher text bit XOR Key bit

3. **Study of JPEG Standard**
   - Image compression standard

4. **Study of Adaptive Huffman Coding Technique**
   - Limitation of Huffman coding techniques are removed in adaptive coding

5. **Program for RLE Encoding Technique**
   - Run-Length encoding technique is lossless data compression technique. It is generally used for text and image compression.

Reference Books:

1. William Stallings, “Cryptography and Network Security”, Fifth edition, Pearson, 2011
2. Mark Nelson and Jean-Loup Gailly, “The Data Compression Book”, Second edition, BPB Publications
3. Bruce Schneider, “Applied cryptography: Protocols, Algorithms and sources code in C”, Second edition, Willey, 2008.
4. Atul Kahate, “Cryptography and Network Security”, Second edition, TMH, 2007.
5. D.C. Hankerson , Greg A. Harris and Peter D. Johnson Jr., “Introduction to Information Theory and Data Compression”, Second edition, CRC Press, 2003.
6. Alfred J. Menezes, Paul C. van Oorschot and Scott A. Vanstone, “Handbook of Applied Cryptography”, CRC Press, 1996.
7. Forouzan, “Cryptography & Network Security ”, Second edition, TMH, 2010.

Discrete Structure and Graph Theory Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Discrete Structure and Graph Theory	**DSGT LAB**	

Course Description:

This laboratory provides students with a comprehensive study of the C programming language in discrete structures and graph theory. Classroom lectures stress the strengths of C which provide students with the means of writing efficient codes for discrete structures and graph theory.

	Hours / Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	**02**	**15**	**30**	**01**

Total Semester Credits: 1

Prerequisite Course(s): Fundamental knowledge of C.

LAB COURSE CONTENT

Outline of Content:

(Note: Minimum FIVE experiments from the group A and minimum FIVE experiments from the group B.)

(Group A)

1. **A program for logical operations using bitwise operators.**
   Perform logical operations like AND,OR,NOT,IF THEN,IF AND ONLY IF
2. **A program for set operations: Union, Intersection, Difference, Symmetric difference.**
   Perform set operations like union, intersection, difference, symmetric difference, complement
3. **A program for generation of Power set of a given set.**
   Producing power set for a given input set.
4. **A program for generation of permutations.**
   Producing permutations set for a given input set.

5. **A program for generation of combinations.**

   Producing permutations set for a given input set.
6. **A Program for Bubble sort.**

   Sorting of given numbers by using Bubble sort.

(Group B)

1. **A Program for Matrix multiplication.**

   Performing Multiplication of two matrices.
2. **A Program for Binary search.**

   Searching of a given number using binary search.
3. **A Program for Shortest Path algorithm using Dijkstra's.**

   Finding shortest path in a graph using Dijkstra’s algorithm.
4. **A program for implementation of Kruskal's algorithm.**

   To find minimum spanning tree using kruskals algorithm.
5. **A program for implementation of Prim's algorithm.**

   To find minimum spanning tree using kruskals algorithm.
6. **A program for Inter conversion of number system.**

   Interconverting numbers from one base to another base.

Reference Books:

1. Kenneth H. Rosen, Discrete Mathematics and its Application, Fifth edition, TMH
2. V. K. Balakrishnan, “ Graph Theory”, TMH.
3. B. Kolman , R. Busby and S. Ross, “Discrete Mathematical Structures”, Fourth edition, Pearson.

Digital System and Microprocessor Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Digital System and Microprocessor	**DSM**	

Course Description:

This laboratory provides students with a comprehensive study of the digital system covering basic concepts of digital system and microprocessor covering microprocessor concepts. This laboratory focuses on basic analysis and design of digital circuit's and the basic concepts and programming related to microprocessor.

	Hours / Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	**02**	**15**	**30**	**01**

Total Semester Credits: 1

Prerequisite Course(s): Fundamental knowledge of basic digital design and microprocessor concepts.

LAB COURSE CONTENT

Outline of Content:

(Note: Minimum SIX experiments from group A and FOUR experiments from group B)

Group A (Digital System)

1. **Verify the truth table of all logic gates and verify the Demorgan's theorem**
   a. Draw the logical symbol and truth table
   b. Implement the connection on bread board and verify the truth table

2. **Implement any logic gates by using universal gates**
   a. Construct logic gates using universal gates
   b. Implement the connection on bread board and verify the truth table

3. **Construct and Implement Half Adder and Full adder**

    a. Construct Half Adder and Full adder
    b. Implement the connection on bread board and verify the truth table

4. **Construct and Implement Half Subtractor and Full Subtractor**

    a. Construct Half Subtractor and Full Subtractor
    b. Implement the connection on bread board and verify the truth table

5. **Construct and Implement various Code converters (Binary to Gray and Gray to Binary)**

    a. Construct Code Converter
    b. Implement the connection on bread board and verify the truth table

6. **Verify Muliplexer and Demultiplexer**

    a. Construct Muliplexer and Demultiplexer
    b. Implement the connection on bread board and verify the truth table

7. **Verify the truth table of BCD to 7-Segment display**

    a. Construct BCD to 7-Segment display
    b. Implement the connection on bread board and verify the truth table

8. **Implement and verify S-R, J-K,D, and T flip flop using ICs**

    a. Construct flip flops
    b. Implement the connection on bread board and verify the truth table

Group B (8086 Microprocessor)

Program using Macro

Display personal information using Macro

1. **Program using NEAR and FAR Procedure**

    Addition of two numbers using NEAR and FAR Procedure Perform

2. **Perform arithmetic operations on two numbers**

    Addition/subtraction/multiplication of two numbers using NEAR and FAR Procedure

3. **Find factorial of given number**

    Factorial of given number using recursive instruction

4. **Program for Password Verification**

   Program for Password Verification

5. **Perform the BCD Addition**

   Addition of two 16 bit BCD numbers

6. **Program to Display System Time & Date**

   Display current Time & Date of system

7. **Convert HEX To BCD and BCD to HEX**

   a. HEX to BCD Conversion
   b. BCD to HEX Conversion

Guide lines for ESE:

- ESE will be based on the practical assignments submitted by the students in the form of journal.
- In the ESE, the students may be asked to perform the practical assignment with minor modification.
- Evaluation will be based on the paper work of algorithm, understanding of the logic and the syntax, quality of the program, execution of the program, type of input and output for the program.

Reference Books:

1. M. Morris Mano, "Digital Logic and Computer Design", Pearson, 1979.
2. V.K.Puri, "Digital Electronic Circuit and System", Tata McGraw Hill, 1997.
3. F.J. Hill, "Digital Logic and Microprocessor", John Willy & sons.
4. Anandkumar, "Fundamentals of Digital Circuits", Pearson.
5. John Wiley and Sons, "Introduction to Switching Theory and Logic Design", Hill and Peterson, Third edition.
6. Douglas V Hall, "Microprocessor and Interfacing, Programming and Hardware", Tata McGraw Hill, Second edition.
7. Soumitra Kumar Mandal, "Microprocessor and Microcontroller: Architecture, Programming and Interfacing using 8085, 8086 and 8051", Tata McGraw Hill.
8. B Ram, "Advanced Microprocessors and Interfacing", Tata McGraw Hill.
9. Peter Abel, "IBM PC Assembly Language and Programming", Pearson, Fifth edition.

Object Oriented Technology Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Object Oriented Technology	**OOT**	

Course Description:

This laboratory provides students with a comprehensive study of the C++ programming language. Classroom lectures stress the strengths of C++, which provide students with the means of writing efficient, maintainable, and portable code.

	Hours / Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	**02**	**15**	**30**	**01**

Total Semester Credits: 1

Prerequisite Course(s): Fundamental knowledge of Computers and C programming

LAB COURSE CONTENT

Outline of Content:

(Note: Minimum SIX Experiments from group A and FOUR from group B.)

Group A

1. **Write a program for a simple class and object.**
   Performing simple arithmetic operations using C++ class and object like,
   a. Addition,
   b. Subtraction,
   c. Multiplication,
   d. Division.
2. **Write a program for parameterized constructor.**

Demonstrate the use parameterized constructor by passing different types of parameters to the constructor.

3. **Write a program for overloading constructors.**

   Demonstrate the concept of overloading constructor functions using class and object.

4. **Write a program to find the area of rectangle, triangle and sphere using function overloading.**

   To calculate the area of rectangle, triangle and sphere using function overloading and class and object.

5. **Write a program to overload unary operator using member function.**

   Demonstrate the overloading of unary operators using the concept of member functions.

6. **Write a program to overload binary operator using member function.**

   Demonstrate the overloading of binary operators using the concept of member functions.

7. **Write a program for arrays of pointers to objects.**

   Declaring an array of pointers to objects using suitable example.

8. **Write a program using single inheritance, multiple inheritance and hierarchical inheritance.**

   Demonstrate the use of single inheritance, multiple inheritance and hierarchical inheritance by taking suitable example.

9. **Write a program using multilevel inheritance and hybrid inheritance.**

   Demonstrate the use of multilevel inheritance and hybrid inheritance by taking suitable example.

10. **Write a program for virtual base classes.**

    To calculate the total mark of a student using the concept of virtual base class.

11. **Write a program to read and write class objects from files.**

    Writing/reading class object to/from file.

12. **Write a program to format output using ios class functions and flags.**

    To format the output using different ios class functions and flags.

13. **Write a program to format output using manipulators.**

    To format the output using different manipulators.

14. **Write a program using class template.**

    To swap the numbers using the concept of function template.

15. **Write a program for overloading of template functions.**

    Overload templates functions with the number of parameters.

Group B

1. **Write a program for the copy constructor.**

   To calculate factorial of a given number using copy constructor.

2. **Write a program to overload unary operator using friend function.**

   Demonstrate the overloading of unary operators using the concept of friend function.

3. **Write a program to overload binary + operator using member function for concatenation of two strings.**
   Demonstrate the overloading of binary + operator using the concept of member function for concatenation of two strings.
4. **Write a program for matrix multiplication using new and delete dynamic memory allocation operators.**
   Perform the matrix multiplication using new and delete dynamic memory allocation operators.
5. **Write a program to convert class type data to basic type data.**
   Perform the class type data conversion to any basic type data.
6. **Write a program for run time polymorphism using virtual functions.**
   Perform the run time polymorphism using virtual functions.
7. **Write a program for bubble sort using template functions.**
   Perform the bubble sort using the concept of template functions.

Reference Books:

1. E. Balagurusamy, "Object Oriented Programming with C++", Fifth Edition, Tata McGraw Hill, 2011.
2. Robert Lafore, "Object Oriented Programming in C++", Fourth Edition, Pearson Education, 2002.
3. Ashok N. Kamthane, "Object-Oriented Programming with ANSI and Turbo C++", Pearson Education, 2006.
4. Rajesh K. Shukla, "Object-Oriented Programming in C++", Wiley India, 2008.
5. Bjarne Stroustrup, "C++ Programming Language", Third Edition, Addison Wesley, 2002.
6. Yashavant P. Kanetkar, "Let Us C++", Second Edition, BPB Publications, 2003.
7. Venugopal K.R., "Mastering C++", First Edition, TMH, 1999.
8. Mahesh Bhave, Sunil Patekar, "Object Oriented Programming with C++", Second Edition, 2012.
9. Herbert Schildt, "The Complete Reference C++", Fourth Edition, TMH, 2003.

Guide lines for ESE:-

- ESE will be based on the practical assignments submitted by the students in the form of journal.
- In the ESE, the students may be asked to perform the practical assignment with minor modification.
- Evaluation will be based on the paper work of algorithm, understanding of the logic and the syntax, quality of the program, execution of the program, type of input and output for the program.

NORTH MAHARASHTRA UNIVERSITY, JALGAON (M.S.)

Second Year Engineering

(Information Technology)

Faculty of Engineering and Technology

COURSE OUTLINE

Semester – IV

W.E.F 2013 – 2014

Data Communication

COURSE OUTLINE

Course Title	Short Title	Course Code
Data Communication	**DC**	

Course Description:

This course is aimed at introducing the fundamentals of data communications to undergraduate students. The goals of the course are to understand the basics and knowledge about the Data Communications using components and protocols of data communications.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	03	15	45	03

Prerequisite Course(s): Fundamentals of Data Communication.

COURSE CONTENT

Data Communication **Semester- IV**

Teaching Scheme	**Examination Scheme**	
Lecture: 3 hours / week	**End Semester Examination (ESE)**	**: 80 Marks**
	Paper Duration (ESE)	**: 03 Hours**
	Internal Sessional Exam (ISE)	**: 20 Marks**

1 Introduction to Data Communication and Signals

(08 Hours, 16 marks)

a Basics of Data Communication: Characteristics and Components
b Data Representation and Data Flow
c Networks, Introduction to ISO-OSI Reference model
d Introduction to Signals and Transmission Impairments: Analog and Digital
e Periodic Analog Signals, Digital Signals
f Transmission impairment, data rate limits, Performance

2 Digital transmission and Analog transmission

No of Lect – 8, Marks:16

a Digital to Digital Conversion

b Analog to Digital Conversion
c Transmission Modes
d Digital-to-analog Conversion

3 Multiplexing and Transmission Media (08 Hours, 16 marks)

a Multiplexing
b Guided Media
c Unguided Media

4 Switching and Multiple Access (08 Hours, 16 marks)

a Circuit-switched Networks
b Datagram networks
c Virtual-circuit networks
d Multiple Access

5 Error Control and Data Link Control (08 Hours, 16 marks)

a Types of errors
b Block coding
c Linear block codes
d Cyclic codes
e Checksum
f Flow and error control

Text Books:

1. Behrouz A Forouzan, "Data Communications and Networking", Fourth edition: Tata McGraw Hill.
2. P. C. Gupta, "Data Communications", PHI Publications.

Reference Books:

1. William Stallings, "Data & Computer Communications", Seventh edition: PHI Publication.
2. Leon - Garcia, Indra Widijaja, "Communication Networks Fundamental Concepts and Key Architectures", Second edition: McGraw Hill Education.
3. Achyut Godbole, "Data Communication Networks", Tata McGraw Hill.
4. Bruce Hartpence, "Packet Guide to Routing and Switching", O'Reilly.
5. Bruce Hartpence, "Packet Guide to Core Network Protocol" , O'Reilly.
6. James Irvine & David Harle, "Data Communication and Networks: An Engineering Approach", Wiley Edition.

Microprocessor & Microcontroller Interfacing

COURSE OUTLINE

Course Title	Short Title	Course Code
Microprocessor & Microcontroller Interfacing	**MPMCI**	

Course Description:

The objective of this course is to introduce the students to the fundamentals of microprocessor & microcontroller interfacing with assembly programming language and enable them to apply these concepts for real world applications.

Lecture	Hours / Week	No. of Weeks	Total Hours	Semester Credits
	03	15	45	04
Tutorial	01	15	15	

Prerequisite Course(s): Fundamental knowledge of Microprocessors & Microcontrollers.

COURSE CONTENT

Microprocessor & Microcontroller Interfacing **Semester- IV**

Teaching Scheme	**Examination Scheme**	
Lecture: 3 hours / week	**End Semester Examination (ESE)**	**: 80 Marks**
Tutorial: 1 hour / week	**Paper Duration (ESE)**	**: 03 Hours**
	Internal Sessional Exam (ISE)	**: 20 Marks**

1. Basic I/O Interface

(08 Hours, 16 marks)

a. MSDOS FAT
b. MS DOS Device Drivers Types, Structure of device drivers.
c. 8255 PPI : Internal block diagram, control word and status word, modes of operation, numericals on control word design.

2.

(08 Hours, 16 marks)

a. 8254(PIT) : Internal block diagram, control word format, operating modes, numericals on control word design.

b. 8251(USART) : Architecture and signal description, operating modes, interfacing with 8086 and numericals.
c. TSR programs : concept and implementation.

3. Overall Motherboard Component Logic (08 Hours, 16 marks)

a. Functional block diagram of PC.
b. Motherboard (8086/8088 based) : Motherboard components.
c. Motherboard logic : Reset logic, Interrupt logic, RAM parity logic, NMI logic, Wait state logic, Bus Arbitration logic, RAM & ROM logic, CPU logic, DMA logic, keyboard interface block diagram.
d. Microcomputer Display : Raster scan basics, Overview of character display control system.
e. PC display adapters : CGA,EGA,VGA.
f. Introduction to LCD and Plasma display.

4. 8086 Microprocessor interface (08 Hours, 16 marks)

a. Parallel Printer Interface
b. 7 segment display interface.
c. Disk reading methods: FM , MFM.
d. Internal structure of Floppy disk and hard disk.
e. Floppy Disk Controller : Overview, FDC system interface, Overall operation of floppy disk subsystem, 8272 FDC : internal block diagram and commands.
f. Hard disk controller : HDC commands and device control block.

5. Microcontrollers and Interfacing (08 Hours, 16 marks)

a. Interfacing LEDs and of 7-segment displays.
b. Interfacing keys and keyboard interfacing .
c. Interfacing 0808/0809 ADC.
d. Interfacing DAC 0808.
e. Interfacing stepper motor.

Reference Books:

1. Douglas V. Hall, " Microprocessors and Interfacing : Programming and Hardware", Second edition , Tata McGraw Hill.
2. A. K. Ray & K. M. Bhurchandi, "Advanced Microprocessor and Peripherals – Architecture, Programming and Interfacing", Third edition, Tata Mc Graw Hill.
3. Ray Duncan, "Advanced MS-DOS Programming", Second edition, Microsoft Press.
4. Peter Abel, " IBM PC Assembly language and programming" , Fifth edition, Pearson education/ Prentice Hall of India Pvt. Ltd.
5. B. Govindarajalu, "IBM PC and Clones", Second edition, Tata McGraw Hill.

Data Structures

COURSE OUTLINE

Course Title	Short Title	Course Code
Data Structures	**DS**	

Course Description:

The objective of this course is to introduce the students to the fundamentals of Data Structure with concepts of the C programming language and enable them to apply these concepts for solving real world problems.

	Hours / Week	No. of Weeks	Total Hours	Semester Credits
Lecture	03	15	45	04
Tutorial	01	15	15	

Prerequisite Course(s): Fundamental knowledge of C

COURSE CONTENT

Data Structures **Semester - IV**

Teaching Scheme

Lecture: 3 hours / week
Tutorial: 1 hour / week

Examination Scheme

End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

1. **Introduction to Data Structures (08 Hours, 16 marks)**
   a Introduction of data and data object.
   b Data structure and Abstract Data Type(ADT).
   c Implementation of different data structures.
   d Basic terminologies with data structures, types of data structures.
   e Data structure operations.
   f Concept of arrays,pointer and structures.

2. **Stack and Queue (08 Hours, 16 marks)**
   a Detailed knowledge of data structure like stack, queue & circular queue.
   b Polish notations & interconversions by using stack.
   c Use of stack in function call,recursion,tower of Hanoi.

3. Linked Lists (08 Hours, 16 marks)

a Understand the concept of linked list data structure.

b Pros & Cons of array compared with linked list.

c Creation,traversing,searching,insertion,deletion opertions w.r.t. single linked list.

d Pros & cons of single linked list, double linked list

e Polynomial addition using single linked list as well as storing multivariable polynomials using generalised list.

4. Trees (08 Hours, 16 marks)

a Creation,traversing,searching,insertion,deletion opertions w.r.t. binary search tree.

b Concept of threaded binary tree,tree traversals(recursive & non-necursive).

c Concept of Huffman Algorithm.

e Height Balanced Tree(AVL Search Tree).

5. Searching and Sorting (08 Hours, 16 marks)

a Basics of searching techniques.

b Basics of sorting techniques.

c Different sorting algorithms including Bubble, Insertion, Selection,Quick,Merge,Heap,Radix.

d Time and Space complexity of an algorithm with big ‘O’, ‘⍰’ , ‘Ω’ notations.

e Best, Worst, and Avgerage case time complexity of each of these algorithms.

Text Books:

1. Seymour Lipschutz, “Data Structures”, Schaums Outlines Tata McGraw Hill, 2006.
2. Ellis Horowitz and Sartaj Sahani, “Fundamentals of Data Structures”, Galgotia Publication.

Reference Books:

1. G.S.Baluja, “Data Structures through C”, Dhanpatrai Publications.
2. Ashok N. Kamthane, “Introduction to Data structures in C”, Person Publications, 2007.
3. Aarom Tanenbaum, Yedidyah Langsam, Moshe Augenstein, “Data structures using c”, Pearson Publication.
4. Alfred Aho, John Hopcroft, Jeffrey Ullman, “Data Structures and Algorithms”,Pearson Publications.
5. E.Balagurusamy,”Data Structures using C”,Tata MacGraw Hill Publications.
6. P.S.Deshpande,O.G.Kakde,”C and Data Structures”,dreamtech press Publications.
7. Rajesh K.Shukla, “Data Structures using C and C++” ,Willy India Publication.
8. Larry Nyhoff, “ADTs’ Data Structures and prolems with C++”,Pearson Publications.

Computer Organization

COURSE OUTLINE

Course Title	Short Title	Course Code
Computer Organization	**CO**	

Course Description:

This course introduces the students about the computer. It includes the terms, concepts, architectures, formats and addressing. This course also describes the Memory organization etc.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	03	**15**	**45**	**03**

Prerequisite Course(s): Introduction to Computer.

COURSE CONTENT

Computer Organization **Semester- IV**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week

End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

1. **Introduction to system concepts (08 Hours, 16 marks)**
   a. To introduce students to System Concept.
   b. To learn about Instruction format.
   c. To learn General addressing Modes.
   d. To learn about Expanding op-codes.
   e. To learn about Bus Structures.

2. **Arithmetic (08 Hours, 16 marks)**
   a To know how Numbers are represented.
   b To learn Multiplication using Booths and Bit-pairing Algorithms.
   c To learn Division using Restoring and Non-Restoring Methods.
   d To learn addition and Subtraction of signed numbers.
   e To learn Floating point System.

3. **Processing Unit** **(08 Hours, 16 marks)**

a To design control unit.

b Designing Control unit using hardwired and Micro programmed methods.

c Learning Wilkes Design method.

d To learn Bus organization.

e To learn execution of complete instruction.

4. **Memory** **(08 Hours, 16 marks)**

a Memory organization techniques.

b To know cache memory organization.

c To know Virtual memory.

d To learn basic concepts of memory.

e Introduction to SDRAM, RDRAM, DDRSDRAM, Flash memory.

5. **System Organization** **(08 Hours, 16 marks)**

a To know concepts system buses.

b To know Daisy chaining, polling.

c Concepts of PCI bus, SCSI bus, Universal Serial Bus.

d RISC and CISC .

Text Book:

1. Hamacher, Vransic, Zaky, “Computer Organization”, Fifth edition, McGraw Hill international.

Reference Books:

1. J.P. Hayes, “Computer Architecture and Organization”, Third edition, McGraw Hill international.
2. Sajjan Shiva, “Computer Organization Design & Architecture”, CRC Press Publication.
3. Tanenbaum, “Structured Computer Organization”, Pearson.
4. William Stallings, “Computer Organization and Architecture”, Sixth edition, Pearson.
5. Swati Saxena,”Computer Organization” Dhanpat Rai.
6. Murdocca, Heuring, “Computer Architecture & Organization”, Second edition, Wiley.
7. Nicholas Carter, “Computer Architecture”, Schaum’s Outline.

Computer Graphics and Multimedia

COURSE OUTLINE

Course Title	Short Title	Course Code
Computer Graphics & Multimedia	**CGM**	

Course Description:

This course introduces the students about the concepts of user interface with graphics system. It includes the graphics standards, transformations, filling & clipping objects, 2D & 3D as well as multimedia concepts. This course also describes about graphics applications corresponds with scientific work as well as animation, simulation etc.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	03	**15**	**45**	**03**

Prerequisite Course(s): Engineering Graphics.

1. **Basic Concepts** **(08 Hours, 16 marks)**
   a. Introduction to computer graphics
   b. Graphics Standards
   c. Interactive Computer Graphics
   d. Linear and Circle Generation

2. **Polygons** **(08 Hours, 16 marks)**
   a. Polygons
   b. Types of Polygons
   c. Polygon filling
   d. Scan conversion algorithm
   e. Segments

3. **2D & 3D Geometry** **(08 Hours, 16 marks)**
   a. 2D transformation primitives and concepts
   b. 3 D transformations
   c. 3D viewing transformation
   d. Concept of parallel perspective projections
   e. Viewing parameters

4. **Multimedia** **(08 Hours, 16 marks)**
   a. Multimedia Presentation & Production
   b. Hardware & software requirements
   c. Analog & digital representations
   d. Introduction to text & image presentation.

5. **Multimedia Architecture** **(08 Hours, 16 marks)**

   a. Multimedia Architecture
   b. Multimedia Extensions
   c. Distributed multimedia applications
   d. Introduction to animation
   e. Principles of animation

Text Books:

1. "Computer graphics", ISRD group, THM publications, Eleventh reprint 2012.
2. Ranjan Parekh, "Principles of Multimedia", McGraw Hill.

Reference Books:

1. David F. Rogers, "Procedural Elements for Computer Graphics, Tata McGraw Hill, Second edition.
2. Shirley, Marshner, "Fundamentals of Computer Graphics", Third edition, CRC Publication/ A.K. Peters.
3. Steven Harringtom, "Computer graphics A Programming Approach", MGH.
4. Mukherjee, "Fundamentals of Computer Graphics and Multimedia", PHI.
5. Maurya, "Computer Graphics: with virtual reality system", Wiley India.
6. Donald Hearn and Pauline Baker," Computer Graphics", Pearson LPE, Second edition.
7. Rao and Prasad, "Graphics user interface with X windows and MOTIF", New Age.
8. Foley, Vandam, Feiner, Hughes, "Computer Graphics Pricipals & Practice", Pearson Second edition.

Application Development Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Application Development Lab	**ADL**	

Course Description:

The objective of this course is to introduce the students to the fundamentals of web development. It includes the technologies like HTML, XML, CSS and Scripting Languages.

Lecture	**Hours per Week**	**No. of Weeks**	**Total Hours**	**Semester Credits**
	01	**15**	**15**	**02**

Prerequisite Course(s): Fundamental knowledge of Computers.

LAB COURSE CONTENT

This course will use advanced techniques in creating documents for the World Wide Web. Emphasis will be placed on HTML, JavaScript, XML and Java.

1 Introduction to HTML **(03 Hours)**

a. Tags and Elements
b. Separating Heads from Bodies
c. Attributes
d. Basic Text Formatting
e. Presentational and Phrase Elements
f. List
g. Links and Navigation

2 CSS Style Sheet and Scripting Languages **(03 Hours)**

a. URLs
b. Images, Audio, and Video
c. Tables, Forms and Frames
d. Cascading Style Sheets
e. Page Layout
f. Scripting Language (Java, VB)

3 Introduction to XML **(03 Hours)**

a. XML Basics

b. XML Elements
c. Working with DTD

4 DTD and Style Sheet (03 Hours)

a. Adding Style, Using Schemas

5 Introduction to Java (03 Hours)

a. Basic Input/output
b. Applet Class
c. Event handling
d. Introduction to AWT: working with windows, Graphics and Text

Reference Books:

1. Jon Duckett, "Beginning HTML, XHTML, CSS, and JavaScript", John Wiley & Sons publication, 2010.
2. Heather Williamson, "XML: The Complete Reference", First edition, Tata McGraw-Hill Education, 2001.
3. Herbert Schildt, "Java: The Complete Reference", Seventh edition, Tata McGraw-Hill Education, 2006.
4. Thomas A. Powell, "HTML & CSS: The Complete reference", Fifth edition, TMH 2010.
5. Elliotte Rusty Harold, "XML 1.1 Bible", Third edition, Willey Publication, 2004.
6. Steven Holzner, "XML: A Beginner's Guide", First edition, TMH, 2009.
7. Herbert Schildt, "Java: A Beginners Guide", Fifth edition, TMH, 2011.
8. Yashavant Kanetkar, "Let Us Java", BPB Publication, 2011.

Data Communication Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Data Communication Lab	**DC**	

Course Description:

This laboratory provides students with a comprehensive study of the Data Communication concepts and practical implementation of Data Communication concepts.

Laboratory	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	02	**15**	**30**	**01**

Total Semester Credits: 1

Prerequisite Course(s): Fundamental knowledge of Data Communication.

LAB COURSE CONTENT

Outline of Content:

Group A

1. Comparative analysis of different types of network cables with Specifications
    - Study of different types of Network cables – CAT-5, CAT – 6.
    - Study of different cable specifications comparisons.
2. Implementation of Network performance calculator.
    - Simple Program for Calculating Network Performance.
3. Network related commands such as ARP, IPCONFIG, PING, TRACERT, NSLOOKUP, GETMAC, NETSTAT etc.
    - Practical use of Network commands ARP
    - Study of IPCONFIG for IP configurations
    - Study of PING command for finding destination reachable or not.
    - Study of TRACERT command
    - Study of NSLOOKUP command
    - Study of GETMAC to get MAC address.

- Study of NETSTAT to get the network status.

4. I.T Infrastructure planning using Network Connecting Devices.
   - Consider our own college as a case & prepare a planning for I.T. infrastructure.
5. Network Connecting Devices Specifications and configurations.
   - Practical study of Network Connecting device – Repeater.
   - Practical study of Network Connecting device – Switch /HUB.
   - Practical study of Network Connecting device – Router

Group B

1. Implementation of Stop and Wait Protocol
   - Study the working of stop and wait protocol
   - Implementation of simple client and server should be simple
   - Modular approach should be followed.
2. Implementation of Internet checksum
   - Consider a simple example
   - Study it theoretically.
   - Implementation of same .
3. Crimping of cross-wire and straight-through UTP cable to inter-connect two computers.
   - Study of crimping tool.
   - Study of color coding of Network cables.
   - Crimping the cable using Crimping Tool
   - Test the crimping by interconnecting two computers
4. Interconnections of computers in Local Area Network to share resources.
   - Study of concept of LAN & Shared resources.
   - Interconnect computers in LAN
   - Share and make the use of shared resources.
5. Implementation of cyclic redundancy check
   - Study the concept of CRC.
   - Consider Suitable example.

Implement same using modular approach.

Note:

- Concerned faculty should suitably frame 08 practical assignments (Four from PART – A and Four from PART – B) from above list.

- Every student is required to submit the assignments in the form of journal.

Reference Books:

1. Behrouz A Forouzan, “Data Communications and Networking”, Fourth edition: Tata McGraw Hill.
2. P. C. Gupta, “Data Communications”, PHI Publications.
3. William Stallings, “Data & Computer Communications”, Seventh edition: PHI Publication.
4. Leon - Garcia, Indra Widijaja, “Communication Networks Fundamental Concepts and Key Architectures” Second edition: McGraw Hill Education.
5. Achyut Godbole, “Data Communication Networks”, Tata McGraw Hill.
6. Bruce Hartpence, “Packet Guide to Routing and Switching”, O’Reilly.
7. Bruce Hartpence, “Packet Guide to Core Network Protocol” , O’Reilly.
8. James Irvine & David Harle, “Data Communication and Networks: An Engineering Approach”, Wiley Edition.

Microprocessor & Microcontroller Interfacing Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Microprocessor & Microcontroller Interfacing Lab	**MPMCI**	

Course Description:

This laboratory provides students with a comprehensive study of the 8086 and 8051 assembly programming language.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	**2**	**15**	**30**	**1**

Total Semester Credits: 1

Prerequisite Course(s): Fundamental knowledge of microprocessors & microcontroller along with instruction set and addressing modes.

LAB COURSE CONTENT

Outline of Content:

(**Note:** Any 6 experiments from Group A and any 4 experiments from Group B. Total 10 experiments should be conducted.)

Group A

Assembly language programming for 8086.

1. Program for mouse interfacing.
2. Program for graphics editor.
3. Program for PC to PC communication using serial port.
4. Program for parallel printer interfacing.
5. Program for ADC interfacing with 8086.
6. Program for DAC interfacing with 8086.
7. Program for stepper motor interfacing.
8. Program for printer device driver.

Group B

Assembly language programming for 8051.

1. Program for interfacing LEDs.
2. Program for interfacing 7-segment displays.
3. Program for keyboard interfacing.
4. Program for ADC interfacing.
5. Program for DAC interfacing.

6. Program for stepper motor interfacing.

Guide lines for ESE:-

- ESE will be based on the practical assignments submitted by the students in the form of journal.
- In the ESE, the students may be asked to perform the practical assignment with minor modification.
- Evaluation will be based on the paper work of algorithm, understanding of the logic and the syntax, quality of program, execution of the program, type of input and output for the program.

Reference Books:

1. Douglas V. Hall, " Microprocessors and Interfacing : Programming and Hardware", Second edition , Tata McGraw Hill.
2. A. K. Ray & K. M. Bhurchandi, "Advanced Microprocessor and Peripherals – Architecture, Programming and Interfacing", Third edition, Tata Mc Graw Hill.
3. Ray Duncan, "Advanced MS-DOS Programming", Second edition, Microsoft Press.
4. Peter Abel, " IBM PC Assembly language and programming" , Fifth edition, Pearson education/ Prentice Hall of India Pvt. Ltd.
5. B. Govindarajalu, "IBM PC and Clones", Second edition, Tata McGraw Hill.

Data Structures Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Data Structures Lab	**DS**	

Course Description:

This laboratory provides students with a comprehensive study of the C programming language in data structures. Classroom lectures stress the strengths of C which provide students with the means of writing efficient codes for different data types and data structures.

	Hours per Week	No. Of Weeks	Total Hours	Semester Credits
Laboratory	**2**	**15**	**30**	**1**

Total Semester Credits: 1

Prerequisite Course(s): Fundamental knowledge of C.

LAB COURSE CONTENT

Outline of Content:

(Note: Minimum FIVE experiments from the Group A and FIVE experiments from the Group B .)

(Group A)

1. **Implementation of stack using array or linked list.**
   Performing simple operations like push, pop and display with respect to stack.

2. **Implementation of queue using array or linked list.**

   Performing simple operations like insertion and deletion of an element into the queue.

3. **Implementation of circular queue using array or linked list.**
   Performing simple operations like insertion and deletion of an element into the circular queue.
4. **Conversion of infix expression to postfix expression.**
   Performing simple conversions of given infix expression into postfix expression.

5. **Conversion of postfix expression to infix expression**.

Performing simple conversions of given postfix expression into infix expression.

6. **Program for addition of two single variable polynomials using Linked List.**
   Performing the addition of two polynomials using Linked List.

(Group B)

1. **Implementation of double linked list & perform insertion, deletion and searching.**
   Performing the operations on double linked list like insertion, deletion and searching.

2. **Creation of binary tree & perform all non-recursive traversals**.
   Create the binary tree and perform the Inorder,Preorder and Postorder traversal.

3. **Creation of binary search tree & perform insertion, deletion and printing in tree shape.**
   Create the Binary Search tree performing the operations on BST like insertion, deletion and printing in tree shape.

4. **Create a hash table and handle the collision using linear probing with or without replacement**
   Creation of hash Table and handle the collision using linear probing with or without replacement.

5. **Implementation of Quick Sort.**
   Sort the given set of numbers using Quick sort.

6. **Implementation of Radix Sort.**
   Sort the given set of numbers using Radix sort.

7. **Implementation of Merge Sort.**
   Sort the given set of numbers using Merge sort.

8. **Conversion of Infix Expression to Prefix Expression.**
   Performing Simple conversions of given Infix Expression into prefix Expression.

Reference Books:

1. G.S.Baluja, “Data Structures through C”, Dhanpatrai Publications.
2. Ashok N. Kamthane, “Introduction to Data structures in C”,Person Publications,2007.
3. Aarom Tanenbaum,Yedidyah Langsam,Moshe Augenstein, “ Data structures using C”,Pearson Publications.

4. Alfred Aho,John Hopcroft,Jeffrey Ullman, “Data Structures and Algorithms”,Pearson Publications.
5. E.Balagurusamy, “Data structures using C”,Tata McGraw Hill publications.
6. P.S.Deshpande,O.G.Kakde,”C and Data Structures”,dreamtech press publications.
7. Rajesh K.Shukla, “Data Structures using C and C++” ,Willy India Publication.
8. Larry Nyhoff, “ADTs’ Data Structures and prolems with C++”, Pearson Publications.

Guide lines for ESE:-

- ESE will be based on the practical assignments submitted by the students in the form of journal.
- In the ESE, the students may be asked to perform the practical assignment with minor modification.
- Evaluation will be based on the paper work of concept understanding of topic and algorithm, understanding of the logic and the syntax, quality of program, execution of the program, type of input and output for the program.

Computer Graphics and Multimedia Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Computer Graphics & Multimedia	**CGM LAB**	

Course Description:

This laboratory provides students with a comprehensive study of graphics commands , animation & use of multimedia. The practical's make students able for draw different line styles, polygon, circle as well as clipping of polygons & filling of polygons. It also implements 2D & 3D transformations. Because of it students with the means of writing efficient, maintainable, and portable code.

	Hours per Week	No. Of Weeks	Total Hours	Semester Credits
Laboratory	**2**	**10**	**20**	**1**

Total Semester Credits: 1

Prerequisite Course(s): Fundamental knowledge of C, C++ & Graphics.

Group A: Computer Graphics

1. Study of various Graphics Commands
2. Line generation using DDA
3. Different Line Style using Bresenham's Algorithm
4. Circle Generation using Bresenham's Algorithm
5. Program for Polygon Filling
6. Program for 2D Transformations (Translation, Rotation and Scaling)
7. Program for Segmentation
8. Program for 3D rotation
9. Program for Parallel Projections
10. Program for Perspective Projection

Group B: Multimedia

1. Program for animation using C/C++.
2. Program using flash.
3. Program using dream viewer.
4. Mini Project based on creating animation using Maya.

Concerned faculty should suitably frame at least 10 practical assignments. Any seven lab assignments from computer graphics & any three from multimedia.

Guide lines for ESE:-

- ESE will be based on the practical assignments submitted by the students in the form of journal.
- Evaluation will be based on the paper work of flowchart and algorithm, understanding of the logic and the syntax, quality of program code, execution of the program code, type of input and output for the program code.
- Simple program codes may be asked based on above syllabus.

Reference Books:

1. David F. Rogers, "Procedural Elements for Computer Graphics, Tata McGraw Hill, Second edition.
2. Shirley, Marshner, "Fundamentals of Computer Graphics", Third edition, CRC Publication/ A.K. Peters.
3. Steven Harringtom, "Computer graphics A Programming Approach", MGH.
4. Mukherjee, "Fundamentals of Computer Graphics and Multimedia", PHI.
5. Maurya, "Computer Graphics: with virtual reality system", Wiley India.
6. Donald Hearn and Pauline Baker," Computer Graphics", Pearson LPE, Second edition.
7. Rao and Prasad" Graphics user interface with X windows and MOTIF", New Age.
8. Foley, Vandam, Feiner, Hughes, "Computer Graphics Principals & Practice", Pearson Second edition.

NORTH MAHARASHTRA UNIVERSITY, JALGAON (M.S.)

Third Year Engineering

(Information Technology)

Faculty of Engineering and Technology

COURSE OUTLINE

Semester – V

W.E.F 2014 – 2015

Annexure - I

TE Semester – V

Name of the Course	Group	Teaching Scheme				Evaluation Scheme					Credits
						Theory		Practical		Total	
		Theory Hrs / week	Tutorial Hrs / week	Practical Hrs / week	Total	ISE	ESE	ICA	ESE		
Software Engineering*	D	3	---	---	3	20	80	---	---	100	3
Formal Language & Automata Theory*	D	3	---	---	3	20	80	---	---	100	3
Computer Network*	D	3	---	---	3	20	80	---	---	100	3
System Programming*	D	3	---	---	3	20	80	---	---	100	3
Principles of Management*	C	3	---	---	3	20	80	---	---	100	3
Software Engineering Lab*	D	---	---	2	2	---	---	25	25 **(OR)**	50	1
Linux Lab*	D	---	---	2	2	---	---	25	---	25	1
Computer Network Lab*	D	---	---	2	2	---	---	25	25 **(PR)**	50	1
System Programming Lab*	D	---	---	2	2	---	---	25	25 **(OR)**	50	1
Java Programming Lab*	B	1	---	2	3	---	---	50	---	50	2
Industrial Training / EDP / Special Study*	D	---	---	---	---	---	---	25	---	25	2
Total		**16**	**---**	**10**	**26**	**100**	**400**	**175**	**75**	**750**	**23**

ISE: Internal Sessional Examination **ESE: End Semester Examination** **ICA : Internal Continuous Assessment**

*** Common Subjects with TE Comp**

TE Semester – VI

Name of the Course	Group	Teaching Scheme				Evaluation Scheme					Credits
						Theory		Practical		Total	
		Theory Hrs / week	Tutorial Hrs / week	Practical Hrs / week	Total	ISE	ESE	ICA	ESE		
Operating System*	D	3	--	---	3	20	80	---	---	100	3
Object Oriented Modeling & Design*	D	3	---	---	3	20	80	---	---	100	3
Database Management System*	D	3	---	---	3	20	80	---	---	100	3
E-Commerce	D	3	---	---	3	20	80	---	---	100	3
Management Information System*	C	3	---	---	3	20	80	---	---	100	3
Operating System Lab*	D	---	---	2	2	---	---	25	25 **(OR)**	50	1
Object Oriented Modeling & Design Lab*	D	---	---	2	2	---	---	25	25 **(OR)**	50	1
Database Management System Lab*	D	---	---	2	2	---	---	25	25 **(PR)**	50	1
Web Programming Lab*	B	---	---	2	2	---	---	25	---	25	1
Minor Project*	D	---	---	2	2	---	---	50	---	50	2
Seminar – I*	D	---	---	2	2	---	---	25	---	25	2
Total		**15**	**---**	**12**	**27**	**100**	**400**	**175**	**75**	**750**	**23**

ISE: Internal Sessional Examination **ESE: End Semester Examination** **ICA: Internal Continuous Assessment**

*** Common Subjects with TE Comp**

Software Engineering

COURSE OUTLINE

Course Title — Short Title — Course Code
Software Engineering — **SE**

Course Description:
The objective of this course is to introduce students the knowledge of Software Development Life Cycle, application of analysis, design, testing principles and project planning & management concepts to develop quality software economically.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	03	14	42	03

Prerequisite Course(s): Knowledge of programming languages and data structures.

COURSE CONTENT

Software Engineering **Semester-V**

Teaching Scheme

Lecture: 3 Hours/Week

Examination Scheme

End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

1. Introduction to Software Engineering (08Hrs, 16 Marks)

a. Nature of Software
b. Software Process
c. Software Engineering Practice
d. Software Myths
e. Generic Process model
f. Process Assessment and Improvement
g. Perspective Process Models
h. Specialized Process Models
i. Personal and Team Process Models
Agile Process models:
j. Agile process
k. Extreme programming

2. Requirements Engineering (08Hrs, 16 Marks)

Requirements Engineering:
a. Eliciting Requirements
b. Building the Requirements Model
c. Negotiating requirements
d. Validating requirements
e. Requirements Analysis

f. Scenario-Based Modeling
g. Requirements modeling strategies
h. Flow-Oriented Modeling
i. Data modeling Concepts
j. Class based modeling
k. SRS.

3. Design Engineering (08Hrs, 16 Marks)

a. Design Process
b. Design Concepts
c. The Design Model
Architectural Design:
d. Software Architecture
e. Architectural Styles
f. Architectural Design
User Interface Design:
a. Rules
b. User Interface Analysis and Design
c. Interface Analysis
d. Interface Design Steps
e. Pattern Based Design
f. Design Patterns
g. Pattern Based software Design
h. Component Level Design patterns
i. User Interface Design patterns
j. WebApp Design patterns
Introduction to UML Diagrams.

4. Software Testing (08Hrs, 16 Marks)

Testing Strategies:
a. A Strategic approach to Software Testing
b. Strategic Issues
c. Testing Strategy for Conventional Software
d. Testing Strategy for Object-Oriented Software
e. Testing strategies for Web App
f. Validation Testing
g. System Testing
Testing Tactics:
h. Testing Fundamentals
i. White Box Testing
j. Basis Path Testing
k. Control Structure Testing
l. Black Box Testing

5. Software Project Planning & Management Concepts (08Hrs, 16 Marks)

a. Management Spectrum
b. People
c. Product

d. Process
e. Project
f. Critical Practices

Estimation for software project:

g. Project Planning Process
h. Software scope and feasibility
i. Resources
j. Decomposition Techniques
k. Empirical Estimation Models
l. Make/Buy Decision

Project Scheduling:

a. Task set for Software project
b. Defining a task network
c. Scheduling
d. Earned Value Analysis

Product Metrics:

e. A framework for product metrics
f. Software Quality
g. Software Quality Factors

Text Books:

1. Pressman R., "Software Engineering, A Practitioners Approach", 7th Edition, Tata McGraw Hill.

Reference Books:

1. Rajib Mall, "Software Engineering", 3rd Edition, PHI.
2. Pankaj Jalote, "An Integrated Approach to Software Engineering", 3rd Edition, Springer.
3. Sommerville, "Software Engineering", 8th Edition, Pearson.
4. Fairly R. , "Software Engineering", Tata McGraw Hill.
5. Davis A. , "Principles of Software Development", Tata McGraw Hill.
6. Shooman, M.L., "Software Engineering", Tata McGraw-Hill.

Formal Language and Automata Theory

COURSE OUTLINE

Course Title — Short Title Course Code

Formal Language and Automata Theory — **FLAT**

Course Description:
The objective of this course is to introduce the students the knowledge of automata Theory, principles of Grammars, Push down Automata, Turing Machines and enable them to apply these concepts for solving real world problems.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	03	14	42	03

Prerequisite Course(s): Knowledge of Discrete Structure & Graph Theory and Data Structures.

COURSE CONTENT

Formal Language and Automata Theory — **Semester-V**

Teaching Scheme
Lecture: 3 hours / week

Examination Scheme
End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

1. Finite State Machines: **(08 Hrs, 16 Marks)**

Mathematical Preliminaries:

a. Sets , Relations and Functions
b. Alphabets, Words / Strings, their Properties and operations
c. Graphs and trees
d. Basic machine

Finite State Machines:

e. State tables, Transition graph
f. Adjacency matrix
g. Description of a Finite automaton
h. Transition Systems
i. Properties of Transition functions
j. Acceptability of a string by a FA
k. Deterministic and Non-deterministic FSM's
l. Equivalence of DFA and NFA
m. Moore and Mealy Models
n. Minimization of Finite Automata
o. FSM with Epsilon moves

2. Regular Expressions: (08 Hrs, 16 Marks)

a. Definition, Identities for Regular Expressions
b. Finite Automata and Regular Expressions

   Transition System Containing ^-moves, NDFAs with ^-moves and Regular Expressions, Conversion of Nondeterministic Systems to Deterministic Systems
c. Building RE
d. Construction of Finite Automata Equivalent to a Regular Expression
e. Conversion of RE to FA
f. Converting FA to RE
g. Equivalence of two FA
h. Pumping lemma for regular sets
i. Applications of Pumping lemma
j. Closure properties of Regular sets

(08 Hrs, 16 Marks)

3. Grammars:

a. Definition
b. Derivation trees
c. Leftmost and Rightmost Derivations
d. Ambiguous grammar
e. Removal of ambiguity
f. Chomsky hierarchy
g. Construction of Reduced Grammar
h. Eliminating Useless symbols
i. Eliminating Epsilon productions
j. Eliminating Unit productions

Normal Forms for Context – free Grammars

k. Chomsky Normal Form
l. Greibach Normal Form
m. Reduced Forms – CNF and GNF
n. Reduction to CNF and GNF
o. Pumping Lemma for Context – free Languages
p. Decision Algorithms for Context- free Languages

4. Pushdown Stack Memory Machines & Production Systems (08 Hrs, 16 Marks)

Pushdown Stack Memory Machines:

a. Definition, PDM examples
b. Acceptance by PDA
c. Power of PDM
d. Deterministic and Non-deterministic PDM
e. Construction of PDA from CFG
f. Construction of CFG from PDA

Production Systems:

a. Definition, Post canonical system
b. PMT systems
c. Markov algorithm

5. Turing Machine: **(08 Hrs, 16 Marks)**

a. Turing Machine Model
b. Representation of Turing Machines
c. Language Acceptability By Turing Machines
d. Design of Turing Machines
e. Techniques for TM Construction
f. Variants of Turing Machines
g. Composite and Iterated TM
h. Universal TM
i. TM limitations
j. The Halting problem

Text Books -

1. E V Krishnamurthy, S.K.Sen, “Introductory Theory of Computer Science”, Second Edition, EWP.
2. John E. Hopcroft, Rajeev Motwani, Jeffery D. Ullman, “Introduction to Automata Theory, Languages and Computation”, Third Edition, Pearson.
3. K.L.P.Mishra, N. Chandrasekaran, “Theory of Computer Science Automaton, Languages and Computation”, Third Edition, PHI.

Reference Books -

1. Daniel Cohen, “Introduction to computer Theory”, Wiley India.
2. John Martin, “Introduction to Languages and the Theory of Computation”, TMH.
3. Lewis H., Papadimitriou C., "Elements of Theory of Computation", Second Edition, Pearson.
4. Moret B., “The Theory of Computation", Pearson Education.

Computer Network

COURSE OUTLINE

Course Title	Short Title	Course Code
Computer Network	**CN**	

Course Description:

This course is aimed at introducing the fundamentals of Computer Networking to undergraduate students. The objective of the course is to understand the basics and knowledge about the Computer Network concepts and different protocols.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Lecture	**03**	**14**	**42**	**03**

Prerequisite Course(s): Data Communications.

COURSE CONTENT

Computer Network **Semester-V**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week

End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

1. TCP/IP Protocol Suit, Data Link Layer and Ethernet
(08 Hours, 16 marks)

TCP/IP Protocol Suit: Physical and Data Link Layers, Network Layer, Transport Layer, Application Layer. Addressing: Physical Addresses, Logical Addresses, Port Addresses, Specific Addresses.
Data Link Layer: Framing: Fixed size and variable size framing.
Ethernet: IEEE Standards: Data Link Layer, Physical Layer. Standard ETHERNET: MAC Sublayer, Physical Layer. Changes in the standard: Bridged Ethernet, Switched Ethernet, Full-Duplex Ethernet. Fast Ethernet: MAC Sublayer, Physical Layer. Gigabit Ethernet: MAC Sublayer, Physical Layer, Ten-Gigabit Ethernet.

2. Network Layer: Logical Addressing, Internet Protocol and Address Mapping
(08 Hours, 16 marks)

Logical Addressing: IPv4 Addresses: Address Space, Notations, Classful Addressing, Classless Addressing, Network Address Translation (NAT).
Internet Protocol: IPv4: Datagram, Fragmentation, Checksum, Options. IPv6: Structure, Address Space, Advantages, Packet Format, Extension Headers, Transition from IPv4 to IPv6: Dual Stack, Tunneling, Header Translation.
Address Mapping: Mapping Logical to Physical Address: ARP, Mapping Physical to Logical Address: RARP, BOOTP and DHCP.

3. Network Layer: Error Reporting, Delivery, Forwarding and Unicast 7 Mulicast Routing Protocols **(08 Hours, 16 marks)**

Error Reporting: ICMP: Types of Messages, Message Format, Error Reporting, Query, Debugging Tools.

Delivery: Direct Versus Indirect Delivery.

Forwarding: Forwarding Techniques, Routing Table.

Unicast Routing Protocols: Optimization, Intra and Interdomain Routing, Distance Vector Routing, Link State Routing, Path Vector Routing.

Multicast Routing Protocols: Source-Based Tree and Group-Shared Tree, MOSPF, Core-Based Tree (CBT).

4. Transport Layer: UDP and TCP

(08 Hours, 16 marks)

Transport Layer: Transport-layer services: Process-to-Process Communication, Addressing: Port Numbers, Encapsulation and Decapsulation, Multiplexing and Demultiplexing, Flow Control and Error Control.

User Datagram Protocol (UDP): User Datagram, UDP Services: Process-to-Process Communication, Connectionless Services, Flow Control and Error Control.

Transmission Control Protocol (TCP): Services, Features, Segment, Connection, Flow Control, Error Control and Congestion Control: open-loop congestion control and closed-loop congestion control.

5. Wireless Networks: 802.11 and Network Security

(08 Hours, 16 marks)

Introduction to Wireless Network: Why Wireless? 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 Operations, Mobility Support.

Network Security: Introduction to cryptography, symmetric-key and asymmetric-key cryptography. Symmetric-Key cryptography: Introduction, traditional ciphers, simple modern ciphers: XOR Cipher, Rotation Cipher, Substitution Cipher: S-box, Transposition Cipher: P-box. Asymmetric-Key cryptography: RSA, Diffie-Hellman algorithms.

Text Books:

1. B. A. Forouzan, "Data Communications and Networking", TMH, Fourth Edition.
2. A. S. Tanenbaum, "Computer Networks", Pearson Education, Fourth Edition.
3. Matthew S. Gast, "802.11 Wireless Networks: The Definitive Guide", O'Reilly, Second Edition.

Reference Books:

1. B. A. Forouzan, “TCP/IP Protocol Suite", TMH, Fourth Edition.
2. W.R. Stevens, “Unix Network Programming”, Vol.1, Pearson Education.
3. S. Keshav, “An Engineering Approach to Computer Networking”, Addison Wesley.
4. Comer, “Internetworking with TCP/IP", Vol. 1, Pearson Education, Fourth Edition.
5. W. Stallings, “Data and Computer Communications", Pearson Education, Fifth Edition.

System Programming

COURSE OUTLINE

Course Title	Short Title	Course Code
System Programming	**SP**	

Course Description:
The objective of this course is to introduce the students to the fundamentals of System Programming. In this basic system programs are studied in order to understand the working of system software.

	Hours per week	No. of Weeks	Total Hours	Semester Credits
Lectures	**03**	**14**	**42**	**03**

Prerequisite Course(s): Discrete Structure and Graph Theory, Data Structures.

COURSE CONTENT

System Programming **Semester-V**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week | **End Semester Examination (ESE) : 80 Marks**
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

1. Introduction to System Programs and Assembler: (08 Hours, 16 marks)

a. Introduction to system programming, Types of software and application software, System programming and system programs, Need of system software. Assemblers, Loaders, Compilers, Interpreters, Macros, Operating system and formal system, Translators and its types.
b. Assemblers: Structure of assembler, basic function, Machine dependent and machine independent features of assembler, Types of assemblers – single pass, multi-pass, cross assembler.
c. General design procedure of assembler, Design of Pass-I and Pass-II assembler (with reference to 8086 assembler).
d. Operating System:- concept, services, types (brief introduction only).

2. Macro processor & Loader: (08 Hours, 16 marks)

a. Macros and Macro Processors: Definition and function of Macro Processor, Macro expansion, Features of macro facility.
b. Design of macro processor – single pass and two pass macro processor, detailed design of two pass macro processor.
c. Loaders and Linkage Editors: Basic loader functions, Relocation and linking concepts, various loader schemes (Compile and go loader, Absolute loader, Relocating loader, general loading scheme) with their advantages and disadvantages.

3. Loader, Linker & Grammar: (08 Hours, 16 marks)

a. Design of direct linking loaders, specification of problem, specification of data structures, format of databases.
b. Design of a linker, A linker for MS DOS, Linking for overlays.
c. Other loader schemes – Binders, Linking loaders, Overlays, Dynamic binders.
d. Grammar and scanner, Programming language grammar, Derivation, Reduction and Syntax tree, Ambiguity, Regular grammar and Regular expression.

4. Parser and Parsing Techniques (08 Hours, 16 marks)

a. Parsing Techniques: - Concept, Top Down and Bottom up Parsing.
b. Top Down Parsing :- limitations of Top Down Parsing -Recursive descent and Predictive Parsing
c. Bottom Up Parsing:- Concept, Shift Reduce Parser, LR Parser, LALR, SLR Parser
d. Operator Precedence Parser, Syntax directed translation (Concept and introduction only).
e. Introduction to software development tools LEX & YACC.

5. Compiler & Inter Process Communication (08 Hours, 16 marks)

a. Overview of compilation process, Basic functions of complier, Machine dependent and machine independent features of compiler.
b. Types of compilers – single pass, multi-pass, cross compiler and pseudo code compiler,
c. Phase structure of compiler.
d. Introduction to inter process communication in windows(DLL, DDE, OLE, Clipboard:- concept and introduction only).

Reference Books:

1. John J. Donovan, "System Programming", 2nd Edition, TATA Mc GRAW HILL.
2. D. M. Dhamdhere, "System Programming and Operating Systems", Second Revised Edition, TATA Mc GRAW HILL.
3. Aho Alfred V, Sethi Rav and Ullman D, "Compiler Principles Techniques and Tools", 2nd Edition, Pearson Education.

Principles of Management

COURSE OUTLINE

Course Title	Short Title	Course Code
Principles of Management	**POM**	

Course Description:
The objective of this course is to introduce the students to the Knowledge of Functions of Management and Project management, life-cycle of project, its scheduling and total quality management enable them to Understood and gain for further study.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	03	14	42	03

COURSE CONTENT

Principles of Management **Semester- V**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week

End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

1. **Basic Concepts of Management** **(08 Hours, 16 marks)**

   a. Management :Definition, classification, Characteristics and Importance of management, Principles of Management
   b. Management objectives, Types of objectives
   c. Functions of managers, Managerial accounting
   d. Development of management thoughts : Functional approach to management by Henry Foyal
   e. Scientific Management Approach by Taylor, Gilbreth, Gantt
   f. Human Relation Approach by Elton Mayo,Follet
   g. Schools of management Thoughts
   h. Tools of Management science, Managerial economics

2. **Functions of Management and Organisations**

   (08 Hours, 16 marks)

   a. Functions of Management: Planning, Organising
   b. Staffing - Concept, Nature, Importance, Steps, Concept of Knowledge worker
   c. Directing– Concept, Nature, Importance
   d. Controlling-Concept, Nature, Importance, Process of controlling Leadership theories, characteristic and styles of leaderships
   e. Management by objectives: steps in setting up M.B.O, Problem in the approach of M.B.O., Management of participation, management by exception, quantitative and qualitative objectives
   f. Organisation and its Concept: Nature, Importance, Principles, Centralization, Decentralization
   g. Organization Structures- Line and Staff, Functional, Organizations.

3. Human Resource Management

(08 Hours, 16 marks)

a. Function and objective Personnel Management
b. Manpower Planning, Selection and Recruitment of Employees
c. Needs & Types of Training, Objective and Benefits of training, Training for Craftsman, supervisor and Executive
d. Motivation and motivators: motivations, perspective: self-motivation
e. Motivation: the carrot and the sticks, kinds of Motivation, Herzberg's motivation, Hygien Theory
f. Personal management: concept, principles of good personal policy
g. Communication in industry, suggestion system, discipline in industry, promotion, transfer, layout and discharge

4. Project and Quality Management

(08ours, 16 marks)

a. Introduction, Project Management Terminology, Concept of project Management
b. Role and Responsibilities of Project Manager
c. Types of project, Project Life Cycle Phase
d. Project Planning, Project Scheduling, Project Monitoring and Control
e. Basic tools and Techniques for Project Scheduling
f. Total quality management: Introduction, factors affecting quality,
g. product quality analysis, product quality analysis, causes of quality failure
h. elements of T.Q.M , requirements of T.Q.M, Aims of T.Q.M., quality circles, ISO 9000

5. Industrial Psychology, Ethics and MIS

(08 Hours, 16 marks)

a. Industrial Psychology: Definition and Concepts, Industrial psychology Vs Personal Management
b. Aims and Objectives of Industrial Psychology, Scope
c. Individual difference in behavior, Group Dynamics
d. Theory X and Y, Working Environmental Conditions, Industrial Fatigue
e. Professional and Business Ethics: Concepts, Ethics and Morals, Business Ethics, Professional Ethics
f. Need and Importance of ethics, Ethical problems and business, Ethical Issues, How to make business ethical
g. Definition, Evolution of MIS, Need/Objective/Functions of an MIS, Need for Information, Qualities of Good information
h. Information as an Organizational Resource, Management Information Categories, Application of MIS

Text Books:

1. T.R.Banga & S.C.Sharma , "Industrial Organization and Management Economics" Twenty-Third Edition, Hanna Publishers.

2. O.P.Khanna, “Industrial Organization and Management Economics”, Dhanpat Rai Publications, 2006.

Reference Books:

1. Koontz and Weihrich, “Management –A Global Perspective”, Tenth Edition, Mc Graw-Hill International Editions.
2. Tritaphy and Reddy, “Principles of Management”, Second edition, TMH.
3. Hill and Steven, “Principles of Management”, McGraw Hill, Special Indian Edition, 2007.
4. M.S.Mahajan,” Industrial Engineering and Production Management” Dhanpat Rai and Co.
5. W.S.Jawadekar, “Management Information System”, TMH.

Software Engineering Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code

Software Engineering **SE**

Course Description:
This laboratory provides students an ability to apply analysis & design concepts to develop quality software economically.

Laboratory	Hours/Week	No. of Weeks	Total Hours	Semester Credits
	02	14	28	01

Prerequisite Course(s) : Knowledge of Object Oriented Concepts and any system programming language.

LAB COURSE CONTENT

The Software Engineering Lab must include any five of following software Mini-Projects covering Problem Definition, Analysis & Design using a CASE Tool and Documentation for each.

1. ATM System
2. Library Management System
3. Inventory Control System
4. Railway Reservation System
5. College Admission System
6. University Result Management System
7. Vehicle Navigation System
8. Hospital Management System
9. Banking System
10. Web based/Online Auction System

Guidelines for ICA:
Students must submit ICA in the form of journal. Each assignment should be well documented. Faculty in charge will assess the assignments continuously and grade or mark each assignment on completion date declared for each assignments.

Guidelines for ESE:
The oral examination will be based on the assignments performed by the candidates as part of ICA. Questions will be asked during the oral examination to judge the understanding of the student. It is expected that student knows theoretical (Software Engineering) aspect of the problem.

Reference Books:

1. Timonthy C. Lethbridge and Robert Laganiere, “Object Oriented Software Engineering – A Practical Software Development using UML and JAVA”, 2nd Edition, Tata McGraw-Hill.

2. Mike O’Docherty, “Object-Oriented Analysis & Design – Understanding System Development with UML 2.0”, Wiley.

Note:-

- Use of Open Source Tool / Technology is recommended for laboratory assignments of concern subject.

Linux Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Linux	**Linux**	

Course Description:

This laboratory provides students with a basic knowledge of the linux programming environment. So that students able to use basic commands of linux as well as they will able to perform basic operations.

Laboratory	Hours / Week	No. of Weeks	Total Hours	Semester Credits
	02	**14**	**28**	**01**

Total Semester Credits: 01

Prerequisite Course(s): Fundamental knowledge of Operating system.

LAB COURSE CONTENT

Outline of Content:

Teacher should facilitate learning following lab experiments:

Group A

1 **Installation of Linux OS.**
Installing latest version of Linux. Observing each step of installation and notice the differences.

2 **Study and execution of various Linux Commands.**
Studying various basic commands of Linux. Use of commands.

3 **Study of vi editor.**
Studying basic working and use of vi editor.

4 **Configuration of Linux Server (any two)**
It shows step by step Configuration of various types of servers
   1) Web Server
   2) Mail Server
   3) Proxy Server
   4) Telnet Server
   5) FTP Server

5 **Shell script for finding out factorial of a number.**
To calculate the Factorial of number.

6 **Shell script for finding out file type and displaying list of a directory.**
To find out file type and displaying list of directory.

7 **Shell Script for File Handling.**
Demonstrates the various file operations such as :
   1) Create a File.
   2) Read a File.
   3) Add a record into a File.
   4) Delete a record from File.
   5) Delete a file.
   6) Update a File.

Group B

1 **Write shell script for displaying user process and system related information using environment variables.**
Displays a user process and system related information using environment variables.

2 **Write a shell script to find the largest among the 3 given numbers.**
To find out largest number among 3 given numbers.

3 **Write a shell script to reverse the contents of a String.**
To print contents of string in reverse order.

4 **Write a shell script to print date and time.**
To print date and time along with greetings depend on time.

5 **Shell script to perform arithmetic operations.**
To perform arithmetic operations such as – Addition, Subtraction, Multiplication, Division **.**

Guidelines for ICA:
Students must submit ICA in the form of journal. Each assignment should be well documented. Faculty in charge will assess the assignments continuously and grade or mark each assignment on completion date declared for each assignments.

Reference Books:

1. Stevens Richard W, Rago Stephen A “Advanced programming in the unix environment”, Pearson 2008.
2. Gopalan N P,Sivaselvan B “Beginners guide to unix”, PHI Learning: New Delhi, 2009.
3. Richard Blum, Christine Bresnahan, “Linux Command Line and Shell Scripting Bible, 2nd Ed ”, Wiley India, 2011.
4. Dayanand Ambawade, Deven N. Shah, “Linux Lab: Hands on Linux”, Dreamtech Press
5. “Linux Administration”, Kogent Learning Solutions Inc.
6. Evi Nemeth, Garth Snyder, Trent R. Hein, Ben Whaley, “Unix and Linux System Administration Handbook” 4th Edition, Pearson.
7. Neil Matthew, Richard Stones ,“Beginning Linux Programming”, 4th Edition, Wiley.
8. K. L. JAMES, “Linux -Learning the Essentials”, PHI,2011.

Note:

- Concerned faculty should suitably frame at least **10 practical** assignments **(SIX from PART – A and FOUR from PART – B)** out of the above list.
- Every assignment should include syntax, use of commands/functions used for coding & print out of code with proper comments and output.
- Every student is required to submit the assignments in the form of journal.
- Use of Open Source Tool/Technology is recommended for laboratory assignments of concern subject.

Computer Network Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Computer Network	**CN**	

Course Description:

This laboratory provides students with a comprehensive study of the Computer Networking and protocols. Classroom lectures stress the strengths of Computer Networks, which provide students with the means of writing efficient, maintainable, and portable code and simulating protocols and networks.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	**02**	**14**	**28**	**01**

Total Semester Credits: 01

Prerequisite Course(s): Fundamental knowledge of Computers and Data Communication, C, C++ and Java Programming.

LAB COURSE CONTENT
Outline of Content:

(Note: Minimum SIX Experiments from PART A and TWO from PART B.)

PART - A

1. Implementation of Character count/Bit-Stuffing/Byte stuffing framing methods.
2. Implementation of Dijkastra's Shortest Path Network routing algorithm.
3. Implementation of TCP checksum.
4. Socket programming for TCP.
5. Socket programming for UDP.
6. Encryption/Decryption using XOR symmetric-key cryptography algorithm.
7. Encryption/Decryption using RSA asymmetric-key cryptography algorithm.
8. Implementation of RLE data compression algorithm.

PART – B

1. Simulate the Ethernet LAN for wired networks.
2. Simulate the point-to-point wired network.
3. Simulate any Wireless network.

Guidelines for ICA:

Students must submit ICA in the form of journal. Each assignment should be well documented. Faculty in charge will assess the assignments continuously and grade or mark each assignment on completion date declared for each assignments.

Guidelines for ESE:

ESE will be based on the practical assignments submitted by the students in the form of journal. In the ESE, the students may be asked to perform the practical assignment with minor modification.

Evaluation will be based on the paper work of algorithm, understanding of the logic and the syntax, quality of the program, execution of the program, type of input and output for the program.

NOTE: -

- Concerned faculty should use any network simulator software like NS-2/NS-3/ OPNET/ NetSim/ OMNeT++ to perform **PART-B** assignments.
- Concerned faculty should suitably frame at least **08 practical** assignments **(SIX from PART – A and TWO from PART – B)** out of the above list.
- Every assignment should include, theory, algorithm, print out of code with proper comments and output. Every student is required to submit the assignments in the form of journal.
- Use of Open Source Tool/Technology is recommended for laboratory assignments of concern subject.

System Programming Lab

LAB COURSE OUTLINE

Course Title | Short Title | Course Code
System Programming | **SP** |

Course Description:

The objective of this course is to introduce the students to the fundamentals of System Programming. In this basic system programs are studied in order to understand the working of system software.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	02	14	28	01

Total Semester Credits: 01

Prerequisite Course(s): Fundamental knowledge of Discrete Structures and Graph Theory, Data Structures.

LAB COURSE CONTENT
Outline of Content:

1 **Develop an application to simulate pass-I of Two Pass Assembler.**
To analyse the source program for finding Pseudo–opcode, Machine opcode, Literals and symbols.

2 **Develop an application simulate pass- II of Two pass Assembler.**
To analyse the output of pass-I to generate the machine operation code.

3 **Develop an application to create simple text editor.**
Develop a text editor for creation, opening, editing and saving the content into a file.

4 **Develop an application for simulating Lexical Phase of compiler.**
Develop a Lexical Analyser for generating keywords, symbols, operators and identifires within the source code.

5 **Develop an application for simulating Syntax Analysis Phase of compiler.**
Develop a Syntax Analyser for generating a Parse tree from source code.

6 **Develop an application for simulating Pass-I of Macro Processor.**
Develop Pass-I of Macro processor for recognizing macro definition specified within a program.

7 **Develop an application for simulating Pass-II of Macro Processor.**
Develop Pass-II of an Macro processor for expanding a macro definition specified within a program

8 **Develop an application for simulation of any one of parsing techniques.**
Develop a parser from the grammar specified within a source code.

Guidelines for ICA:

Students must submit ICA in the form of journal. Each assignment should be well documented. Faculty in charge will assess the assignments continuously and grade or mark each assignment on completion date declared for each assignments.

Guidelines for ESE:

- ESE will be based on the practical assignments submitted by the students in the form of journal.
- In the ESE, the students may be asked to perform the practical assignment with minor modification.

Note:

- Concerned faculty should suitably frame at least **06 practical** assignments out of the above list.
- Every assignment should include theoretical concept, algorithm, print out of code with proper comments and output.
- Every student is required to submit the assignments in the form of journal.
- Use of Open Source Tool / Technology is recommended for laboratory assignments of concern subject.

Java Programming Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Java Programming	**JPL**	

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	**02**	**14**	**28**	**01**

Group-A

1 **Write a program that demonstrates string operations.**

2 **Write a program that demonstrate package creation and use in program.**

3 **Write a program to demonstrate the abstract class and abstract method**.

4 **Write a Java program that illustrates the concepts of Java class that includes**
- (a) constructor with and without parameters.
- (b) Overloading methods.
- (c) Overriding methods

5 **Write a Java program to demonstrate inheritance by creating suitable classes.**

6 **Create a Java package, interface and implement in Java program.**

7 **Write a program to demonstrate**
- Use of implementing interfaces.
- Use of extending interfaces.

Group- B

1 **Write a program to implement the concept of threading.**

2 **Write a program to demonstrate the predefined and User defined exception handling.**

3 **Write a program using Applet**
- to display a message in the Applet.
- for configuring Applets by passing parameters.

4 **Write programs for using Graphics class**
- to display basic shapes and fill them.
- draw different items using basic shapes
- set background and foreground colors.

5 **Write a program in Java that demonstrates JDBC**

6 **Write a program that demonstrates JDBC on applet/application**

Guidelines for ICA:
Students must submit ICA in the form of journal. Each assignment should be well documented. Faculty in charge will assess the assignments continuously and grade or mark each assignment on completion date declared for each assignments.

Reference Books:

1. Herbert Schildt, "Java2:The Complete Reference" , Tata Mc GrawHill, 5th edition.
2. E. Balagurusamy , "Programming with Java A primer", 3rd Edition.
3. Horstman Cay and Cornell Gary, "Core JavaTM2", Vol.1, Pearson education.
4. Kathey Sierra and Bert Bates, "Head First Java", SPD Publication.
5. Steven Holzner, "JAVA 2 Programming Black Book", Wiley India.

Note:

- Concerned faculty should suitably frame at least **08 practical** assignments **(FIVE from PART – A and THREE from PART – B)** out of the above list.
- Every assignment should include algorithm, print out of code with proper comments and output.
- Every student is required to submit the assignments in the form of journal.
- Use of Open Source Tool/Technology is recommended for laboratory assignments of concern subject.

Industrial Training / EDP / Special Study

COURSE CONTENT

Industrial Training / EDP / Special Study	**IT/EDP/SS**	
Course Title	Short Title	Course Code

Semester-V — **Examination Scheme**

Total Semester Credits: 02 — **Internal Continuous Assessment (ICA): 25 Marks**

Industrial Training

- Student shall undergo industrial training for a minimum period of **two weeks** during summer vacations between fourth semester and fifth semester.
- The industry in which industrial training is taken should be a medium or large scale industry
- The paper bound report on training must be submitted by the student in the beginning of Fifth semester along with a certificate from the company where the student took training.
- Every student should write the report separately.
- Institute / Department/T&P Cell have to assist the students for finding Industries for the training.
- Students must take prior permission from Department before joining for Industrial Training.

OR

EDP (Entrepreneurship Development Program)

- Student has to participate in Entrepreneurship Development Program for a minimum period of **One week** during summer vacations between fourth semester and fifth semester.
- Every student must submit the paper bound report based on the program in the beginning of Fifth semester along with a certificate (Course / Program completion) from the program organizers.
- Every student should write the report separately.
- Institute / Department may arrange Entrepreneurship Development Program at their campus.
- Students must take prior permission from Department before attending any Entrepreneurship Development Program.

OR

Special Study

- Student has to submit name of three topics of his interest to the department.
- Special study in a group shall not be allowed.
- The three-member committee appointed by Head of Department shall allot one topic out of the three topics submitted by the student.
- Every student must submit the paper bound report based on special study at the end of Firth semester.
- Department should allot guide to all such students, for monitoring their progress and guide them for literature survey / report writing etc.
- Evaluation of special study shall be done based on presentation made by student, followed by brief question answer session.

Evaluation of Industrial Training / EDP / Special Study

ICA: The Internal Continuous Assessment shall be based on the active participation of the students in the training / EDP / Special study and based on knowledge / skill acquired by the student. The three-member committee appointed by Head of Department shall assess the reports and award marks based on following:

(a) Report	10 marks.
(b) Presentation	10 marks.
(c) Viva-voce at the time of presentation	05 marks.
Total:	**25 marks.**

NORTH MAHARASHTRA UNIVERSITY,

JALGAON (M.S.)

Third Year Engineering

(Information Technology)

Faculty of Engineering and Technology

COURSE OUTLINE

Semester – VI

W.E.F 2014 – 2015

Operating System

COURSE OUTLINE

Course Title	Short Title	Course Code
Operating System	**OS**	

Course Description:
The objective of this course is to introduce the students to the concepts of Operating Systems functions, types and their working details.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	03	14	42	03

Prerequisite Course(s): Computer Organization, System Programming.

COURSE CONTENT

Operating System **Semester-VI**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week
End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

1. **Operating System Overview**

(08 Hours, 16 marks)

a. Introduction: Computer system organization, Architecture, Evolution of OS, Need of OS, User view and System view of OS.
b. Types of Operating System: Batch, Timesharing, Multiprogramming, Multitasking, RTOS, Distributed.
c. Operating System Services and Components: Different OS services and OS components, System calls and its types.
d. Operating System Structures: Monolithic, Layered, Kernel, Microkernel, Virtual Machine.
e. Threads: Overview, Benefits, Models (Introduction Only).

2. **Process and Process Management**

(08 Hours, 16 marks)

a. Process Concept: The process, Process states, Process Control Block, Context Switching, SPOOLING, CPU & I/O burst.
b. Scheduling: Concept, Objectives, Queuing diagram.
c. Types of Schedulers: Long term Scheduler, Middle term Scheduler, Short term Scheduler.

d. Scheduling Algorithm (For Uniprocessor System): FCFS, SJF (preemptive & non preemptive), Priority (preemptive & non preemptive), Round Robin, MLQ with and without feedback.

e. IPC: Concept and Types.

f. Critical Section: Critical section problem, Solution to critical section problem, Mutual exclusion with busy waiting, TSL, Peterson's solution for two processes, Dijkstra's semaphore.

g. Problem in Concurrent Programming: Producer-Consumer problem, Readers–Writers problem, Dinning Philosopher problem, Monitors.

3. Deadlocks

(08 Hours, 16 marks)

a. Deadlock: System Model, Deadlock Characterization, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock.

b. Memory Management: Memory Management Requirements.

c. Memory Partitioning: Fixed and Dynamic Partitioning.

d. Memory Allocation: Allocation strategies (First Fit, Best Fit and Worst Fit), Fragmentation, Swapping, Paging and Segmentation.

e. Virtual Memory Management: Background, Demand Paging, Page Replacement (FIFO, LRU, Optimal LRU), Thrashing.

4. Storage Management

(08 Hours, 16 marks)

a. File concept: File Organization, Access Methods and Directory Structure.

b. Allocation of Disk Space: Contiguous allocation, Non-contiguous allocation (chaining and indexing).

c. Disk Scheduling: FCFS, SSTF, SCAN, C-SCAN, LOOK.

5. Secondary Storage Structure, Protection and Security, Introduction to UNIX.

(08 Hours, 16 marks)

a. Disk Management: Disk formatting, Boot block, Bad blocks.

b. Swap Space Management: Swap Space Use, Swap Space.

c. System Protection: Goals of protection, Domain of protection, Threats, Security attacks.

d. Introduction to UNIX: History, System architecture.

e. Internal Representation of File: Inode, Structure of regular file, Super block, Pipes (No Algorithms).

f. Process Control: Process creation, Process States and Transitions, Process system calls (exec, fork).

Text Books:

1. A. Silberschatz, P. B. Galvin, G. Gagne, “Operating Systems Concepts”, 7th / 8th edition, John Wiley Publications, 2008.
2. William Stalling, “Operating System Internals and Design Principles”, 6th edition, Pearson Publication, 2013.

Reference Books:

1. Maurice J. Bach, “The Design of the Unix Operating System”, 1st edition, PHI.
2. Dhananjay M. Dhamdhere, “Operating Systems-A Concept-Based Approach”, 3rd edition, TMH, 2012.
3. A. S. Tanenbaum, “Modern Operating System”, 2nd edition, Pearson publication”, 2001.
4. H. M. Deitel, P. J. Deitel, D. R. Choffnes, “Operating System”, 3rd edition, Pearson publication, 2013.
5. Rajiv Chopra, “Operating Systems-A Practical Approach”, 1st edition, S. Chand Publication, 2009.
6. Sibsankar Haldar, Alex A. Arvind, “Operating Systems”, 1st edition, Pearson Publication, 2009.

Object Oriented Modeling & Design

Course Title	Short Title Course Code
Object Oriented Modeling and Design	**OOMD**

Course Description:
The objective of this course is to introduce students the knowledge about Modeling and Design of Software firmware and business processes. It introduces UML 2.0 and its diagrams as a modeling tool for large and complex systems. It also gives understanding of the concepts being modeled in UML.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	03	14	42	03

Prerequisite Course(s): Knowledge of software engineering and object oriented concepts.

COURSE CONTENT

Object Oriented Modeling and Design **Semester-VI**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week

End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

1. Introduction of Object Oriented Modeling **(08 Hrs, 16 Marks)**
Introduction:
a. What is object-oriented?
b. What is Object oriented development? : Modeling Concept , Not Implementation , Object- Oriented Methodology , Three Models
c. Object oriented themes

Why We Model:
d. The Importance of Modeling
e. Principles of Modeling
f. Object-Oriented Modeling

4+1 View architecture,
Architectural approaches: Use case driven, Architecture-centric, Iterative and Incremental,
Rational Unified Process:
g. Characteristics of the process

Phases and Iterations:
h. Inception Phase
i. Elaboration Phase
j. Construction Phase
k. Transition Phase
l. Iterations
m. Process Workflows
n. Artifacts
o. Other Artifacts

2. Introduction to UML **(08 Hrs, 16 Marks)**
a. An Overview of the UML: Visualizing, Specifying, Constructing, Documenting
b. Background , UML Basics

c. Introducing UML 2.0

A Conceptual Model of the UML:

d. Building Blocks of the UML
e. Rules of the UML
f. Common Mechanisms in the UML: Specifications, Adornments, Common divisions
g. Extensibility Mechanisms: stereotypes, tagged values, constraints

Object Constraint Language:

h. OCL Basics, OCL Syntax, Advanced OCL Modeling

3. Class Diagram and Composite Structure Diagram (08 Hrs, 16 Marks)

Object Diagram:

a. **Terms and Concepts:**
   Common Properties, Contents, Common Uses
b. **Common Modeling Techniques:** Modeling Object Structures

Class Diagram:

c. Classes, Attributes, Operations, Abstract Classes
d. **Relationships:** Dependency, Association, Aggregation, Composition, Generalization, Association Classes, Association Qualifiers
e. **Advanced Relationships:**
   Stereotypes on Dependency, Stereotypes and Constraints on Generalization, Constraints on Association, Realization
f. Interfaces
g. Templates
h. Class Diagram: Common Properties, Contents, Common Uses
i. Common Modeling Techniques : Modeling Simple Collaborations, Modeling a Logical Database Schema
j. Forward and Reverse Engineering

Composite Structures Diagram:

k. Connectors, Ports, Structured classes and Properties

4. Behavioral Diagrams (08 Hrs, 16 Marks)

a. **Use case Diagram**
   Names, Use Cases and Actors, Use Cases and Flow of Events, Use Cases and Scenarios, Use Cases and Collaborations, Organizing Use Cases, Common Properties, Contents, Common Uses
b. **Sequence Diagram**
c. **Communication Diagram**
d. **Timing Diagram**
e. **State chart Diagram:**
   Behavioral State Machines, States, Composite States, Submachine States, Transitions, Activities, Protocol State Machines ,Pseudo States , Event Processing
f. **Activity Diagram:**
   Common Properties, Contents, Action States and Activity States, Transitions, Branching, Forking and Joining, Swimlanes, Object Flow, Common Uses

5. Package Diagram, Component Diagram, Deployment Diagram (08 Hrs, 16 Marks)

Package Diagram:

a. **Terms and Concepts**
   Names, Owned Elements, Visibility, Importing and Exporting
b. **Common Modeling Techniques:** Modeling Groups of Elements, Modeling Architectural Views

Component:

c. **Terms and Concepts**
   Names, Components and Classes, Components and Interfaces, Kinds of Components

Component Diagram:

d. Common Properties, Contents, Common Uses
e. **Common Modeling Techniques:** Modeling Source Code, Modeling an Executable Release, Modeling a Physical Database, Modeling Adaptable Systems
f. Forward and Reverse Engineering

Deployment:

g. **Terms and Concepts**
   Names, Nodes and Components, Connections

Deployment Diagram:

h. Common Properties, Contents, Common Uses
i. **Common Modeling Techniques:** Modeling an Embedded System, Modeling a Client/Server System, Modeling a Fully Distributed System
j. Forward and Reverse Engineering

Text Books:

1. James Rumbaugh , Michael Blaha , William Premerlani, Frederick Eddy, William Lorensen ,"Object- Oriented Modeling and Design", Pearson Education.
2. Grady Booch, James Rumbaugh, Ivar Jacobson, "The Unified Modeling Language User Guide", Pearson Education.
3. Dan Pilone, Neil Pitman, "UML 2.0 in a Nutshell", SPD ,O'Reilly.

Reference Books:

1. Martin Fowler, "UML Distilled: A Brief Guide to the Standard Object Modeling Language", Third Edition ,Addisioh Wesley.
2. Tom Pender, "UML 2 Bible", Wiley.
3. Meilir Page-Jones, "Fundamentals of Object Oriented Design in UML", Pearson Education.
4. Pascal Roques, "Modeling Software Systems Using UML2", Wiley.
5. Atul Kahate, "Object Oriented Analysis & Design", The McGraw-Hill Companies.
6. Mark Priestley, "Practical Object-Oriented Design with UML", TATA McGraw-Hill.
7. Craig Larman, "Appling UML and Patterns: An introduction to Object–Oriented Analysis and Design and Iterative Development", Pearson Education.
8. Mike O'Docherty, "Object-Oriented Analysis & design understanding system development with UML 2.0", John Wiley and Sons.

Database Management System

COURSE OUTLINE

Course Title	Short Title Course Code
Database Management System	**DBMS**

Course Description:
The objective of this course is to introduce the students to Learn and practice data modeling using the entity-relationship and developing database designs, apply normalization techniques to normalize the database, learn techniques for controlling the consequences of concurrent data access also understand the needs of Object based Database and Database System Architecture.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	03	14	42	03

Prerequisite Course(s): Knowledge of data structures.

COURSE CONTENT

Database Management System **Semester-VI**

Teaching Scheme

Lecture: 3 hours / week

Examination Scheme

End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

1) Introduction to DBMS **(08 Hrs, 16 Marks)**

a. Database-System Applications
b. Purpose of Database Systems
c. View of Data: Data Abstraction ,Instances and Schemas, data independence
d. Data Models: Relational Model , Entity-Relationship Model ,Object-Based data model, Semistructured Data Model
e. Database Languages
f. Data Storage and Querying
g. Transaction Management
h. Database Architecture
i. Database Users and Administrators

Database Design and E-R Model

j. Overview of the Design Process
k. The Entity Relationship Model: Entity Sets , Relationship Sets, Attributes, Constraints
l. Entity-Relationship Diagram: Basic Structure , Mapping Cardinality, Roles, Weak Entity sets
m. Extended E-R Features: Specialization, Generalization, Attribute Inheritance, Constraints on Generalizations, Aggregation

2) Structured Query Language **(08 Hrs, 16 Marks)**

a. Introduction to relational Model: structure of relational Databases, Database Schema, Keys, Schema Diagrams
b. Overview of the SQL Query Language
c. SQL Data Definition

d. Basic Structure of SQL Queries
e. Additional Basic Operations
f. Set Operations
g. Null Values
h. Aggregate Functions
i. Nested Subqueries
j. Modification of the Database

Intermediate SQL:

k. Joined Expressions: Join Conditions , Outer Joins
l. Views
m. Integrity Constraints

3) Formal Relational Query Languages (08 Hrs, 16 Marks)

The Relational Algebra:

a. Fundamental Operations:
   The select Operation, The Project Operation, The Union Operation, The Set-Difference Operation, The Cartesian-Product Operation, The Rename Operation, Formal definition of Relational Algebra
b. Additional Algebra Operations:
   The Set-Intersection Operation, The Natural-Join Operation, The Assignment Operation, Outer Join Operations
c. Extended Relational-Algebra Operations:
   Generalized Projection, Aggregation

The Tuple Relational Calculus:

d. Formal Definition
e. Example Queries

The Domain Relational Calculus:

f. Formal Definition
g. Example Queries

Functions and Procedures

Triggers

4) Relational Database Design and Transaction Management (08 Hrs, 16 Marks)

Relational Database Design:

a. Features of Good Relational Designs
b. Atomic Domains and First Normal Form
c. Decomposition Using Functional Dependencies:
   Keys and Functional Dependencies, Boyce-Codd Normal Form, BCNF and Dependency Preservation, Third Normal Form
d. Decomposition Using Multivalued Dependencies: Multivalued Dependencies, Fourth Normal Form

Transaction Management:

e. Transaction Concept
f. A simple Transaction Model
g. Transaction Atomicity and Durability

Concurrency Control:

h. Lock-Based Protocols: Locks, Granting of Locks, The Two Phase Locking protocol
i. Timestamp–Based Protocols: Timestamps , The Timestamps-Ordering Protocol

Recovery System:

j. Failure Classification
k. Storage
l. Recovery and Atomicity: Log records, Database Modification, Concurrency Control and Recovery ,Transaction Commit , Using the Log to Redo and Undo Transactions

5) Object–Based Databases and Database- System Architectures (08 Hrs, 16 Marks)
Object–Based Databases

a. Overview,
b. Complex Data Types
c. Structure Types and Inheritance in SQL
d. Table Inheritance
e. Array and Multiset Types in SQL: Creating and Accessing Collection Values, Querying Collection-Valued Attributes
f. Object–Identity and Reference Types in SQL
g. Persistent Programming Languages: Persistence of Objects, Object Identity and Pointers

Database-System Architectures

h. Centralized and Client–Server Architectures
i. Server System Architectures
j. Parallel Systems
k. Distributed Systems

Text Book:

1. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, “Database System Concepts”, 6th Edition, McGraw-Hill.

Reference Books:

1. R. Ramkrishnan , J. Gehrke, "Database Management Systems", 3rd Edition, McGraw-Hill.
2. C. J. Date, “Introduction to Database Management Systems”, 8th Edition, Pearson.
3. V.K.Jain, “ Database Management System”, Dreamtech Press (Wiley India).
4. Atul Kahate, “Introduction to Database Management System”, 3rd Edition, Pearson.
5. G. K. Gupta, “Database Management Systems”, McGraw–Hill.
6. S. K. Singh, “Database Systems Concepts, Design and Applications”, Pearson.
7. Bipin Desai, “Introduction to database management systems”, Galgotia.

E-Commerce

COURSE OUTLINE

Course Title	Short Title	Course Code
E- Commerce	**E-Com**	

Course Description:

The aim of this course is to equip students with the range of technical and business skills needed to study and understand e-commerce concepts and practices in a business environment. The student gains an overview of all aspects of E-Commerce. The course provides different types of e-commerce, concepts of C2C, P2P, M-Commerce business models. Major security threats in the e-commerce environment along with technology solutions are discussed. Later part of course is devoted to e-commerce payment, marketing communications, ethical issues in e-commerce and online content.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	03	15	45	03

Prerequisite Course(s): Principles of Management

COURSE CONTENT

E-commerce **Semester-IV**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week

End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

1. **Introduction to E-Commerce and Business Models**
   (08 Hours, 16 marks)

   I. Introduction to E-Commerce
   a. What is E-Commerce
   b. The difference between E-commerce and E-business
   c. Why study E-Commerce?
   d. Eight unique features of E-Commerce technology
   e. Types of E-commerce

   II. E-commerce Business Models
   a. Introduction
   b. Eight Key Elements of a Business Model
   c. Business Models in Emerging E-commerce Areas

2. **Security Issues and Technology Solutions**
   (08 Hours, 16 marks)

I. Major Security Threats in the E-Commerce Environment

a. Malicious Code
b. Unwanted Programs
c. Phishing and Identity Theft
d. Hacking and Cybervandalism
e. Credit Card Fraud/Theft
f. Spoofing (Pharming) and Spam (Junk) Web Sites
g. Denial of Service (DoS) and Distributed Denial of Service (DDoS) Attacks
h. Sniffing
i. Insider Attacks
j. Poorly Designed Server and Client Software

II. Technology Solution

a. Protecting Internet Communications
b. Securing Channels of Communication
c. Protecting Servers and Clients

3. Management Policies And E-Commerce Payment Systems

(08 Hours, 16 marks)

I. Management Policies, Business Procedures, and Public Laws

a. A Security Plan: Management Policies
b. The Role of Laws and Public Policy

II. E-Commerce Payment Systems

a. Online Credit Card Transactions
b. Digital Wallets
c. Digital Cash
d. Online Stored Value Systems
e. Digital Accumulating Balance Payment Systems
f. Digital Checking Payment Systems
g. Wireless Payment Systems

4. Communication and Online Marketing

(08 Hours, 16 marks)

I. Marketing Communications

a. Online Advertising
b. E-mail Marketing and the Spam Explosion
c. Online Catalogs
d. Social Marketing: Blogs, Social Networks and Games
e. Targeted Marketing: Getting Personal
f. Mixing Offline and Online Marketing Communications

II. Understanding the Costs and Benefits of Online Marketing Communications

a. Online Marketing Metrics: Lexicon
b. How Well Does Online Advertising Work?
c. The Costs of Online Advertising

d. Software for Measuring Online Marketing Results

5. **Ethical Issues and Online Content**

(08 Hours, 16 marks)

I. **Understanding Ethical Issues in E-commerce**

a. A Model for Organizing the Issues
b. Basic Ethical Concepts: Responsibility, Accountability, and Liability
c. Analyzing Ethical Dilemmas
d. Candidate Ethical Principles

II. **Online Content**

a. Content Audience and Market: Where Are the Eyeballs and the Money?
b. Media Industry Structure
c. Media Convergence: Technology, Content, and Industry Structure
d. Online Content Revenue Models and Business Processes
e. Key Challenges Facing Content Producers and Owners

Text Book:

1. Kenneth C. Laudon, Carol Guercio Traver, "E-Commerce - Business, Technology, Society 2008", Fourth Edition, Pearson Education.

Reference Books:

7. Harvey M. Deitel, Paul J. Deitel, Kate Steinbuhler, "E-Business and E-Commerce for Managers", Prentice Hall.
8. Greenstein, Feinnon, " Electronic Commerce", Tata McGraw Hill Edition.
9. Ravi Kalakota, et al, "Electronic Commerce – A Manager's Guide", Addison Wesley Longman.

Management Information System

COURSE OUTLINE

Course Title	Short Title	Course Code
Management Information System	**MIS**

Course Description:

This course provides an introduction to information systems for business and management. It is designed to familiarize students with organizational and managerial foundations of systems, the technical foundation for understanding information systems, the role of information systems in enhancing business processes and management decision making across the enterprise, and the process of building and managing systems in organizations. The course will focus on topics such as Management of the Digital Firm, Internet and Internet technology, the Electronic Business and Electronic Commerce, the Information Technology (IT) Infrastructure, the Ethical and Security Issues related to Information Systems, and the Enterprise Applications. The course will provide students with information systems knowledge that is essential for creating successful and competitive firms.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	03	14	42	03

Prerequisite Course(s): Principles of Management.

COURSE CONTENT

Management Information Systems **Semester-VI**

Teaching Scheme
Lecture: 3 hours / week

Examination Scheme
End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

1. Information Systems

(08 Hours, 16 marks)

i. Introduction

a) Data Vs Information
b) Functions of Management
c) Managerial Roles
d) Levels of Management
e) Classification of Information System
f) Framework for Information System

ii. Systems

a) System concepts
b) System and their Environments
c) How system works
d) System approach for problem solving

2. E Business Enterprise:

(08 Hours, 16 marks)

i. **E Business Technology**

a) Introduction to E Business
b) Models of E Business
c) Internet and WWW
d) Security in E Business
e) Electronic Payment System
f) Web Enabled Business Management
g) Enterprise Portal
h) MIS in Web Environment

ii. **Organization of Business in Digital Firm**

a) E Business
b) E Commerce
c) E Communication
d) E Collaboration
e) Real Time Enterprise

3. Applications To Functional Business Areas

(08 Hours, 16 marks)

i. **Operational Information System**

a) Accounting / Finance
b) Marketing
c) Production
d) Human Resource

ii. **Tactical Information System**

a) Accounting / Finance
b) Marketing
c) Production
d) Human Resource

iii. **Strategic Information System**

a) Accounting / finance
b) Marketing
c) Production
d) Human Resource

4. DSS, EMS And ES:

(08 Hours, 16 marks)

i. **Decision Support System**

a) Characteristics of Decision Making Process
b) Features of DSS
c) Development of DSS
d) Benefits and Risks of DSS
e) GDSS

ii. **Enterprise Management System**

a) ERP System
b) ERP Model and Modules
c) Benefits of ERP
d) Supply Chain Management
e) Customer Relationship Management

iii. **Expert Systems**

a) Characteristics
b) How an Expert System Works
c) Advantages
d) Expert System and DSS
e) Expert Systems and AI.

5. **Information Security and Information Technology**

(08 Hours, 16 marks)

i. **Information Security Challenges in E Enterprise**

a) Risks
b) Common Threats
c) Common Controls
d) Protection of information system

ii. **IT: Impact on Society**

a) Impact of IT on Privacy
b) Ethics
c) Technical Solution for Privacy Protection
d) Intellectual Property
e) Copyright and Patents
f) Impact of IT on the Workplace
g) Impact of quality on Life

Text Books:

1. Robert Schultheis and Mary Sumner, "Management Information Systems The Managers View", 4th Edition Tata McGraw Hill
2. Waman S. Jawadekar, "Management Information Systems", 4th Edition Tata McGraw Hill.

Reference Books:

1. Sahil Raj "Managament Information Systems" PearsonEducation
2. Kenneth C Laudon and Jane Laudon, "Management Information System", Pearson Education
3. James A. O'Brien, "Management Information Systems", Tata McGraw Hill
4. S. Sadagopan, "Management Information System", PHI.

Operating System Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Operating System	**OS**	

Course Description:

This laboratory provides students with a comprehensive study of the operating system functions, its working details and implementation of various algorithms used in the operating systems.

Laboratory	Hours / Week	No. of Weeks	Total Hours	Semester Credits
	02	14	28	03

Total Semester Credits: 03

Prerequisite Course(s): C Programming, Basic Knowledge of Linux Operating System.

LAB COURSE CONTENT

Outline of Content:

(Note: Minimum FOUR Experiments each from group A and B)

Group A

1. **Study of Commercial and Open Source Operating Systems (01 each) and Design structure of these of Operating Systems.**
    a. Study the basic structures.
    b. Study the File systems.
    c. Study the Security aspects of Operating Systems.
    d. e. g. Windows OS, Linux OS.
2. **Write a program to implement Command Interpreter using system calls.**
   Implementation of Command Interpreter using various system calls showing working of Command Line Interpreter.
3. **Write a program to implement concept of Threading.**
   Demonstrate the concept of Threading in process. (Without using System Call / Kernel Functions).
4. **Write a program to implement CPU Scheduling algorithms**
   Demonstrate the working of CPU Scheduling algorithms (any two).
    a. FCFS
    b. SJF(Preemptive & non-preemptive)
    c. Round Robin
    d. Priority(Preemptive & non-preemptive)

5. **Write a program to implement algorithmic solution for Critical Section Problem**

   Demonstrate solution to overcome the critical section problem.

Group B

1. **Write a program to implement Memory Management algorithms – best fit, first fit, worst fit**

   Demonstrate the working of Memory Management algorithms (any two).
   a. First Fit
   b. Best Fit
   c. Worst Fit
2. **Write a program to implement Page Replacement algorithms**

   Demonstrate the working of Page Replacement algorithms (any two).
   a. FIFO(First In First Out)
   b. LRU(Least Recently Used)
   c. Optimal
3. **Write a program to implement Inter process communication**

   Demonstrate the working of Inter Process Communication (any one).
   a. Full Duplex pipes
   b. Half Duplex pipes
4. **Write a program for Banker's algorithm**

   Demonstrate the working of Banker's algorithm.
5. **Write a program to demonstrate disk scheduling algorithms**

   Demonstrate the working of the Disk Scheduling algorithms (any two).
   a. FCFS
   b. SSTF
   c. SCAN
   d. C-SCAN

Guidelines for ICA:

Students must submit ICA in the form of journal. Each assignment should be well documented. Faculty in charge will assess the assignments continuously and grade or mark each assignment on completion date declared for each assignments.

Guide lines for ESE:-

- ESE will be based on the practical assignments submitted by the students in the form of journal.
- In the ESE, the students may be asked to perform the practical assignment with minor modification.
- Evaluation will be based on the paper work of algorithm, understanding of the logic and the syntax, quality of the program, execution of the program, type of input and output for the program.

Reference Books:

1. A. Silberschatz, P. B. Galvin, G. Gagne, "Operating Systems Concepts", 7th / 8th edition, John Wiley Publications, 2008.

2. William Stalling, "Operating System Internals and Design Principles", 6th edition, Pearson Publication, 2013.
3. Maurice J. Bach, "The Design of the Unix Operating System", 1st edition, PHI.
4. Dhananjay M. Dhamdhere, "Operating Systems-A Concept-Based Approach", 3rd edition, TMH, 2012.
5. A. S. Tanenbaum, "Modern Operating System", 2nd edition Pearson publication, 2001.
6. H. M. Deitel, P. J. Deitel, D. R. Choffnes, "Operating System" 3rd edition, Pearson publication, 2013.
7. Rajiv Chopra, "Operating Systems-A Practical Approach", 1st edition, S. Chand Publication, 2009.
8. Sibsankar Haldar, Alex A. Arvind, "Operating Systems", 1st edition, Pearson Publication, 2009.

Note:-

- Use of Open Source Tool / Technology is recommended for laboratory assignments of concern subject.

Object Oriented Modeling & Design Lab

LAB COURSE OUTLINE

Course Title | Short Title Course Code
Object Oriented Modeling and Design | **OOMD**

Course Description:
The objective of this course is to introduce the students to learn how to understand the requirements of a system, its analysis, its scope, good design and good modeling practices and to document them. Students are being able to discuss the pros and cons of system design and issues in modeling large and complex systems. It explores UML 2.0 Basic and advanced concepts and notation for the same & diagrams for modeling different aspects of a system throughout the SDLC lifecycle.

Laboratory	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	02	14	28	01

Total Semester Credits: 01
Prerequisite Course(s): Knowledge of software engineering.

LAB COURSE CONTENT
Outline of Content:
(Note: Minimum Six Experiments out of eight)

To meet above objectives teachers will help students choose a following system for modeling. The students will try and identify scope of such a system as realistically as possible. Students will learn to draw, discuss different UML 2.0 diagrams, concepts, notation, advanced notation, forward and reverse engineering aspects. As far as possible draw as many diagrams for one single system, unless they are not applicable for the chosen system in which case other systems may be chosen for specific diagrams.

1. Design ATM system using Structural and Behavioral UML diagram.
2. Design Coffee vending machine using Structural and Behavioral UML diagram.
3. Design College Admission Process using Structural and Behavioral UML diagram.
4. Design Library Management system using Structural and Behavioral UML diagram.
5. Design Hospital Management system using Structural and Behavioral UML diagram.
6. Design Railway Reservation system using Structural and Behavioral UML diagram.
7. Design Online Shopping system using Structural and Behavioral UML diagram.
8. Design Hotel Management system using Structural and Behavioral UML diagram.

Guidelines for ICA:
Students must submit ICA in the form of journal. Each assignment should be well documented. Faculty in charge will assess the assignments continuously and grade or mark each assignment on completion date declared for each assignments.

Guide lines for ESE:-

- ESE will be based on the practical assignments submitted by the students in the form of journal.

Reference Books:

1. Pascal Roques, “Modeling Software Systems Using UML 2”, Wiley.
2. Russ Miles and Kim Hamilton, “Learning UML 2.0, SPD”, O’Reilly.
3. Craig Larman, “Applying UML and patterns: An introduction to Object-Oriented Analysis and Design and Iterative Development”, Pearson Education.
4. Mike O’Docherty “Object-Oriented Analysis & design understanding system development with UML 2.0”, John Wiley and Sons.
5. Jim Arlow, Ila Neustadt, “UML 2 and the Unified Process: Practical Object-Oriented Analysis and Design”, 2nd Edition, Addison-Wesley Professional.
6. Mark Priestley, “Practical Object-Oriented Design with UML”, TATA McGraw-Hill.

Note:-

- Use of Open Source Tool / Technology is recommended for laboratory assignments of concern subject.

Database Management System Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Database Management System	**DBMS**	

Course Description:

The objective of this course is to introduce the students to learn and practice Structure Query Language for creation, Manipulation, controlling database, apply normalization techniques to normalize the database also learn different types of Join, view, PL/SQL, Trigger, Stored Procedure, Stored function and enable them to apply these concepts for solving real world problems.

Laboratory	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	02	**14**	**28**	**01**

Total Semester Credits: 01

Prerequisite Course(s): knowledge of Data Structures

LAB COURSE CONTENT

Outline of Content:

(Note: Group A is Mandatory and Minimum Three experiments from Group B.)

GROUP A

1. Creating a sample database using any client server RDBMS (Oracle/ Open Source Database) package using SQL DDL queries. This will include constraints (Primary key, Foreign key, Unique, Not Null, and Check) to be used while creating tables.
2. SQL DML queries: Use of SQL DML queries to retrieve, insert, delete and update the database created in experiment No. 1.
3. SQL Queries: The queries should involve SQL feature such as aggregate functions, group by, having, order by the database created in experiment No. 1.
4. SQL Queries: The queries should involve Set Operations and Set Comparisons the database created in experiment No. 1.
5. Screen design and Report generation: Sample forms and reports should be generated using any front end tools.

GROUP B

1. Write a program to demonstrate different types of JOIN.
2. Write a program to demonstrate use of Trigger.
3. Write a program to demonstrate view.
4. Write a program to demonstrate PL/SQL block.
5. Write a program to demonstrate stored function.
6. Write a program to demonstrate stored procedure.

Guidelines for ICA:

Students must submit ICA in the form of journal. Each assignment should be well documented. Faculty in charge will assess the assignments continuously and grade or mark each assignment on completion date declared for each assignments.

Guide lines for ESE:-

- ESE will be based on the practical assignments submitted by the students in the form of journal.
- In the ESE, the students may be asked to perform the practical assignment with minor modification.
- Evaluation will be based on the paper work understanding of the logic and the syntax, quality of the program, execution of the program, type of input and output for the program.

Reference Books:

1. Rick F. Van der Lans, “Introduction to SQL”, Pearson education.
2. B. Rosenzweig, E. Silvestrova, “Oracle PL/SQL by Example”, Pearson education.
3. Steven Feuerstein, “Oracle PL/SQL Programming”, SPD, O’Reilly.
4. Dr. P. S. Deshpande, “SQL& PL/SQL for Oracle 10g Black Book”, Dreamtech Press
5. M. McLaughlin, “Oracle Database 11g PL/SQL Programming”, TMH.
6. J. J. Patrick, “SQL Fundamentals”, Pearson Education.

Note:-

- Use of Open Source Tool/Technology is recommended for laboratory assignments of concern subject.

Web Programming Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Web Programming	**WPL**	

LAB COURSE CONTENT

Teacher should facilitate learning following lab experiments:

(Part A)

1. **Develop a complete web page using HTML basic tags, CSS, Table and Layout**
   - A simple web page that includes basic tags such as head, body, text formatting tags, lists, paragraph, image tags, css, table and layout etc.
2. **Design a page web using JavaScript to demonstrate, if statement, if...else statement and Switch statement**
   - A simple web page that include JavaScript statements such as if, if...else and switch.
3. **Design a page web using JavaScript to demonstrate, Alert box Alert box with line breaks, Confirm box and Prompt box**
   - A simple web page that include JavaScript alert box, alert box with line breaks, confirm box and prompt box.
4. **Design a page web using JavaScript to demonstrate, Call a function ,Function with an argument, Function that returns a value**
   - A simple web page that include JavaScript call a function, function with arguments, function that return a value.
5. **Design a page web using JavaScript to demonstrate, For loop, While loop, Do While loop, Break a loop, Break and continue a loop**
   - A simple web page that include JavaScript for loop, while loop , do while loop, break a loop, break and continue a loop.
6. **Design a page web using JavaScript to demonstrate, Acting to the onclick event, Acting to the onmouseover event, onblur , onchange, ondblclick, onkeydown, onkeypress, onkeyup, onresize, onunload**
   - A simple web page that include JavaScript events like onclick, onmouseover, onblur, onchange, ondblclick, onkeydown, onkeypress, onkeyup, onresize, onunload etc.
7. **Design a page web using JavaScript to demonstrate, Sort an array (alphabetically and ascending), Sort numbers (numerically and ascending), Sort numbers (numerically and descending)**
   - A simple web page that include JavaScript to sort an array alphabetically and ascending, sort numbers numerically and ascending and sort numbers numerically and descending.
8. **Design a page web using PHP to demonstrate, variables, echo/print, data types, string functions and operators**
   - A simple web page that include PHP variables, echo/print, data types, string functions and operators.
9. **Design a page web using PHP to demonstrate, if-else-elseif, switch, for loop, while loop, functions and arrays**
   - A simple web page that include PHP if-else-elseif, switch, for loop, while loop, functions and arrays.
10. **Design a page web using PHP to demonstrate, form handling, form validation and form URL/E-mail**
    - A simple web page that include PHP form handling, form validation and form URL/E-mail**.**

(Part B)

1 **Web server installation and configuration**

- Installation and configuration of any web server like IIS, Apache, WAMP, XAMP etc.

2 **Design a page web using PHP to demonstrate, date, file, file upload, cookies and sessions**

- A simple web page that include PHP date, file, file upload, cookies and sessions.

3 **Design a page web using PHP to demonstrate, MySQL connect, create DB/Table, insert into, select, where, order by, update and delete**

- A simple web page that include PHP MySQL connect, create DB/Table, insert into, select, where, order by, update and delete.

4 **Design a Website with the help of HTML and JavaScript with not less than 15 full size pages for a selected topic (Commercial, Institute, Portal or decided jointly by the student and teacher)**

- Design a website on the above listed topics with the help of HTML and JavaScript.

5 **Design a Website with the help of HTML and PHP for a selected topic (Banking, Commercial, Institute, Portal or decided jointly by the student and teacher)**

- Design a website on the above listed topics with the help of HTML and PHP.

Guidelines for ICA:

Students must submit ICA in the form of journal. Each assignment should be well documented. Faculty in charge will assess the assignments continuously and grade or mark each assignment on completion date declared for each assignments.

Reference Books:

1. "Web Technologies HTML, JavaScript, PHP, Java, JSP, XML and AJAX", Black Book, Kogent Learning Solutions Inc., dreamtech press, 2014.
2. Chris Bates, "Web Programming: Building Internet Applications", Third Edition, Wiley India, 2012.
3. Jon Duckett, "Beginning HTML, XHTML, CSS, and JavaScript", John Wiley & Sons publication, 2010.
4. Thomas A. Powell, "HTML & CSS: The Complete reference", Fifth edition, TMH 2010.

Note:

- Concerned faculty should conduct at least 07 practical assignments from part A and 03 from part B out of the above list.
- Every assignment should include print out of program with proper comments and output.
- Every student is required to submit the assignments in the form of journal.
- Use of Open Source Tool/Technology is recommended for laboratory assignments of concern subject.

Minor Project

COURSE CONTENT

Minor Project **MIP**

Course Title | Short Title | Course Code

Semester-VI

Laboratory	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	02	**10**	**20**	**02**

Examination Scheme
Internal Continuous Assessment (ICA): 50 Marks

- Every student shall undertake the Minor Project in semester VI.
- Each student shall work on an approved project, a group of **05 students (maximum)** shall be allotted for the each minor project.
- Minor project may involve design or investigation of a technical problem that may take design, experimental or analytical character or combine element of these areas. The project work shall involve sufficient work so that students get acquainted with different aspects of design or analysis.
- Each student is required to maintain separate log book for documenting various activities of minor project.
- The three-member committee appointed by Head of the department shall be constituted for finalizing the topics of minor project. Maximum four minor project groups shall be assigned to one teaching staff.
- Assessment of the project for award of ICA marks shall be done jointly by the guide and departmental committee as per the guidelines given in **Table-A.**
- Before the end of semester, student shall deliver a seminar and submit the seminar report (paper bound copy)in following format:
    - Size of report shall be of minimum 25 pages.
    - Student should preferably refer minimum five reference books / magazines/standard research papers.
    - Format of report
        - Introduction.
        - Literature survey.
        - Theory (Implementation, Methodology, Applications, Advantages, Disadvantages. etc)
        - Future scope.
        - Conclusion.

Assessment of Minor Project

Name of the Project: ________________________________

Name of the Guide: ________________________________

Table-A

SN	Exam Seat No	Name of Student	Project Selection	Documentation	Design /Simulation/Logic	PCB/hardware/programming	Result Verification	Presentation	Total
			5	10	10	10	10	5	50

Seminar-I
COURSE CONTENT

Seminar-I	**S-I**	
Course Title	Short Title	Course Code

Semester-VI

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	**02**	**10**	**20**	**02**

Examination Scheme
Internal Continuous Assessment (ICA): 25 Marks

1. For Seminar-I 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 during the term.
2. The three-member committee appointed by Head of the department shall be constituted for finalizing the topics of Seminar-I. Seminar shall be related state of the art topic of his choice approved by the committee.
3. Seminar topic should not be repeated and registration of the same shall be done on first come first serve basis.
4. Topic of Seminar shall be registered within a two week from commencement of VI Semester and shall be approved by the committee.
5. Maximum six seminar supervision shall be allotted to each teacher.
6. Before the end of semester, student shall deliver a seminar and submit the seminar report (paper bound copy).

7. **ASSESSMENT OF SEMINAR-I**

Assessment of the Seminar-I for award of ICA marks shall be done by the guide and a departmental committee jointly, as per the guidelines given in **Table- B**

Title of Seminar: ______________________________
Name of Guide: ______________________________

Table-B

SN	Exam Seat No	Name of Student	Topic Selection	Literature survey	Report writing	Depth of understanding	Presentation	Total
			5	5	5	5	5	25

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
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.

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BE (Information Technology)
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TERM – I

Enterprise Resource Planning

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 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:	**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

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	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 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: ________________________

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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BE (Information Technology)
(w.e.f. 2008-09)

TERM – II

Elective – II
Artificial Intelligence 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 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.

NORTH MAHARASHTRA UNIVERSITY, JALGAON

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.

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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.

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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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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	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 (M.S.)

Second Year Engineering
(Mechanical Engineering)
Faculty of Engineering and Technology

COURSE OUTLINE

SEMESTER – III

W.E.F 2013 – 2014

SE Semester - III

Name of the Course	Group	Teaching Scheme				Evaluation Scheme					Credits
		Theory		PR	Total						
		TH Hr/W	Tut Hr/W	PR Hr/W	Total	ISE	ESE	ICA	ESE	Total	
Fluid Mechanics	D	3	1	---	4	20	80	---	---	100	4
Engineering Thermodynamics	B	3	---	---	3	20	80	---	---	100	3
Strength of Materials	D	3	1	---	4	20	80	---	---	100	4
Material Science and Metallurgy	D	3	---	---	3	20	80	---	---	100	3
Manufacturing Engineering -I	D	3	---	---	3	20	80	---	---	100	3
Soft Skills - III	C	1	---	2	3	---	---	50	---	50	2
Engineering thermodynamics-Lab.	B	---	---	2	2	---	---	50	---	50	1
Fluid Mechanics Lab.	D	---	---	2	2	---	---	25	25	50	1
Material Science and Metallurgy Lab.	D	---	---	2	2	---	---	25	25	50	1
Workshop Practice -III	D	---	---	2	2	---	---	25	25	50	1
Total		16	2	10	28	100	400	175	75	750	23

ISE: Internal Sessional Examination **ESE:** End Semester Examination **ICA:** Internal Continuous Assessment

SE Semester - IV

Name of the Course	Group	Teaching Scheme				Evaluation Scheme					Credits
		Theory		PR	Total						
		TH Hr/W	Tut Hr/W	PR Hr/W	Total	ISE	ESE	ICA	ESE	Total	
Engineering Mathemathics -III	A	3	1	---	4	20	80	---	---	100	4
Theory of Machines -I	D	3	---	---	3	20	80	---	---	100	3
Applied Thermodynamics	D	3	1	---	4	20	80	---	---	100	4
Basic Electrical Drives and Controls	D	3	---	---	3	20	80	---	---	100	3
Manufacturing Engineering -II	D	3	---	---	3	20	80	---	---	100	3
Machine Drawing Lab.	B	1	---	2	3	---	---	50	---	50	2
Basic Electrical Drives and Controls Lab.	D	---	---	2	2	---	---	50	---	50	1
Applied Thermodynamics Lab.	D	---	---	2	2	---	---	25	25	50	1
Theory of Machines -I Lab	D	---	---	2	2	---	---	25	25	50	1
Workshop Practice- IV	D	---	---	2	2	---	---	25	25	50	1
Total		16	2	10	28	100	400	175	75	750	23

ISE: Internal Sessional Examination **ESE:** End Semester Examination **ICA:** Internal Continuous Assessment

Course Outline

Fluid Mechanics	**FM**	
Course Title:	Short Title	Course Code
Branch - Mechanical / Automobile Engineering	**Year – Second Year**	

Course Description: This course introduces undergraduate students to Fluid Mechanics. The background required includes a sound knowledge of Mathematics (Calculus), Engineering Mechanics and Physics of first year Level. The course aims at imparting knowledge of Fluid properties and analysis of forces inside the fluid.

Teaching Scheme:

	Hours per Week	No. Of Weeks	Total Hours	Semester Credits
Lecture	3	14	42	4
Tutorial	1	14	14	

Examination scheme:

End semester exam (ESE)	80 Marks	Duration : 03 hours
Internal Sessional exam (ISE)	20 Marks	

Purpose of Course: Degree Requirement

Prerequisite Course(s): Mathematics (Calculus) and Engineering Mechanics at first year level.

Outline of Content: This course contains:

UNIT-1

1.	**Fluid properties & Hydrostatic**	**No. of Lectures – 12, Marks: 16**
	a	Fluid properties & its definitions, definition of fluid, Viscosity, Bulk modulus of elasticity, Vapour pressure, Surface tension, Capillarity, Manometers (No numerical on manometers)
	b	Pascal's law, Hydrostatic law its derivation
	c	Total pressure & Centre of pressure on vertical, horizontal, inclined, curved surface its derivation
	d	Concept Of buoyancy & flotation Meta centre, metacentric height its derivation. Stability, unstability, equilibrium of floating & submerged body

UNIT-2

2.	**FLUID KINEMATICS AND DYNAMICS**	**No. of Lectures – 08, Marks: 16**
	a	Types of flow, Definition of steady, Unsteady, Uniform, Non uniform, Laminar, Turbulent, Compressible, incompressible, rotational, Irrotational flow, 1D-2D flows, Stream line, Streak line, Path line, concept of Velocity, potential & stream function flow net (no numerical treatment)
	b	Continuity equation for steady, Unsteady, Uniform, Non uniform, Compressible incompressible,2D Euler's equation, Bernoulli's equation along a stream line for incompressible flow
	c	Practical applications of Bernoulli's equation - Pitot tube, Venturi meter, Orifice meter.

UNIT-3

3.	**VISCOUS AND BOUNDARY LAYER FLOW**	**No. of Lectures – 08, Marks: 16**
	a	Introduction to flow of viscous fluid through circular pipes, two parallel plates derivation
	b	kinetic and momentum energy correction factor (only theory no numerical)
	c	Power absorbed in viscous flow, viscous resistance to journal bearing, footstep bearing, collar bearing.
	d	Introduction to boundary layer flow, laminar and turbulent boundary layer, laminar sub layer, boundary layer thickness, displacement thickness, momentum thickness, separation of boundary layer. (No numerical treatment)

UNIT-4

4.	Dimensional analysis and Flow through Pipes **No. of Lectures – 07, Marks: 16**	
	a	Introduction to dimensional analysis, dimensional homogeneity, methods of dimensional analysis- Rayleigh's method, Buckingham's π-theorem, dimensionless numbers. (No numerical treatment)
	b	Loss of energy in pipes, loss of energy due to friction, minor energy losses, concept of HGL and TEL, flow through syphon, flow trough pipes in series or compound pipes, equivalent pipe, parallel pipes, branched pipes.
	c	Power transmission through pipes. Water hammer phenomenon (No numerical on water hammer)

UNIT-5

5.	**CENTRIFUGAL AND RECIPROCATING PUMP** **No. of Lectures – 07, Marks: 16**	
	a	Introduction to main parts of centrifugal pump, working & construction of centrifugal pump, types of impellers, types of casings, priming.
	b	Work done on centrifugal pump, various heads and efficiencies of centrifugal pump, minimum starting speed of a centrifugal pump, multistage centrifugal pump, principles of similarity applied to centrifugal pump.
	d	Specific speed, NPSH, cavitations in pumps.
	e	Introduction to main parts of Reciprocating pump, construction & working of Reciprocating pump, classification of Reciprocating pump, slip of reciprocating pump, air vessels. (No numerical on Reciprocating pump)

References

1. Introduction to Fluid Mechanics and Fluid Machines, S.K. Som and G. Biswas, Tata McGraw Hill Education Publishing Company Limited, 2007.
2. Fluid Mechanics, F.M. White, McGraw-Hill, 2005.
3. Fluid mechanics and Hydraulic machines, Dr. R. K. Bansal , Laxmi Publication, Delhi, 2005
4. Fluid Mechanics and Machines, Kotharduraon and Rudramoorthy, New Age Internationals, 2007
5. Hydraulics And Fluid Mechanics Including Hydraulics Machines, Dr. P.N.Modi , Dr. S.M. Seth, Standard Book House / Rajsons Publications p ltd, Delhi, 2011.
6. Fluid Mechanics, Mohanty A.K., Prentice Hall of India, 2005.
7. Fluid Mechanics, Streeter, Tata McGraw Hill (SI).
8. Fluid Mechanics and Hydraulic Machines, S C Gupta, Pearson Publication.

Course Outline

Engineering Thermodynamics	**ET**	
Course Title	Short Title	Course Code

Mechanical / Automobile Engineering	**Second Year**	**Second**
Branch	Year	Semester

Course Description:

The course aims at imparting knowledge of basic Thermodynamics. The background required includes a sound knowledge of Mathematics (Calculus), Physics and Chemistry at Higher Secondary Level. The objectives of the course are to understand thermodynamics concepts, its laws, and their applications and gas/vapor processes.

	Hours per Week	No. Of Weeks	Total Hours	Semester Credits
Lecture	3	14	42	3

Examination scheme:

End semester exam (ESE)	80 Marks	Duration : 03 hours
Internal Sessional exam (ISE)	20 Marks	20 Marks

Prerequisite Course(s): Fundamental knowledge of Physics, Chemistry and Engineering Mathematics.

Outline of Content: This course contains:

1	**Introduction to Engineering Thermodynamics** **No. of Lectures – 9, Marks: 16**	
	a	Scope and applications of thermodynamics, System, surroundings, boundary, control volume, types of system, unit and dimensions.
	b	Macroscopic and Microscopic view point, Thermodynamic Properties, Path function, Point function,
	c	State and Equilibrium, Process, Cycle, Quasi-static process and its significance.
	d	Energy, Flow Energy, Potential energy, Kinetic energy, Heat transfer, sign convention. Numerical.
	e	Work transfer, shaft work, displacement work, power. Numerical.
	f	Zeroth law of thermodynamics, temperature, temperature scales
	g	Numerical on temperature measurement.
	h	Pressure, Absolute and gauge pressure, simple manometer, Bourdon's pressure gauge.
2	**First Law of Thermodynamics** **No. of Lectures – 8, Marks: 16**	
	a	Joule's experiment, internal energy as a property, 1^{st} law of thermodynamics
	b	First Law applied to closed system undergoing a process/ a cycle, PMM-I
	c	Numerical on application of 1^{st} law to closed system.
	d	Enthalpy and internal energy of an ideal gas, specific heat, Cv and Cp.
	e	Principles of conservation of mass and energy, steady state steady flow process, continuity equation.
	f	Steady flow energy equation (SFEE), applications of SFEE.
	g	Significance of $-\int vdP$, relation between $\int Pdv$ and $-\int vdP$,
	h	Numerical on application of 1^{st} law to steady flow systems.
3	**Second Law of Thermodynamics** **No. of Lectures – 8, Marks: 16**	
	a	Limitations of First Law, thermal reservoir, heat engine & its efficiency, Refrigerator and Heat pump, Coefficient of Performance.
	b	Statements of second law, Equivalence of statements of second law, PMM-II
	c	Numerical on application of 2^{nd} law.
	d	Reversibility and Irreversibility, Causes of irreversibility, Carnot cycle, Reversed Carnot cycle, their analysis.
	e	Carnot theorem, Absolute temperature scale
	f	Numerical on Carnot cycle, Carnot theorem and temperature scales.
	g	Entropy – Introduction, Law for two isentropic path, Entropy as property,

		Clausius theorem. (No numerical)
	h	Clausius statement, Clausius inequality, Entropy principle
4	**Properties of Ideal Gases** **No. of Lectures – 8, Marks: 16**	
	a	Ideal gas, Laws for an ideal gas, Equation of state, Universal gas constant Characteristic gas constant, Relation between Cp, Cv and R.
	b	Numerical on above syllabus.
	c	Ideal Gas Processes, their presentation on p-v, T-S plane, Analysis for Heat transfer, Work transfer, change in Internal Energy, enthalpy and Entropy – Isobaric, Isochoric and Isothermal processes.
	d	Numerical on above gas processes.
	e	Reversible Adiabatic process, presentation on p-v, T-S plane, Analysis for Heat transfer, Work transfer, and change in Internal Energy, enthalpy and Entropy.
	f	Reversible Polytropic process, presentation on p-v, T-S plane, Analysis for Heat transfer, Work transfer, and change in Internal Energy, enthalpy and Entropy.
	g	Numerical on above gas processes.
	h	Numerical on cyclic gas processes.
5	**Properties of Steam** **No. of Lectures – 8, Marks: 16**	
	a	Pure substance, Phases of pure substances, Phase change diagrams (p-v, p-T, T-s) for water substance at standard atmospheric pressure, sensible heat and latent heat of steam.
	b	Terminology: dry, superheated, wet steam, saturation temperature, critical point and triple point, use of steam table.
	c	Numerical using steam table.
	d	Numerical using Mollier diagram.
	e	Measurement of dryness fraction by using separating and throttling calorimeter. Numerical.
	f	Vapor processes- sketch on P-V, T-S, H-S diagrams, analysis for property changes, heat and work transfer.
	g	Numerical on steam processes
	h	Numerical on steam processes

References:

1	Engineering thermodynamics, P K Nag; Tata McGraw Hill.
2	Thermodynamics, C P Arora;Tata McGraw Hill.
3	Fundamentals of classical thermodynamics, G J Van Wylen, Richard E Sonntag; Wiley.
4	Engineering thermodynamics, Y V C Rao; Universities Press.
5	Engineering thermodynamics, J B Jones and R E Dugan; PHI.
6	Thermodynamics, 6th Edition, Yunus Cengel and M A Boles; Tata McGraw Hill.
7	Basic Engineering Thermodynamics, A. Venkatesh; Universities Press.
8	Basic Thermodynamics" by Dr. Ganesan, Tata McGraw Hill.

Course Outline

Strength of material	**SOM**	
Course Title:	Short Title	Course Code
Branch - Mechanical / Automobile Engineering	**Year – Second Year**	

Course Description: This course introduces undergraduate students to Strength of material. The background required includes a sound knowledge of Mathematics (Calculus), Engineering Mechanics and Physics of first year Level. The course aims at imparting knowledge of strength of materials.

Teaching Scheme:

	Hours per Week	No. Of Weeks	Total Hours	Semester Credits
Lecture	3	14	42	4
Tutorial	1	14	14	

Examination scheme:

End semester exam (ESE)	80 Marks	Duration : 03 hours
Internal Sessional exam (ISE)	20 Marks	

Purpose of Course: Degree Requirement

Prerequisite Course(s): Mathematics (Calculus) and Engineering Mechanics at First year level.

Outline of Content: This course contains:

UNIT-1

1.	**Introduction to Strength of material** **No. of Lectures – 12, Marks: 16**	
	a	Concept of stress and strain (linear, lateral, shear and volumetric),Hook's law, Poisson's ra 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, in relation Between elastic modulus.
	b	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.
	c	Axial stresses and strain in determinate members –axial stress, strain and deformation in following indeterminate, homogeneous and composite bars. 1) Prismatic 2) Linearly varying 3) Stepped section under concentrated loads, self-weights.
	d	Temperature stresses & strain for Prismatic, Linearly varying & composite bars

UNIT-2

2.	**PRINCIPLE STRESSES AND STRAINS** **No. of Lectures – 08, Marks: 16**	
	a	Introduction to Normal and shear stress on any oblique plane, concept of principle plane.
	b	Derivation of expression for principle stresses and planes and plane of max. Shear stress, position of principle plane and plane of max. Shear,
	c	Graphical solution using Mohr's circle of stresses.
	d	Combined effect of shear and bending in beams.
	e	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.

UNIT-3

3.	SHEAR FORCE AND BENDING MOMENT DIAGRAM No. of Lectures – 07, Marks: 16	
	a	Introduction to different types of beams, different types of supports & loads.
	b	Concept and definition of shear force and bending moment in determinant beams due to concentrated loads, UDL, UVL and couple.
	c	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.
	d	Construction of BMD and load diagram from SFD, Construction of load diagram and SFD from BMD.

UNIT-4

4.	BENDING STRESSES No. of Lectures – 07, Marks: 16	
	a	Theory of simple bending, assumptions in bending theory, Derivation of flexural formula
	b	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.
	c	Direct and bending stresses in short column with eccentric point loads, concept of core section, middle third rule.
	d	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.

UNIT-5

5.	TORSION IN CIRCULAR SHAFTS No. of Lectures – 08, Marks: 16	
	a	Stresses, strains and deformations in solid and hollow shafts, homogeneous and composite circular cross-sections subjected to torsion.
	b	Derivation of torsion equation. Stress due to combined torsion, bending and axial force on shafts.
	c	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.

REFERENCES

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.

Course Outline

Material Science and Metallurgy	**MSM**	
Course Title	Short Title	Course Code

Branch - Mechanical / Automobile Engineering **Year – Second Year**

Course Description:

This course provides the introduction of the fundamentals of Material Science and Metallurgy to undergraduate students. The objective of the course is to understand the basic principles of material science and metallurgy. It includes mechanical testing to determine mechanical properties. It also includes various heat treatments, introduction of furnaces and various engineering materials and their applications.

Teaching Scheme:

	Hours per Week	No. Of Weeks	Total Hours	Semester Credits
Lecture	3	14	42	3

Examination scheme:

End semester exam (ESE)	80 Marks	Duration : 03 hours
Internal Sessional exam (ISE)	20 Marks	

Prerequisite Course(s): Fundamental knowledge of Engineering Chemistry and Physics

Outline of Content: This course contains:

1	**Nature of Metals and Alloys**		**No of Lect – 8, Marks: 16**
	a	Relationship between Structure-Property-Processing-Performance. Elastic and plastic deformation and its mechanism i.e. slip and twinning.	
	b	Relation of crystal structure with plastic deformation i.e. effects of BCC,FCC or HCP structure on plastic deformation.	
	c	Dislocation theory of slippage, strain hardening.	
	d	Crystal defects and their effects on plastic deformation i.e. description of point, line and surface defects.	
	e	Plastic deformation in polycrystalline metals.	
	f	Cold working- recovery, recrystllisation, grain growth and hot working.	
	g	Strengthening mechanisms in metals - solid solution strengthening, Strain hardening.	
	h	Dispersion and precipitation hardening, phase transformation.	
2	**Properties of Metals and Testing**		**No of Lect – 8, Marks: 16**
	a	Tension test, engineering and true stress-strain curves, evaluation of properties, ductility, brittleness and toughness.	
	b	Types of engineering stress-strain curve, compression test.	
	c	Hardness testings- Brinell hardness Test, Poldi hardness Test, Rockwell hardness Test , Vickers hardness Test.	
	d	Durometers, microhardness. Relation among the various hardness test and hardness to tensile strength.	
	e	Impact test- charpy and izod impact test.	
	f	Fatigue and creep test.	
	g	Non-destructive test of metals-dye penetrant test, magnetic particle test.	
	h	Ultrasonic testing, radiography and eddy current testing.	
3	**Ferrous Metals and its Alloys**		**No of Lect – 8, Marks: 16**
	a	Iron, allotropy, cooling curves and volume changes of iron.	
	b	Iron-carbon equilibrium dig., critical temperatures, various phase reactions, solubility of carbon in iron.	

c Microstructures of slowly cooled steels.

d Non - equilibrium of cooling of steels.

e Cast Irons- types like gray cast iron, nodular cast iron.

f Austempered cast iron, white cast iron, malleable C .I .

g Effects of various parameters on structure and properties of C.I. like carbon equivalent, cooling rate during eutectic reaction and alloying additions.

h Properties, compositions, applications and specifications of C.I.

4 Heat Treatments No of Lect – 8, Marks: 16

a Introduction and principles of heat treatment of steels, processing heat treatments for steels like full annealing, normalizing, process and stress relief anneal, spheroidization. Heat treatments for non-ferrous metals.

b Strengthening heat treatments for steels, isothermal transformation diagram.

c Tempering of martensite, continuous cooling transformations.

d Jominy test for hardenability and its considerations. Quench media, austempering and martempering.

e Surface hardening of steels- flame, induction , laser and electron beam hardening

f Pack, gas and liquid carburizing, nitriding ionnitriding.

g Heat treatment furnaces and atmospheres, classification of furnaces.

h Heat treatment and energy and controlled atmospheres.

5 Alloy Steels and Advanced Materials No of Lect – 8, Marks: 16

a Alloy steels – Limitation of plain carbon steels, effects of major alloying elements in steels.

b Classification of alloying elements, examples of alloy steels.

c Stainless steels –classification ,heat treatment of stainless steels.

d Tool steels-classification, cold work and hot work tool steels.

e High speed tool steels , heat treatment of high speed tool steel, special purpose tool steels.

f Introduction of Advanced materials- types and properties of composite materials.

g High temperature materials.

h Engineering ceramics.

Reference Books:

1. Degarmo's "Materials and processes in manufacturing", by J.T. Black,Ronald A. Kosher, Willey student edition.
2. "Material Science and Metallurgy for Engineers", by V.D.Kodgire, Everest Publishing House. Pune
3. "Introduction to Engineering Materials", by B. K. Agrawal, Tata Mcgraw Hill, New Delhi.
4. "An Introduction to Physical Metallurgy", by S.H. Avner, Tata Mcgraw Hill, New Delhi.
5. "Fundamentals of modern manufacturing materials, processesand systems" , by Mikell P. Groover, Wiley student edition, New Delhi.
6. "Material Science and Metallurgy", by Parashivamurthy K. I., Pearson Publication
7. "Material Science and Metallurgy", by U. C. Jindal, Pearson Publication
8. "Introduction to Materials Science for Engineers", by James F. Shackleford & Madanapalli K. Muralidhara, Pearson Publication
9. "A textbook of Material Science and Metallurgy", by O. P. Khanna, Dhanpat Rai Publication
10. "Metallurgy", by A.S.Gholap and Dr. M.S. Kulkarni, "Nirali Prakashan.

Course Outline

Manufacturing Engineering-I **ME-I**

Course Title Short Title Course Code

Branch - Mechanical / Automobile Engineering **Year – Second Year**

Course Description:

This course provides the basic knowledge of manufacturing processes. Course includes fundamentals of casting processes, Metal forming processes, Welding and joining processes, Metal removing processes, Powder metallurgy.

Teaching Scheme:

	Hours per Week	No. Of Weeks	Total Hours	Semester Credits
Lecture	3	14	40	3

Examination scheme:

End semester exam (ESE)	80 Marks	Duration : 03 hours
Internal Sessional exam (ISE)	20 Marks	

Prerequisite Course(s): This course is aimed at introducing the Manufacturing processes to undergraduate students. The background expected familiar with Workshop Practice I & II.

<u>Outline of Content:</u> This course contains:

1	**Fundamental of Casting**	**No. of Lect – 8, Marks: 16**
	a	Introduction to Casting process
	b	Casting terminology
	c	Pattern and sand casting
	d	Solidification and Molten metal problems
	e	Melting furnaces
2	**Metal forming processes**	**No. of Lect – 8, Marks: 16**
	a	Introduction to metal forming processes
	b	Rolling processes
	c	Forging processes

	d	Extrusion methods
	e	Drawing processes
3		**Welding and joining processes** **No. of Lect – 8, Marks: 16**
	a	Introduction to welding and joining processes
	b	Welding joints
	c	Fusion welding
	d	Pressure welding
	e	Riveting, Soldering and brazing
4		**Metal removing processes** **No. of Lect – 8, Marks: 16**
	a	Introduction to Lathe machine
	b	Lathe Machine operations
	c	Milling machine operations
	d	Drilling operations
	e	Grinding operations
	f	Finishing operations operations
5		**Powder metallurgy** **No. of Lect – 8, Marks: 16**
	a	Introduction to Powder metallurgy
	b	Powder manufacturing process
	c	Powder testing and evaluation
	d	Powder Metal production
	e	Secondary operations

Reference Books

1. Materials and processes in manufacturing , J T Black, Ronald A. Kosher, De Garmos, , Wiley student edition
2. Manufacturing technology , P. N. Rao , vol-I & II McGrow Hill publications
3. A Textbook of Production Engineering , P. C. Sharma, , S. Chand & Company. Ltd.
4. A Textbook of Production Technology , P. C. Sharma, S. Chand & Company. Ltd.
5. Process and Material of Manufacturing, S. Chand Publication. Roy A Lindberg, prentice Hall of india pvt ltd,
6. Elements of Workshop Technology Volume I&II , Hajara Choudhari, Bose S.K.
7. Manufacturing Technology –S. K. Garg- Fire wall media ltd.

8. Fundamental of modern manufacturing, Mikell P groover, Wiely asia student edition
9. Manufacturing process and system, Phillip C Ostawald, jairo Munoz, wiely India.
10. Manufacturing Technology, D.K. Singh, Pearson New Delhi.
11. Manufacturing process Vol-I, H. S. Shah, Pearson New Delhi.
12. Manufacturing Engineering and Technology, Serope Kalpakjian, Pearson New Delhi.
13. Manufacturing Processes, Serope Kalpakjian, Pearson New Delhi.

Soft Skills – III

COURSE OUTLINE

Course Title | Short Title | Course Code

Soft Skills – III | **SK-III**

Course Description: Through this course we have tried to prepare the students for the industry. Most companies test mathematical and logical ability through an aptitude test. This subject aims at working on these skills of a student through strategies formulae and practice exercises.

Lecture	**Hours per Week**	**No. Of Weeks**	**Total Hours**	**Semester Credits**
	1	**14**	**14**	**2**

Prerequisite Course(s): Fundamental knowledge of High School Mathematics.

COURSE CONTENT

Soft Skills – III **Semester-III**

Teaching Scheme **Examination Scheme**

Lecture: 1 hour / week **Internal Continuous Assessment (ICA): 50 Marks**

Unit-I: Arithmetic-1 **No. of Lect. – 3, Marks: 10**

a. Basic Formulae

i. Divisibility Rules
ii. Speed Maths
iii. Remainder Theorem
iv. Different Types of Numbers
v. Applications

b. HCF, LCM and Linear Equations

i. HCF – Successive Division and Prime Factorization Methods

ii. LCM – Successive Division and Prime Factorization Methods
iii. Applications
iv. Linear Equations – Elimination Method
v. Substitution Method
vi. Applications

c. Averages and Mixtures

i. Concept of Average
ii. Faster Ways of Finding It
iii. The Allegation Method
iv. Applications

Unit-II: Arithmetic–II **No of Lect. – 3, Marks: 10**

a. Percentages

i. Concept of Percentage
ii. Working with Percentages
iii. Applications

b. Profit and Loss

i. Difference between Cost and Selling Price
ii. Concept of Profit Percentage and Loss Percentage
iii. Applications

c. Time and Work

i. Basic Time and Work Formula
ii. Relation between Time and Work
iii. Applications

Unit-III: Arithmetic–III **No of Lect. –3, Marks: 10**

a. Permutations and Combinations

i. Sum Rule of Disjoint Counting
ii. Product Rule of Counting
iii. Concept of Factorial

iv. Permutations
v. Linear Permutations
vi. Combinations
vii. Circular Permutations
viii. Applications

b. Probability

i. Definition and Laws of Probability
ii. Mutually Exclusive Events
iii. Independent Events
iv. Equally Likely Events
v. Exhaustive Events
vi. Cards
vii. Dice
viii. Applications

c. Time and Distance

i. Speed
ii. Conversion Factors for Speed
iii. Average Speed
iv. Moving Bodies – Passing, Crossing and Overtaking
v. Relative Speed
vi. Boats and Streams
vii. Applications

Unit-IV: Non-Verbal Reasoning **No of Lect. 2,** **Marks: 10**

a. Analogies

i. Examples
ii. Applications

b. Classification

i. Examples
ii. Applications

c. Sequences

i. Examples
ii. Applications

Unit-V: Analytical Reasoning **No of Lect. – 3, Marks: 10**

a. Analytical Puzzles

i. Classification Puzzles
ii. Ordering Puzzles
iii. Assignment Puzzles
iv. Applications

b. Letter and Number Series

i. Different Types of Letter Series
ii. Different Types of Number Series
iii. Mixed Series

c. Coding and Decoding

i. Letter Coding
ii. Number Coding
iii. Mixed Coding
iv. Odd Man Out
v. Applications

Guide lines for ICA:
ICA will be based on credit tests and assignments submitted by the student in the form of journal.

Reference Books:

1. R. S. Aggarwal, "Quantitative Aptitude", S. Chand Publication, New Delhi, 2012.
2. R. S. Aggarwal, "A Modern Approach to Verbal Reasoning", S. Chand Publication, New Delhi, 2012.
3. R. S. Aggarwal, "A Modern Approach to Non-Verbal Reasoning", S. Chand Publication, New Delhi, 2012.

Lab - Course Outline

Engineering Thermodynamics Lab	**ET Lab**
Course Title	Short Title & Course Code

Mechanical / Automobile Engineering	**Second Year**	**Second**
Branch	Year	Semester

Course Description:

This lab includes performance and study practical related to Engineering Thermodynamics.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	2	14	28	1

Total Semester Credits: 1

Evaluation Scheme:

Internal Continuous Assessment (ICA) 50 Marks

Prerequisite Course(s): 11th Physics, 12th Physics

Outline of Content:

This practical contains

Any EIGHT of the following performance practical	
01	**Study and Demonstration of Pressure measuring devices.** Study the principle, construction and working of pressure measurement devices. Demonstrate construction and working of pressure measurement devices practically. Student Activity: Discuss relative merits and demerits of above devices.
02	**Study and Demonstration of Temperature measuring devices.** Study the principle, construction and working of Temperature measuring devices. Demonstrate construction and working of Temperature measuring devices practically. Student Activity: Discuss relative merits and demerits of above devices.
03	**Study and Demonstration of Centrifugal Pump.** Study the principle, construction and working of Centrifugal Pump. Demonstrate construction and working of Centrifugal Pump practically. Student Activity: Discuss application of 1^{st} law to Centrifugal Pump.
04	**Study and Demonstration of Joule's paddle wheel experiment.** Study the Joule's paddle wheel experiment. Demonstrate of Joule's paddle wheel experiment practically. Student Activity: Discuss conclusion of Joule's paddle wheel experiment.
05	**Determination of Dryness fraction using separating throttling calorimeter.** Study the separating throttling calorimeter. Demonstrate of construction, working and determination of dryness fraction using separating throttling calorimeter practically. Student Activity: Discuss merits and demerits of separating throttling calorimeter
06	**Determination and Verification of SFEE for Nozzle.** Study application of SFEE to nozzle. Demonstrate of application of steady flow energy equation to nozzle practically. Student Activity: Verify SFEE using nozzle.
07	**Determination of actual Coefficient of performance of House hold refrigerator.** Study 2^{nd} law of thermodynamics using house hold refrigerator. Demonstrate of application of 2^{nd} law to house hold refrigerator practically. Student Activity: Verify second law using house hold refrigerator.

08	**Numerical Assignment on Unit III (Minimum five Problems)**
09	**Numerical Assignment on Unit IV. (Minimum five Problems)**
10	**Numerical Assignment using steam table/Mollier chart on Unit V. (Minimum five Problems)**

Note: any EIGHT practical from Engineering Thermodynamics Lab shall be conducted during 14 weeks available during semester.

Guide lines for ICA:-

ICA will be based on practical assignments submitted by the student in the form of journal. Evaluation will be based on paper work.

Lab - Course Outline

Fluid Mechanics	**FM**
Course Title	Short Title & Course Code

Branch - Mechanical / Automobile Engineering **Year – Second Year**

Course Description:

This lab includes different fluid mechanics practical's .The course aims at imparting knowledge of Fluid properties and analysis of forces inside the fluid.

Teaching Scheme:

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	2	14	28	1

Evaluation Scheme:

Internal Continuous Assessment (ICA)	25 Marks	50 Marks
End Semester exam (ESE) (Practical)	25 Marks	

Prerequisite Course(s): The background required includes a sound knowledge of Mathematics (Calculus), Engineering Mechanics and Physics of first year Level.

Outline of Content: This course contains

1. Experiment on Red wood viscometer
2. Experiment on Reynolds's apparatus
3. Experiment on Bernoulli's theorem
4. Experiment on flow measurement by orifice meter
5. Experiment on flow measurement by venturi meter
6. Experiment on determination of metacentric height of a floating body
7. Trial on centrifugal pumps
8. Experiment on determination of major and minor losses for flow through pipes
9. Study of sharp edged circular orifice / mouthpieces
10. Study of velocity distribution in boundary layer and its thickness.
11. Study of Manometers.

Note: Lab file should contain at list EIGHT experiments from above mentioned list.

ESE (Practical Examination)

• The Practical Examination will comprise of performing the experiment and viva on the Practical's.

Lab - Course Outline

Material Science and metallurgy **MSM LAB**

Course Title Short Title & Course Code

Branch - Mechanical / Automobile Engineering **Year – Second Year**

Course Description:

This lab includes the practicals related to different testing machines. It also includes preparation and study of different microstructures and introduction of furnace.

Teaching Scheme:

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	2	14	28	1

Evaluation Scheme:

Internal Continuous Assessment (ICA)	25 Marks
End Semester exam (ESE) ORAL	25 Marks

Prerequisite Course(s): Engineering Chemistry and Engineering Physics

Outline of Content:
This practical contains

S. No.	Group A
1	Tensile test, to compare tensile strength, yield point and ductility of three metallic materials.
2	Brinell or Poldi hardness test on steel, cast iron, brass.
3	Vickers hardness test on steel, cast iron, brass.
4	Rockwell and Rockwell superficial hardness measurement.
5	Izod or Charpy impact test to compare impact values of cast iron and mild steel or alluminium and brass.
6	Erichsen Cupping Test
7	Measurement Non-destructive tests: Dye penetrant test, Magnetic particle testing , ultrasonic testing ,eddy current test.(any two)

S. No.	Group B
8	Micro Specimen Preparation and use of metallurgical microscope
9	Study and drawing microstructure of mild steel, medium carbon, eutectoid steel, hypereutectoid steel .
10	Demonstration of Annealing,Normalising and Hardening of medium carbon steel specimens and measurements of hardness and drawing icrostructures.
11	Jominy Hardenability test.
12	Study and drawing microstructure of white, malleable, gray and ductile cast iron or any four non-ferrous metals.
13	Observe and record the microstructures of heat affected zones of fusion welded joint.

Note: The student should maintain a journal keeping record of <u>any four</u> experiments from <u>group A</u> and <u>group B</u> each.

Guide lines for ESE:-

ESE will be based on practical assignments submitted by the student in the form of journal.

Evaluation will be based on paper work.

Lab - Course Outline

Workshop Practice III	**WP-III**
Course Title	Short Title & Course Code
Branch - Mechanical / Automobile Engineering	**Year – Second Year**

Course Description:

Workshop Practice III covers the basic knowledge and practices on conventional lathe machine in machine shop I (Turning shop), various welding joints and welding processes in welding shop, pattern making practices in carpentry shop and casting practices in foundry shop in order to improve the practical skill of students in different workshops.

Teaching Scheme:

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	2	14	28	1

Evaluation Scheme:

Internal Continuous Assessment (ICA)	25 Marks
End Semester exam (ESE) (ORAL)	25 Marks

Prerequisite Course(s): WP-I, WP-II, Engineering Drawing, Engineering Materials.

Outline of Content:

This practical contains

1. **Carpentry shop**

Preparation and manufacturing of solid wooden pattern for foundry shop involving Wood Turing lathe machine.

2. **Foundry Shop**

Mould making Practice: Preparation of mould of above pattern, casting from this mould. Actual weight calculation, yield & casting of item should be performed.

3. **Welding Shop**

One job on welding (fabrication) preparing a component comprising welding joints such as shoe rack, book rack, stands for flower pots, house hold applications, stools etc.(Group of 4 to 5 Students)

4. **Machine shop-I (Turning Shop)**

One job (by each Student) consisting of Turning, Thread Cutting (Internal, External), Facing, Plain turning, Taper turning, Step Turning, chamfering, Grooving, Drilling, boring, Reaming, Knurling etc. operations.

Note:

1. Candidates are required to finish the job to the following limits

   Machine Shop: + 0.5mm or -0.5mm

   CNC Machine: +0.01mm or -0.01mm

2. Workshop book to be submitted comprising of Job drawing, process sheet for a given job along with the sketches of tools used for operations.
3. CNC Programming restricted to class only.

Reference Books:

1. Element of Workshop Technology Volume I and II -Hajara Chaudhary and Bose S.K., Asia Publishing House.

2. Production Technology Volume I and II –P.N.Rao, Tata McGraw Hill Publication.

3. Production Technology- R.K.Jain, Khanna Publications.

4. Production Technology- P.C.Sharma, Khanna Publication.

5. Workshop Technology-Chapman W.A.J., ELBS Publication.

6. Production Technology- HMT, Tata McGraw Hill Publication.

Course Outline

Engineering Mathematics-III **EM-III**

Course Title Short Title Course Code

Course Description:

This course provides the elementary level knowledge of Linear Differential Equations, Transforms, Statistics and Probability Distributions. Course includes solution of n^{th} order linear differential equations, solution of one and two dimensional heat equation, Laplace transform, Fourier transform, and probability distribution and basic of vector differentiation.

	Hours per Week		No. Of Weeks		Total Hours		Semester Credits
Lecture	3		14		40		4
Tutorial	1	1	14	14	14	14	

Examination scheme:

End semester exam (ESE)	80 Marks		Duration : 03 hours
Internal Sessional exam (ISE)	20 Marks	20 Marks	

Prerequisite Course(s): Engineering Mathematics-I, Engineering Mathematics-II.

Outline of Content: This course contains:

1.	**Linear Differential Equations** **No of Lect – 8, Marks: 16**	
	a	Introduction to nth order Linear Differential Equation, Auxiliary Equation, Complimentary Functions
	b	Solution of nth order L.D.E using General Method
	c	Particular Integral using short cut Methods
	d	Solution of 2^{nd} order L.D.E using Variation Parameter Methods
	e	Solution of Cauchy's D.E.
	f	Solution of Legendre's D.E

2.	**Applications of Linear Differential Equations and Partial Differential equations** **No of Lect – 8, Marks: 16**	
	a	Mathematical Model of mass spring system and its solution
	b	Introduction to One Dimensional Heat Flow equation and its solution using method of separation of variables
	c	Introduction to Two Dimensional Heat Flow equation and its solution using method of separation of variables

3.	**Laplace Transform** **No of Lect – 8, Marks: 16**	
	a	Definition of Laplace Transform, Existence of Laplace Transform, Laplace Transform of standard Functions.
	b	Theorems and properties of Laplace transform and its use.
	c	Inverse Laplace Transform of standard functions.
	d	Properties of Inverse Laplace Transform and its use.
	e	Laplace Transform of Unit Step Functions.
	f	Solution of Differential equations using Laplace Transform .

4.	**Statistics and Probability distributions** **No of Lect – 8, Marks: 16**	
	a	Introduction to Mean, Mode, Median standard deviation, Variance, Coefficient of Variation.
	b	Moments, Skewness and Kurtosis.
	c	Correlation and Regression.
	d	Introduction to Binomial, Poisson's Distributions
	e	Introduction to Normal Distributions

5.	**Fourier Transform and Vector Differentiation** **No of Lect – 8, Marks: 16**	
	a	Introduction to Fourier Integral theorem Fourier Transforms, Fourier Cosine Transforms, Fourier Sine Transform and their inverse.
	b	Gradient of Scalar point function.
	c	Directional Derivatives of scalar point functions
	d	Divergence and curl of vector field
	e	Solenoidal and Irrotational vecor fields

Reference Books:

1. H.K. Dass - Advanced Engineering Mathematics (S. Chand Publication) New Delhi, 2008.
2. Erwin Kreyszig - Advanced Engineering Mathematics (Wiley Eastern Ltd.) Tenth Edition.
3. B.S. Grewal - Higher Engineering Mathematics, Khanna Publication, Delhi, 42^{nd} Edition,2012.
4. Wylie C.R. & Barrett - Advanced Engineering Mathematics - Mc Graw Hill, 6th Revised edition ,1995.
5. B.V. Raman - Engineering Mathematics - Tata Mc- Graw – Hill, 2007.
6. A Text Book of Engineering Mathematics, By N. P. Bali, Laxmi Publication,2004 .

Course Outline

Theory of Machines-I	**TOM-I**
Course Title	Short Title Course Code
Branch - Mechanical / Automobile Engineering	**Year – Second Year**

Course Description:

This course provides the elementary level knowledge of Theory of Machines. Course includes introduction to kinematics of machines and mechanisms, various methods of velocity and acceleration analysis of plane mechanisms. Friction and friction devices are also included in the syllabus. One unit on belt, rope and chain drives cover the necessary details of these power transmitting devices.

Teaching Scheme:

	Hours per Week	No. Of Weeks	Total Hours	Semester Credits
Lecture	3	14	42	3

Examination scheme:

End semester exam (ESE)	80 Marks	Duration : 03 hours
Internal Sessional exam (ISE)	20 Marks	

Prerequisite Course(s): Knowledge of vector algebra and Engineering Mechanics.

Outline of Content:

This course contains:

1	**Simple Mechanisms**	**No. of Lectures – 9, Marks: 16**
	a	Introduction, Kinematics, Kinetics, Static & Dynamics, Machine, Kinematic link or element, Type of links, Structure, Difference Between a Machine and a structure, Types of Constrained Motions, Classification of Kinematic Pairs.
	b	Kinematic Chain, Types of Joints in a Chain, Types of Kinematic Chains, Mechanism, Number of Degrees of Freedom for Plane Mechanisms, Application of Kutzbach Criterion to Plane Mechanisms, Grubler's Criterion for Plane Mechanisms.
	c	Inversion of Mechanism, Four Bar Chain or Quadric Cycle Chain, Inversions of Four Bar Chain, Single Slider Crank Chain, Inversions of Single Slider Crank Chain, Double Slider Crank Chain, Inversions of Double Slider Crank Chain(no numerical treatment)
	d	Introduction, Relative & Absolute velocity, Velocity of a point on a link by Instantaneous Centre of Rotation (ICR) method, Properties of ICR, Location of ICRs, Space and Body Centrodes
	e	Kennedy's or Three Centers in Line Theorem, ICR method for different Mechanisms
	f	Relative Velocity Method, Relative Velocity of Two Bodies Moving in Straight Lines, Motion of a Link, Velocity of a Point on a Link by Relative Velocity Method, Velocities in a Four bar mechanism, Slider Crank Mechanism & other inversions, Rubbing Velocity at a Pin Joint, Mechanical Advantage
2	**Acceleration in Mechanisms**	**No. of Lectures – 8, Marks: 16**
	a	Introduction to Linear, Angular, Centripetal, Tangential acceleration, Acceleration Diagram for a Link, Acceleration of a Point on a Link,

		Acceleration in the Four bar Mechanisms
	b	Acceleration in the Slider Crank Mechanism and other inversions
	c	Introduction to Coriolis Component of Acceleration, magnitude and direction, Coriolis Component of Acceleration for different mechanisms
	d	Klien's Construction, different cases of slider crank mechanisms
3	**Inertia Forces in Reciprocating Parts** **No. of Lectures – 8, Marks: 16**	
	a	Introduction, D-Alembert's Principle, Analytical Method for Velocity and Acceleration, Forces on the Reciprocating Parts of an Engine
	b	Equivalent Dynamical System, Determination of Equivalent Dynamical System of Two Masses by Analytical Method, Correction Couple, Analytical Method for Inertia Torque
	c	Mechanisms with Lower Pairs, Pantograph, Straight Line Mechanism, Approximate Straight Line Motion Mechanisms, Steering Gear Mechanism
	d	Universal or Hooke's Joint, Double Hooke's Joint
4	**Friction** **No of Lectures – 9, Marks: 16**	
	a	Introduction, Types of Friction, Friction Between Lubricated Surfaces, Limiting Friction, Laws of Solid Friction, Laws of Fluid Friction, Coefficient of Friction, Limiting Angle of Friction, Angle of Repose, Friction of a Body Lying on a Rough Inclined Plane, Efficiency of Inclined Plane
	b	Screw friction, Terminology of screw, Screw Jack, Torque requirements, Efficiency, Friction of a V-thread
	c	Friction in Journal Bearing- Friction Circle, Friction of Pivot and Collar Bearing, Flat Pivot Bearing, Conical Pivot Bearing, Trapezoidal or Truncated Conical Pivot Bearing, Flat Collar Bearing
	d	Friction Clutches, Single Disc or Plate Clutch, Multiple Disc Clutch, Cone Clutch, Centrifugal Clutch
5	**Belt, Rope and Chain Drives** **No. of Lectures – 8, Marks: 16**	

	a	Introduction, Selection of a Belt Drive, Types of Belt Drives, Types of Belts, Material used for Belts, Types of Flat Belt Drives, Velocity Ratio, Slip of Belt, Creep of Belt
	b	Length of an Open Belt Drive and Cross Belt Drive, Power Transmitted, Ratio of Driving Tensions, Angle of Contact, Centrifugal Tension, Condition For the Transmission of Maximum Power, Initial Tension
	c	V-belt drive, Advantages and Disadvantages, Driving Tensions for V-belt,Rope Drive, Fiber Ropes, Advantages, Sheave for Fiber Ropes, Wire Ropes
	d	Chain Drives, Kinematic of Chain Drive, Classification, Advantages and Disadvantages, Terminology, Chain Speed and Angular Velocity of Sprocket, Length of Chain

Reference Books:

1. Theory of Machines, S. S. Rattan, Tata McGraw Hill, New Delhi.
2. Theory of Mechanisms & Machines, Jagdish Lal, Metropolitan Book Co.
3. Theory of Machines, Longman's Green & Co., London.
4. Theory of Machines, W. G. Green, Blackie & Sons, London
5. Theory of Machines, V.P. Singh, Dhanpat Rai & Co.
6. Theory of Machines and Mechanisms, Shigley, J.E and Uicker, J.J, McGraw-Hill International Book Co.
7. Mechanisms and Machines theory, Rao J.S. and Dukkipati R.V, Wiley Eastern Ltd.
8. The Theory of Machines through solved problems by J.S.Rao. *New age international publishers.*
9. *A text book of Theory of Machines by Dr.R.K.Bansal. Laxmi Publications (P) Ltd.*
10. Theory of Machines by Sadhu Singh, Pearson Publication

Course Outline

Applied Thermodynamics	**AT**	
Course Title	Short Title	Course Code
Mechanical/Automobile Engineering	**Second Year**	**Second**
Branch	Year	Semester

Course Description:

This course imparts knowledge of Applied Thermodynamics to undergraduate students. The background required includes a sound knowledge of course in Engineering Thermodynamics and use of Steam tables. The objectives of the course are to understand various real-life applications of basic Thermodynamics including Reciprocating and rotary Air compressors, Boilers, Steam power plant, etc.

Teaching Scheme:

	Hours per Week	No. Of Weeks	Total Hours	Semester Credits
Lecture	3	14	42	4
Tutorial	1	14	14	

Examination scheme:

End semester exam (ESE)	80 Marks	Duration : 03 hours
Internal Sessional exam (ISE)	20 Marks	20 Marks

Prerequisite Course(s):

Fundamental knowledge of Physics and Engineering Thermodynamics.

Outline of Content: This course contains

1	**Boiler and Boiler Performance**	**No. of Lectures – 8, Marks: 16**
	a	Steam Power Plant layout, Classification and selection of boilers, Stocker fired boiler.
	b	Modern boilers with various fossil fuels, IBR act, Energy conservation opportunities, waste heat recovery boiler.
	c	Boiler performance - Equivalent evaporation, boiler efficiency (direct and indirect Method).
	d	Numerical on boiler performance.
	e	Heat balance for a boiler.
	f	Numerical on boiler Heat balance.
	g	Boiler Draught, Natural & Artificial draught, losses, Condition for maximum discharge through chimney.
	h	Numerical on draught.
2	**Vapor Power Cycle and Steam Condenser**	**No. of Lectures – 8, Marks: 16**
	a	Fundamentals of Vapor Processes, Steam power cycles- Carnot Cycle, Rankine cycle.
	b	Analysis of Rankine cycle for work ratio, efficiency, Power output, specific steam consumption, heat rate. Comparison of Rankine and Carnot cycle.
	c	Numerical on Rankine cycle
	d	Methods to improve Rankine cycle efficiency - Regeneration, Reheating, Co-generation. (Elementary treatment)
	e	Numerical on reheat Rankine cycle, regenerative Rankine cycle.
	f	Condenser, classification of condenser, Necessity of condenser, Vacuum measurement, Condenser efficiency, Vacuum efficiency, Calculation of cooling water required.
	g	Air leakage and its effect on condenser performance, Air extraction pump,

		cooling towers.
	h	Numerical on condenser performance.
3	**Compressible Flow and Steam Nozzle**	**No. of Lectures – 8, Marks: 16**
	a	Compressible fluid flow, Static and Stagnation properties, numerical.
	b	Sonic velocity, Mach number, type of nozzles and diffusers.
	c	One dimensional steady isentropic flow through nozzles and diffusers, Critical pressure ratio, maximum discharge, choked flow.
	d	Numerical on flow through nozzles and diffusers.
	e	Effect of variation in back pressure on nozzle characteristics, Effect of friction and nozzle Efficiency.
	f	Numerical on Effect of friction and nozzle Efficiency.
	g	Super saturated flow, Fanno line, Rayleigh lines (No numerical).
	h	Normal and oblique shock losses. (No numerical)
4	**Reciprocating Air Compressor**	**No. of Lectures – 8, Marks: 16**
	a	Introduction, use of compressed air, terminology used in compressor, Classification of compressors.
	b	Construction and working of single stage compressor, Thermodynamic analysis of reciprocating air compressor without clearance volume, Isothermal Efficiency, Double acting Compressor.
	c	Numerical of reciprocating air compressor without clearance.
	d	Effect of clearance, analysis of reciprocating air compressor with clearance volume, volumetric efficiency, FAD, Actual Indicator diagram.
	e	Numerical of reciprocating air compressor with clearance.
	f	Improvements in volumetric efficiency, multistage compression, Condition for minimum work of compression, Intercooler, after cooler, heat rejected.
	g	Numerical on reciprocating air compressor.
	h	Numerical on reciprocating air compressor.

5	Rotary air Compressor	No. of Lectures – 7, Marks: 16
	a	Introduction, classification of rotary compressors; construction, working, analysis and application of roots blower.
	b	Construction, working, analysis and application of vane type compressor
	c	Construction, working, analysis and application of screw type compressor
	d	Introduction, classification of fans and blowers, Fan characteristics.
	e	Construction and working of centrifugal fan and axial flow fan.
	f	Numerical only on fan.
	g	Numerical only on fan.

References:

1	Thermodynamics: an Engineering Approach, Y A Cengel and M A Boles, Tata McGraw Hill.
2	Applied Thermodynamics for Engineering Technologists, T. D. Eastop and A. McConkey, Pearson Education India
3	Power Plant Engineering, P K Nag, Tata McGraw Hill.
4	Power Plant Technology, M. M. El-Wakil, Tata McGraw Hill.
5	Thermal Engineering, R K Rajput, Laxmi Publication New Delhi.
6	Steam & Gas Turbines & Power Plant Engineering, R. Yadav, Central Publishing House, Allahabad
7	Engineering Thermodynamics, P.K. Nag, Tata McGraw Hill
8	Course in Thermal Engineering, C. P. Kothandaraman, Domkundwar, Domkundwar S, Dhanpat Rai & Company (P) Limited.

Course Outline

Basic Electrical Drives & Controls	**BEDC**	
Course Title	Short Title	Course Code

Branch - Mechanical / Automobile Engineering **Year – Second Year**

Course Description:

This course provides the elementary level knowledge of Basic Electrical Drives & Controls. Course includes introduction to Electric power measurement, Electric Energy measurement, Illumination DC Machines. The course also introduces students to concept of Single phase & three phase transformers & Three Phase Induction Motor, Single phase Induction motors & Synchronous Generator, Special purpose machines, Sensors, Robotics, DAS and Relays.

Teaching Scheme:

	Hours per Week	No. Of Weeks	Total Hours	Semester Credits
Lecture	3	14	42	3

Examination scheme:

End semester exam (ESE)	80 Marks	Duration : 03 hours
Internal Sessional exam (ISE)	20 Marks	

Prerequisite Course(s): Elements of Electrical and Electronics Engineering

.

Outline of Content: This course contains:

1		**Electric power measurement, Electric Energy measurement, Illumination No of Lect – 8, Marks: 16**
	a	Three phase power measurement by single watt meter method, two Watt meter method, three watt meter method.
	b	Effect of load power factor on wattmeter reading. Measurement of reactive power by one wattmeter method.
	c	Single phase energy meter (construction and working).
	c	Various term related to illumination, types
	d	Requirement of good lighting scheme, special purpose lighting.
2		**DC Machines,Special purpose machines No of Lect – 9, Marks: 16**
	a	Constructional, Working principle of D.C.generator, Types of D.C. generator EMF Equation of D.C. Generator (Theoretical concept only).
	b	Working principle of D.C.Motor, back EMF, EMF Equation Types of D.C.Motor, and torque equation for D.C.Motor.
	c	Characteristics of Shunt, series, compound motors, methods for speed control of D.C. Shunt and series motor & applications of DC motor.
	d	Explain the necessity of starter and types.
	e	Principle, working and application of stepper motor, servo motor.
3		**Single phase & Three phase transformers & Three Phase Induction Motor No of Lect – 9, Marks: 16**
	a	Working Principle & Construction of Single phase transformer & derive EMF equation. Efficiency of Transformers & condition for maximum efficiency of Transformer
	b	Types of Transformer connection star / star, delta / delta, star / delta, delta / star connections, V-V and Scott connections.
	c	Constructional features of induction motor and Working principle of three phase induction motor, types
	d	Define slip and derive torque equation , explain torque slip characteristics, power stages
	e	Explain different types of starters and applications of induction motors.

4	**Single phase Induction motors & Synchronous Generator** **No of Lect – 8 Marks: 16**	
	a	Principle of operation, types, and applications.
	b	Constructional features (Salient and Non-salient) of alternators and principle of operation.
	c	Pitch Factor or Chording Factor & Distribution Factor or winding factors, EMF equation.
	d	Alternator on load, concept of synchronous reactance and impedance, Phaser diagram of loaded alternator.
	e	Voltage regulation of alternator by Direct loading method and synchronous impedance method.
5	**Sensors, Robotics,DAS and Relays** **No of Lect – 8, Marks: 16**	
	a	Proximity sensors, Light sensors,
	b	Hall effect sensors, Ultrasonic sensors.
	c	Robotics, Block diagram and operation of Data acquisition system.
	d	Electromechanical control relays, solid state relays, Timing and Latching relays.

References:

1	B L Theraja and A K Theraja, "A Text book of Electrical Technology- Vol-I", S. Chand, 1ST Edition, 2001
2	B L Theraja and A K Theraja, "A Text book of Electrical Technology- Vol-II", S. Chand, 1ST Edition, 2001
3.	Ashfaq Husain, Fundamental of Electrical Engineering,Dhanpat Rai & co.
4	Electrical machines D P Kothari and I J Nagrath, Tata McGraw Hill, Third Edition
5	Electrical Machinery S.K. Bhattacharya TTTI Chandigad
6	Electrical Technology Edward Hughes Pearson Education
7	Art and Science of Utilization of Electrical Energy H Pratap Dhanpat Rai and Co, Third Edition

Course Outline

Manufacturing Engineering-II	**ME-II**	
Course Title	Short Title	Course Code

Branch - Mechanical / Automobile Engineering **Year – Second Year**

Course Description:
This course provides the basic knowledge of Advance manufacturing processes. Course includes fundamentals of metal cutting, Design of jigs and fixtures, Sheet metal working, Gear manufacturing and CNC machine, Unconventional machining processes.

Teaching Scheme:

	Hours per Week	No. Of Weeks	Total Hours	Semester Credits
Lecture	3	14	40	3

Examination scheme:

End semester exam (ESE)	80 Marks	Duration : 03 hours
Internal Sessional exam (ISE)	20 Marks	

Prerequisite Course(s): This course is aimed at introducing the Manufacturing processes to undergraduate students. The background expected familiar with Workshop Practice I & II and Manufacturing Engineering-I.

<u>Outline of Content:</u> This course contains:

1	**Theory of metal cutting**	**No. of Lect – 8, Marks: 16**
	a	Introduction to single point cutting tool
	b	Angle & forces of single point cutting tool
	c	Tool life & Tool wear
	d	Measurement of cutting forces
	e	Cutting power
2	**Design of jigs and fixtures**	**No. of Lect – 8, Marks: 16**
	a	Introduction to jigs and fixtures
	b	Design principle
	c	Clamping
	d	Drill bushes
	e	Fixtures
3	**Sheet metal working**	**No. of Lect – 8, Marks: 16**
	a	Introduction to press tools
	b	Design of dies
	c	Selection of die and presses
4	**Gear manufacturing and CNC machine**	**No. of Lect – 8, Marks: 16**
	a	Introduction to broaching
	b	Gear manufacturing
	c	Introduction to Numerical controls and machine centers
5	**Unconventional machining processes**	**No. of Lect – 8, Marks: 16**
	a	Mechanical Processes
	b	Thermal processes
	c	Electrochemical machining
	d	Electric discharge machining

Reference Books:

1. Workshop technology – Raghuwanshi vol-1 &2, Dhanpatrai , New delhi.

2. Workshop technology – Hajra Choudhary vol-1 &2, Media promoters, Mumbai

3. Plastic technology- W.J. Patton

4. Manufacturing technology (Foundary forming & welding) P. N. Rao, McGraw Hill publications, New Delhi
5. Manufacturing science- Ghosh and Malik
6. P. C. Sharma, A Textbook of Production Engineering by - S. Chand & Company. Ltd.
7. P. C. Sharma, A Textbook of Production Technology by - S. Chand & Company. Ltd.
8. Production Technology- R K Jain, Khanna, publication.
9. Materials and processes in manufacturing , J T Black, Ronald A. Kosher, DeGarmos, Wiley student edition
10. Fundamental of modern manufacturing , Mikell P groover, , Wiely asia student edition
11. Manufacturing process and system , Phillip C Ostawald, jairo Munoz, , wiely india
12. Manufacturing Technology, D.K. Singh, Pearson New Delhi.
13. Manufacturing process Vol-I, H. S. Shah, Pearson New Delhi.
14. Manufacturing Engineering and Technology, Serope Kalpakjian, Pearson New Delhi.
15. Manufacturing Processes, Serope Kalpakjian, Pearson New Delhi.

Course Outline

Machine Drawing	**MD**
Course Title	Short Title & Course Code
Branch - Mechanical Engineering	**Year – Second Year**

Course Description:

This course provides the elementary level knowledge of Machine Drawing. Course includes introduction to machine drawing, dimensioning, elements of production drawing, types of fits, surface roughness, conventional representation of machine components, riveted joints and welded joints. The course also introduces students to study sequences of preparing the assembly drawing and bill of materials.

Teaching Scheme:

	Hours per Week	No. of Weeks	Total Hours
Lecture	1	14	14

Prerequisite Course(s): Knowledge of Engineering Graphics

Outline of Content:

This course contains:

1	**Introduction to Machine Drawing**	**No. of Lectures – 1**
	Introduction to Machine Drawing, Types of Machine Drawing, Sheet layout and Sketching - Sheet layout – Sheet sizes, Margin, Border lines, Title block , Scale and Scale drawing , Sketching and its materials.	
2	**Dimensioning**	**No. of Lectures – 1**
	Dimensioning terms and notations, General rules for dimensioning, placing of dimensions, methods of dimensioning common features such as diameters,radii,position of holes, curved surfaces, key way, taper features, etc.	
3	**Assembly Drawing**	**No. of Lectures – 3**
	Introduction, Types of Assembly drawing, Accepted norms to be observed for assembly drawing, Sequences of preparing the assembly drawing, Bill of materials.	
4	**Elements of Production Drawing**	**No of Lectures – 2**
	Introduction to Geometric tolerances and Dimensional tolerances, Representation of Geometric tolerances and Dimensional tolerances on a drawing.	
5	**Fits**	**No. of Lectures – 2**
	The Indian standard system of limits and fits, Types of fits, Selection of fits, Hole basis system and Shaft basis system.	
6	**Surface Roughness**	**No. of Lectures – 2**
	Terminology for surface roughness, Machining symbols, Roughness symbols, values, and grades recommended by BIS, Representation of Surface Roughness on drawing.	
7	**Conventional Representation of machine Components**	**No. of Lectures – 1**
	Screw Threads, springs, Gears, Bearings, etc.	
8	**Riveted joints and Welded joints**	**No. of Lectures – 2**

	Introduction to Riveting, Forms and proportion of rivet heads, Types of riveted joints, Introduction to welded joints, Representation of welded joints.

Reference Books:

1. Machine Drawing, N. D. Bhatt, Chorotar Publishing House, Anand, India.
2. Mechanical Engineering Design, J. E. Shingle & C. R. Mischke,Tata McGraw Hill Publications, New Delhi.
3. Machine Drawing, N. Sidheswar & Kannaiah, Tata McGraw Hill Publications, New Delhi.
4. Machine Drawing, N. D. Junnarkar, Pearson Education.

Lab Course Outline

Machine Drawing Lab	**MD LAB**
Course Title	Short Title & Course Code
Branch - Mechanical Engineering	**Year – Second Year**

Course Description:

This lab includes drawing sheets related to assembly and details of a machine unit such as couplings, bearings, lathe parts, screw jack, vices, valves, etc. The course also introduces students to study sequences of preparing the assembly drawing and bill of materials.

Teaching Scheme:

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Lecture	2	14	28	2

Examination scheme:

Internal Continuous Assessment (ICA) 50 Marks

Prerequisite Course(s): Knowledge of Engineering Graphics

Outline of Content:

This lab contains

Machine Drawing Lab

Sheet No. 1 and 2- Assembly and details of a machine unit.

This project consisting of a full imperial size sheets 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.

Sheet No. 3 and 4- Assembly and details of a machine unit.

This project consisting of a full imperial size sheets 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.

Assignment:

It should contain all the machining symbols, tolerances and welding symbols, etc. on A4 size sheet.

Note: All the four sheets and assignment must be completed during 14 weeks available during semester.

Guide lines for ICA:

ICA will be based on four drawing sheets and assignment submitted by the student in the form f journal.

Reference Books:

1. Machine Drawing, N. D. Bhatt, Chorotar Publishing House, Anand, India.
2. Mechanical Engineering Design, J. E. Shingle & C. R. Mischke,Tata McGraw Hill Publications, New Delhi.
3. Machine Drawing, N. Sidheswar & Kannaiah, Tata McGraw Hill Publications, New Delhi.
4. Machine Drawing, N. D. Junnarkar, Pearson Education.

Lab - Course Outline

Basic Electrical Drives & Controls	**BEDC LAB**
Course Title	Short Title & Course Code
Branch - Mechanical / Automobile Engineering	**Year – Second Year**

Course Description:

This lab includes elementary level knowledge of Basic Electrical Drives & Controls by study the practicals.

Teaching Scheme:

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	2	14	28	1

Evaluation Scheme:

Internal Continuous Assessment (ICA)	50 Marks

Prerequisite Course(s): Elements of Electrical and Electronics Engineering

<u>Outline of Content:</u>

This practical contains

Basic Electrical Drives & Controls

1) Speed control of DC Shunt motor by armature control and flux control methods.
2) Load test on DC Shunt Motor.
3) Load test on DC Series Motor.
4) Measurement of active power in a three phase balanced inductive load using two wattmeter methods.
5) Regulation of an alternator by synchronous impedance method.
6) Regulation of an alternator by Direct Loading method.
7) Load Test on three Phase Induction Motor
8) Study of D.C. Motor Starters & Three Phase Induction Motor Starter.

Note: All the eight experiments must be completed during 15 weeks available during semester.

Lab - Course Outline

Applied Thermodynamics Lab	**AT LAB**	
Course Title	Short Title & Course Code	
Mechanical/Automobile Engineering	**Second Year**	**Second**
Branch	Year	Semester

Course Description:

This lab includes performance practical and study practical related to Applied Thermodynamics.

Teaching Scheme:

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	2	14	28	1

Evaluation Scheme:

Internal Continuous Assessment (ICA)	25 Marks
End Semester exam (ESE) (Oral)	25 Marks

Prerequisite Course(s):

11th standard Physics, 12th standard Physics, Engineering Thermodynamics.

Outline of Content:
This Lab contains

Following **THREE** performance practical	
01	Determination of heating value of a solid / liquid fuel using Bomb Calorimeter.
02	Exhaust gas analysis using Gas Analyzer OR Orsat Apparatus.
03	Determination of Isothermal and Volumetric efficiency of reciprocating air compressor.
Any FIVE of the following study practical	
04	Study of boiler draught.
05	Study of High pressure boiler.
06	Study of Steam condensers and cooling towers.
07	Study of Steam Nozzles and diffusers.
08	Study of Steam Power Plant.
09	Visit to any thermal power plant, prepare a detailed visit report.
10	Evaluation of Boiler efficiency by Direct and Indirect Method (Through Numerical).

Note:

FIVE Compulsory Assignment on **EACH** unit shall be included in the journal. Each assignment should have at least **FIVE** solved numerical. These assignments should be thoroughly conducted over tutorial sessions under teacher guidance.

Guide lines for ESE:-

End Semester Examination (ESE) **(Oral Exam)** will be based on practical and assignment submitted by the student in the form of journal.
Evaluation will be based on paper work.

Lab – Course Outline

Theory of Machines-I **TOM-I LAB**

Course Title Short Title & Course Code

Branch - Mechanical / Automobile Engineering **Year – Second Year**

Course Description:

This lab includes drawing sheets related to velocity and acceleration analysis of various mechanisms. Experiments on determination of mass moment of inertia and slip & creep in belt drive are also included. In addition two assignments, one on inversions of mechanisms and one on study of various clutches are also added.

Teaching Scheme:

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	2	14	28	1

Evaluation Scheme:

Internal Continuous Assessment (ICA)	25 Marks
End Semester exam (ESE) ORAL	25 Marks

Prerequisite Course(s): Engineering Mathematics, Physics

Outline of Content:

This practical contains

Theory of Machines-I Lab

1. **Drawing sheets on ICR method (2 problems), relative velocity and acceleration method (4 problems) and Klein's construction (2 problems)**
2. **To study the various inversions of kinematic chains. (Assignment)**
3. **To determine slip and creep for a belt-pulley combination.**
4. **To determine mass moment of inertia of compound pendulum.**
5. **To determine mass moment of inertia of rigid body by using bifilar or trifilar suspension method.**
6. **To study the different types of clutches.(Assignment)**

Note: All the six experiments must be completed during 15 weeks available during semester.

Guide lines for ESE:-

ESE will be based on practical assignments submitted by the student in the form of journal. Evaluation will be based on paper work.

Lab - Course Outline

Workshop Practice IV **WP-IV**

Course Title Short Title & Course Code

Branch - Mechanical / Automobile Engineering **Year – Second Year**

Course Description:

Workshop Practice IV covers the basic knowledge and practices on conventional machines like Lathe, Milling, Drilling, Shaper, and Grinding Machines in machine shop II as well as CNC machines like CNC Lathe, CNC Milling in CNC shop along with CNC Job development and programming in order to improve the practical skill of students in different workshops.

Teaching Scheme:

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	2	14	28	1

Evaluation Scheme:

Internal Continuous Assessment (ICA)	25 Marks
End Semester exam (ESE) (Practical)	25 Marks

Prerequisite Course(s): WP-I, WP-II, WP-III, Engineering Drawing, Engineering Materials.

Outline of Content:

This practical contains

1. **Machine shop-II**

One composite job by each student involving different machining operations on Lathe, Milling, Drilling, Shaper, Grinding Machines

2. **CNC Lathe**

One job for programming and manufacturing on CNC lathe machine for each student consisting operations like Turning, Thread Cutting (Internal or External), Facing, Plain turning, Taper turning, Step Turning, Chamfering, Grooving, Drilling etc. operations.

3. **VMC (CNC Milling)**

One job for programming and manufacturing on VMC, CNC Milling machine for each student performing drilling, tapping, milling etc

Note:

4. Candidates are required to finish the job to the following limits

   Machine Shop: + 0.5mm or -0.5mm

   CNC Machine: +0.01mm or -0.01mm

5. Workshop book to be submitted comprising of Job drawing, process sheet for a given job along with the sketches of tools used for operations.
6. CNC Programming restricted to class only.

Guide lines for ESE:-

End Semester Examination (ESE) **(Practical Examination)** will be based on above mention practical list in CNC shop and conventional machine shop which will perform by students during the current semester. The students must be performing the practical in front of the examiner. The workshop instructors will only provide the raw material, tools, and equipments to students and also arrange the set up required for conducting workshop practical in CNC shop and conventional machine shop.

Reference Books:

1. Element of Workshop Technology Volume I and II -Hajara Chaudhary and Bose S.K., Asia Publishing House.

2. Production Technology Volume I and II –P.N.Rao, Tata McGraw Hill Publication.

3. Production Technology- R.K.Jain, Khanna Publications.

4. Production Technology- P.C.Sharma, Khanna Publication.

5. Workshop Technology-Chapman W.A.J., ELBS Publication.

6. Production Technology- HMT, Tata McGraw Hill Publication.

NORTH MAHARASHTRA UNIVERSITY,

JALGAON (M.S.)

Third Year Engineering

(Mechanical Engineering)

Faculty of Engineering and Technology

उत्तर महाराष्ट्र विद्यापीठ

अंतरी पेटवू ज्ञानज्योत

1990

Course Outline

Semester- V &VI

TE Semester - V

Name of the Course	Group	Teaching Scheme				Evaluation Scheme					Credits
		Theory		PR	Total						
		TH Hr/W	Tut Hr/W	PR Hr/W	Total	ISE	ESE	ICA	ESE	Total	
Heat Transfer	D	3	---	---	3	20	80	---	---	100	3
Internal Combustion Engine	D	3	---	---	3	20	80	---	---	100	3
Machine Design - I	D	3	---	---	3	20	80	---	---	100	3
Theory of Machine - II	D	3	---	---	3	20	80	---	---	100	3
Industrial Safety and Engineering	C	3	---	---	3	20	80	---	---	100	3
Heat Transfer Lab.	D	---	---	2	2	---	---	25	25	50	1
Internal Combustion Engine Lab.	D	---	---	2	2	---	---	25	---	25	1
Machine Design - I Lab.	D	---	---	2	2	---	---	25	25	50	1
Theory of Machine - II Lab.	D	---	---	2	2	---	---	25	25	50	1
Computer Graphics Lab.	B	1	---	2	3	---	---	50	---	50	2
Ind Training /EDP/ Special Study	D	---	---	---	---	---	---	25	---	25	2
Total	16	---	10	26	100	400	175	75	750	23	

TE Semester - VI

Name of the Course	Group	Teaching Scheme				Evaluation Scheme					Credits
		Theory		PR	Total						
		TH Hr/W	Tut Hr/W	PR Hr/W	Total	ISE	ESE	ICA	ESE	Total	
Machine Design - II	D	3	--	---	3	20	80	---	---	100	3
Numerical Analysis and Computational Methods	D	3	---	---	3	20	80	---	---	100	3
Metrology and Quality Control	D	3	---	---	3	20	80	---	---	100	3
Turbomachinery	D	3	---	---	3	20	80	---	---	100	3
Project and Business Management	C	3	---	---	3	20	80	---	---	100	3
Machine Design - II	D	---	---	2	2	---	---	25	25	50	1
Turbomachinery	D	---	---	2	2	---	---	25	25	50	1
Metrology and Quality Control	D	---	---	2	2	---	---	25	25	50	1
Programing in C++	B	---	---	2	2	---	---	25	---	25	1
Minor Project	D	---	---	2	2	---	---	50	---	50	2
Seminar-I	D	---	---	2	2	---	---	25	---	25	2
Total	15	---	12	27	100	400	175	75	750	23	

ISE: Internal Sessional Examination **ESE:** End Semester Examination **ICA:** Internal Continuous Assessment

Note : Out of 3 practical ESE heads, at least 1 head should be practical.

Course Outline

Heat Transfer	**HT**	
Course Title:	Short Title	Course Code

Branch - Mechanical / Automobile Engineering **Year – Third Year**

Course Description: This course introduces undergraduate students to Heat Transfer. The background required includes a sound knowledge of Mathematics (Calculus), Engineering Thermodynamics, Applied Thermodynamics and Fluid Mechanics of second year Level. The course aims at imparting knowledge of Heat Transfer and modes of Heat Transfer.

Teaching Scheme:

	Hours Per Week	No. of Weeks	Total Hours	Semester Credits
Lectures	**3**	14	40	3
Practical	**2**	14	28	1

Examination scheme:

End semester exam (ESE) 80 Marks Duration: 03 hours

Internal Sessional exam (ISE) 20 Marks

Purpose of Course: Degree Requirement

Prerequisite Course(s): Mathematics (Calculus) at first year level and Engineering Thermodynamics, Applied Thermodynamics and Fluid Mechanics at Second Year Level.

Outline of Content: This course contains:

UNIT-I

1.	**Heat Conduction**	**No. of Lectures - 8 Marks : 16**
	a	Concepts and Mechanism of heat flow: Steady and unsteady state heat transfer, Modes of heat transfer, their physical mechanism.
	b	Laws of heat transfer, thermal conductivity, heat transfer coefficient, radiation heat transfer coefficient.
	c	Isotropic and an-isotropic materials, Insulation materials, Thermal resistance and thermal conductance.
	d	Generalized one dimensional heat conduction equation and reduction to Fourier, Poisson and Laplace equations, Boundary conditions, Steady state heat conduction without heat generation in plane wall, cylinder and sphere, Thermal contact resistance, critical thickness of insulation on cylindrical bodies.

UNIT-II

2.	**Heat Transfer in Extended Surfaces**	**No. of Lectures - 8 Marks : 16**
	a	Steady state heat conduction with heat generation in plane and composite wall, hollow cylinder, hollow sphere.
	b	Extended Surface: Types of fins, governing equation for pin fin for infinite long fin and fin with negligible heat loss, Fin performance, fin efficiency, fin effectiveness, overall fin effectiveness, approximate solution of fins.
	c	Error in temperature measurement by thermometer.

UNIT-III

3.	**Convection Heat Transfer**	**No. of Lectures - 8 Marks : 16**
	a	Principle of heat convection: mechanism, natural and forced convection.
	b	Non Dimensional Numbers, Dimensional analysis for Natural and Forced Convection.
	c	convection boundary layers: laminar, turbulent, momentum and energy equation, 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
	d	Heat transfer in fully developed flow, Natural convection over vertical planes, use of empirical correlation for convection, Principle of condensation and boiling (No numerical treatment).

UNIT-IV

4.	**Radiation Heat Transfer No. of Lectures - 8 Marks : 16**	
	a	Thermal radiation: Concept, Black body radiation, Spectral and total emissive power, Stefan Boltzmann law, Radiation laws.
	b	Irradiation and radiosity, Surface absorption, reflection and transmission, emissivity.
	c	Radiation view factor, Properties of view factor, (*No numerical treatment on view factor*), radiation heat exchange between two diffuse gray surface, radiation shield.

UNIT-V

5.	**Heat Exchangers No. of Lectures - 8 Marks : 16**	
	a	Classification of heat exchangers, temperature distribution in parallel, counter flow arrangement, condenser and evaporator, Overall heat transfer coefficient, fouling factor.
	b	Log-mean temperature difference method and NTU –effectiveness method of analysis for rating and sizing of heat exchangers.
	c	Requirement of good heat exchanger and heat exchanger and design and selection, practical applications, heat pipe.

- **Note-** Use of Heat transfer data book is allowed in the examination.
- **Note for paper setter:**

Paper setter should provide the required data for numerical problems in question paper itself.

Experiment must be set simultaneously and the no. of student in each group working on a setup should not exceed 05 (five) student.

References

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.

Lab - Course Outline

Heat Transfer	**HT LAB**	
Course Title:	Short Title	Course Code

Branch - Mechanical / Automobile Engineering **Year – Third Year**

Course Description:

This lab includes different practical of Heat Transfer. The course aims at imparting knowledge of Heat Transfer and its modes.

Teaching Scheme:

	Hours Per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	**2**	14	28	1

Evaluation scheme:

Internal Continuous Assessment (ICA)	25 Marks	50 Marks
End Semester exam (ESE) (Practical)	25 Marks	

Prerequisite Course(s): Mathematics (Calculus) at first year level and Engineering Thermodynamics, Applied Thermodynamics and Fluid Mechanics at Second Year Level.

Outline of Content: This course contains:

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 LMTD, 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.

Note: Lab file should contain at list EIGHT experiments from above mentioned list.

ESE (Practical Examination)

The Practical Examination will comprise of performing the experiment and viva on the Practical's.

Instructions for practical Exam. :-

1. Five experiments should be selected for Practical Examination.
2. The Number of Students for each Practical set up should 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.

Internal Combustion Engine (Theory)

Internal Combustion Engine	**ICE**	
Course Title	Short Title	Course Code

Branch- Mechanical Engineering **Year- Third Year**

Course Description:
This course provides the knowledge of Internal Combustion Engine. Course includes different engine cycles its performance analysis, Various systems in IC Engine such as fuel feed, lubrication, cooling, ignition, supercharging and turbo charging. Fundamental of combustion in I C Engine, types and design of combustion chambers. Various emission control norms.

Teaching Scheme:

Lecture hours per Week	No. of Weeks	Total hours	Semester Credits
03	14	40	03

Examination Scheme:

End semester exam (ESE)	80 Marks	Duration: 03 Hours
Internal Sessional Exam (ISE)	20 Marks	

Prerequisite Course(s): Mathematics (calculus), Basic thermodynamics cycles, various ideal gas processes, Engineering Thermodynamics, Applied Thermodynamics.

Objectives:

1. Analysis of air standard cycles in the regard of I C Engine.
2. Understanding of induction system along with fuel feed system.
3. To impart insight in various operating systems like cooling, lubrication, Ignition system.
4. To be familiar with combustion chamber design and pollution control norms.
5. Performance analysis of I C Engine.

Unit. I

1	**BASIC CONCEPTS AND ENGINE CYCLES No. of Lect.-8, Marks-16**
	a)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. **b) 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.

Unit. II

2	**FUEL FEEDING SYSTEMS No. of Lect.-8, Marks-16**
	a) 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. **b) 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.

Unit. III

3	**OPERATING SYSTEM No. of Lect.-8, Marks-16**
	a) Cooling systems: requirement, types of cooling systems, thermostat and additives. **b) Lubrication**: Mechanism of lubrication, different methods, important properties of lubricating oils. **c) Ignition Systems**: requirement, battery ignition, magneto ignition, electronic ignition system, Ignition timing, spark timing advance. **d) Starting methods of engines**: Types of superchargers, Super charging, effect of

	super charging, limitations and advantages of supercharging, and turbo charging of engines.

Unit. IV

4	**COMBUSTION IN SI AND CI ENGINES** **No. of Lect.-8, Marks-16**
	a) 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. **b) 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.

Unit. V

5	**ENGINE TESTING AND PERFORMANCE** **No. of Lect.-8, Marks-16**
	a) Measurement of indicated power, brake power, Morse test, energy balance and efficiency calculations. **b)** BIS specification. Recent trends in internal combustion engines. Engine emission, air pollution due to engines, various Euro 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

TERM WORK-

Practical: 2Hrs/week **ICA: 25 Marks**

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.

Course Outline

Machine Design - I	**MD-I**	
Course Title:	Short Title	Course Code
Branch - Mechanical Engineering	**Year – Third Year**	

Course Description: This course introduces undergraduate students to Machine Design. The background required includes a sound knowledge of Mathematics (Calculus), Engineering Mechanics, SOM and TOM.

Objective: - The course aims at to familiarize the various steps involved in the Design Process to understand the principles involved in evaluating the shape and dimensions of a component to satisfy functional and strength requirements. To learn to use standard practices and standard data learn to use catalogues and standard machine components

Teaching Scheme

	Hours Per Week	**No. of Week**	**Total Hours**	**Semester Credits**
Lecture	03	14	40	3
Practical	02	14	28	1

Examination scheme:

End semester exam (ESE)	80 Marks	Duration: 04 hours
Internal Sesstional exam (ISE)	20 Marks	
Internal Continues Assessment (ICA)	25 Marks	
End Semester Exam (ESE) oral	25 Marks	

Purpose of Course: Degree Requirement

Course Description: A degree holder engineer is expected to design and draw simple machine components. Fundamental knowledge of Mathematics, Applied Mechanics, Strength of Materials, Engineering Materials and Theory of Machines, Manufacturing Process are essential. Subject aims at developing analytical abilities to give solutions to engineering design problems.

Objectives:

Students should be able to:

1. Analyze the various modes of failure of machine components under different load patterns.
2. Design and prepare part and assembly drawings.
3. Use design data books and different codes of design.
4. Select standard components with their specifications from manufacturer's catalogue

UNIT:-I

1.	**Introduction and Design of Simple Machine Parts No. of Lectures – 08 Marks: 16**	
	a	Introduction of Machine Design, 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.
	b	Simple Stress, Thermal Stresses, Impact Stress, tortional stress, Poisson's Ratio, Volumetric Strain, Young's Modulus, Maximum principal Stress Theory, Maximum shear stress theory, Maximum principal strain Theory, Maximum strain energy Theory, Maximum Distortion energy Theory . Stress Concentration – Causes & Remedies.
	c	Design of Simple parts – Knuckle joint & Cotter joint

Numerical Should be asked on Preferred sizes and Theories of Failure (b,c)

UNIT:-II

2.	**Design of Shafts, Keys and Couplings No. of Lectures – 08 Marks: 16**	
	a	*Shafts :*-Material, Design on the basis of strength considering shaft subjected to, twisting moment only, bending moment only, Combine twisting and bending moment, axial load in addition to twisting and bending. Design on the basis of

		rigidity. 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.

*Numerical Should be asked on Shafts, coupling (*Flange coupling and Flexible bushed pin coupling) *(a,c)*

UNIT: - III

3.	**Design of Temporary and Permanent Joints** **No. of Lectures – 08** **Marks: 16**	
	a	Threaded Joints:- Different Forms of Threads, Bolts of uniform strength, Locking devices, I.S.O. metric screw threads, Stresses in threaded joint, eccentrically loaded bolted joint, Torque requirement for bolt tightening.
	b	Welded Joints: - Types of welding and joints, strength of transverse and parallel fillet welded section, axially loaded unsymmetrical welded section, eccentrically loaded joint.

Numerical should be asked on eccentrically loaded bolt joint and axially loaded unsymmetrical welded section, eccentrically loaded joint. *(a,b)*

UNIT:-IV

4.	**Design of Energy Storing Elements** **No. of Lectures – 08** **Marks: 16**	
	a	Flywheel: - Function and material, Torque Analysis, coefficients of fluctuation of energy, Solid disk Flywheel, Rimmed Disk flywheel, stresses in flywheel rim.
	b	Spring:- Types, Applications and materials of springs, Stress and deflection equations for helical springs, Style of ends, Wahl's Stress Factor, Design of helical compression and tension springs, Springs in series and parallel, Concentric helical springs, leaf spring, Shot peening

Numerical should be asked on Solid Disk and Rimmed Disk Flywheel and Design of Helical springs and Leaf spring. *(a,b)*

UNIT: - V

5.	*Design for Fluctuating Loads and Statistical consideration in Design* **No. of Lectures – 08 Marks: 16**	
	a	*Design for Fluctuating Loads:* Stress concentration - causes and remedies, Fluctuating stresses, Fatigue failure, Endurance limit, Notch sensitivity, Reversed stresses, Solderberg and Goodman diagrams, Fatigue design of components under combined stresses such as shafts, bolts and springs.
	b	*Statistical consideration in design:* - Design and natural tolerances –Design for assembly- Statistical analysis of tolerances – Mechanical reliability and factor of safety.

Numerical should be asked on Fatigue design of components under combined stresses such as shafts, bolts and springs. *(a)*

Term Work:

1. Term work shall consist of "ONE" design project. The design project shall consist of assembly drawing with a part list and overall dimensions and the other sheet involving drawing of individual components using AUTO CAD on A3 size paper. 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.
2. Design projects should include selection of prime mover and design of mechanical systems comprising of machine elements: Design data book shall be used extensively for the selection of the components.
3. Total five assignments (One on each unit - only Numerical)

Recommended Books:

[1] Shigley J.E. and Mischke C.R., "Mechanical Engineering Design", Tata 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] FArzdak Haideri, “Machine Desig”, Nirali Prakashan, Pune.

[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] A. H. Burr and J. B. Cheatham, Mechanical Analysis and Design, 2 nd Ed., Prentice Hall.

Lab - Course Outline

Machine Design-I	**MD-I LAB**	
Course Title:	Short Title	Course Code

Branch - Mechanical / Automobile Engineering **Year – Third Year**

Course Description:

This lab includes different practical of Heat Transfer. The course aims at imparting knowledge of Machine Design procedure for different elements.

Teaching Scheme:

	Hours Per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	02	14	28	1

Evaluation scheme:

Internal Continuous Assessment (ICA) 25 Marks
End Semester exam (ESE) (Oral) 25 Marks

Prerequisite Course(s): Fundamental knowledge of Mathematics, Applied Mechanics, Strength of Materials, Engineering Materials and Theory of Machines, Manufacturing Process are essential. Subject aims at developing analytical abilities to give solutions to engineering design problems.

Outline of Content: This course contains:

1. Total five assignments (One on each unit - only Numerical)
2. Design Report: - The design project shall consist of assembly drawing with a part list and overall dimensions and the other sheet involving drawing of individual components using AUTO CAD on A3 size paper. Manufacturing tolerances, surface finish symbols and geometric tolerances should be specified so as to make it working drawing.

ESE (Practical Examination)

The Oral Examination will be based on the all five units of Machine Design – I.

Course Outline

Theory of Machines – II **TOM-II**

Course Title: Short Title Course Code

Branch - Mechanical / Automobile Engineering **Third Year** **First**

Branch Year Semester

Course Description:

The course under Theory of Machine-II has been designed to cover the concepts of force analysis, construction, working and applications of important components of machines. The students will understand the overall working of machines and able to understand constructional and working features of important machine elements. The students should be able to understand the basic theoretical and numerical methods, which is the pre-requisites to design and selection of these components of machines for different applications.

Course Objectives:

1. To understand various types of machine components, its working & applications.
2. To understand the force analysis of power train components gears.
3. To study the need and different methods of balancing of rotating and reciprocating masses.
4. To aware about the speed regulating components such as governors, flywheel, etc.
5. To describe graphical and analytical methods.

Course Outcomes:

Development of concepts and logics about machine components.
Development of problem solving approach by graphical and analytical methods.
Understanding of functional requirements of machine components for designing purpose.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Lecture	3	14	40	3

Examination scheme:		
End semester exam (ESE)	80 Marks	Duration : 03 hours
Internal Sessional exam (ISE)	20 Marks	

Purpose of Course: Degree Requirement

Prerequisite Course(s): Mathematics (Calculus), Engineering Drawing & Element of Mechanical Engineering, Engineering Mechanics at first year level and Theory of Machine-I at Second Year Level.

Course Contents:

UNIT-I

1.	**Flywheel and CAM**	**No. of Lectures - 8 Marks : 16**
	a	Turning moment diagram and fluctuation of the crankshaft speed, D' Alemberts principle Equivalent offset inertia force
	b	Determination of flywheel size for different types of engine and machine.
	c	Types of cams and followers, Analysis of motion of follower
	d	Determination of cam profile for given follower motion
	e	Analysis of cam with specified counters – Circular arc cam, Tangent cam

UNIT-II

2.	**Brakes & Dynamometer**	**No. of Lectures - 8 Marks : 16**
	a	**Brakes:** Types of brakes, Force analysis of brakes, external and internal expanding shoe brakes, block brakes.
	b	Band brakes, Band and block brakes, Breaking torque.
	c	**Dynamometer:** Absorption dynamometers: Prony brakes, Rope brake, Band brake
	d	Transmission dynamometer- belt transmission type, Fluid coupling

UNIT-III

3.	**Governor & Gyroscope**	**No. of Lectures - 8 Marks : 16**
	a	**Governor**: Types of governors – Watt, Porter, Proell, Hartnell, Sensitiveness of governors, Hunting, Isochronisms, Stability.
	b	Effect of governor, Power of governor, Controlling force.
	c	**Gyroscope**: Angular velocity and acceleration, Gyroscopic forces and couple, Gyroscopic effect on naval ships
	d	Gyroscopic stabilization, Stability of two wheel vehicle.

UNIT-IV

4.	**Balancing** **No. of Lectures - 8 Marks : 16**	
	a	Balancing of rotating masses in one and several planes.
	b	Balancing of reciprocating masses in single and multi-cylinder engine, radial and V-types.
	c	Primary and secondary balancing analysis, Concept of direct and reverse cranks.
	d	Balancing of locomotive engines and effect of partial balancing. , Static and dynamic balancing machine.

UNIT-V

5.	**Gears** **No. of Lectures - 8 Marks : 16**	
	a	**Spur Gears**:- Terminology used in gears, conjugate action,.
	b	Involute and cycloidal profile, Path of contact, Arc of contact, Contact ratio.
	c	Interference, Undercutting, Methods to avoid undercutting and interface, Gear standardization,
	d	Effect of center distance variation on the velocity ratio for involute profile tooth gears, Friction between gear teeths.

References:

1. Theory of Machines, S. S. Rattan, Tata McGraw Hill, New Delhi.
2. Theory of Mechanisms & Machines, Jagdish Lal, Metropolitan Book Co.
3. Theory of Machines, Longman's Green & Co., London.
4. Theory of Machines, W. G. Green, Blackie & Sons, London.
5. Theory of Machines, V.P. Singh, Dhanpat Rai & Co.
6. Theory of Machines – II, H. G. Phakatkar, Nirali Publication.
7. Theory of Machines and Mechanisms, Shigley, J.E and Uicker, J.J, McGraw45 Hill International Book Co.
8. Mechanisms and Machines theory, Rao J.S. and Dukkipati R.V, Wiley Eastern Ltd.
9. The Theory of Machines through solved problems , J.S.Rao. New age international publishers.
10. A text book of Theory of Machines, Dr.R.K.Bansal. Laxmi Publications
11. Theory of Machines, Sadhu Singh, Pearson Publication.
12. Theory of machine, P. L. Ballaney, Khanna publication.

Lab - Course Outline

Theory of Machines -II **TOM-II LAB**

Course Title: Short Title Course Code

Branch - **Mechanical / Automobile Engineering** Year – **Third Year**

Course Description:

This lab includes drawing sheets related to cam profile & balancing of rotating & reciprocating masses. Experiments on determination of characteristic curves of the centrifugal governor and verification of principle of working of gyroscope are also included. In addition study of gear boxes and Balancing machine.

Teaching Scheme:

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	2	14	28	1

Evaluation Scheme:

Internal Continuous Assessment (ICA)		: 25 Marks
End Semester exam (ESE) ORAL		: 25 Marks

Prerequisite Course(s): Engineering Mathematics, Theory of machine-I

Outline of Content:

This practical contains

1. To determine the characteristic curves of the centrifugal governor and find its coefficient of insensitivity and stability.
2. To study various types of gear boxes.
3. To verify the principle of working of gyroscope.
4. To study the static & dynamic balancing machine & balancing of masses in different planes.
5. To study graphical methods and prepare drawing sheets for – Drawing sheet 1:- Balancing of rotating masses and reciprocating masses. (2 Problems)
6. To study graphical methods and prepare drawing sheets for Drawing sheet 2: Draw cam profile for various types of follower motion.

Guide lines for ESE:-

ESE (Oral Examination)

The Oral Examination will comprise of viva on the above six experiments.

Course Outline

Industrial Engineering & Safety | **IES** |
---|---|---
Course Title | Short Title | Course Code

Mechanical Engineering	**Third Year**	**First**
Branch	Year	Semester

Course Description:
The course is intended to:

- build up necessary background for understanding the Industrial knowledge
- understand the applications of knowledge and correlation of various departments
- get acquainted with various acts, role of consultant and safety auditor
- acquire managerial skills of handling Industrial environment and human behavior
- develop awareness about industrial Engineering and safety Engineering

(Course outcomes)

Student will be able to:

- seek opportunity to work in the field of Industrial Engineering and safety
- contribute in a better way towards enhancing the productivity
- play the role of industrial and safety manager effectively

Teaching scheme:

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Lecture	3	14	40	3

Examination scheme:

End semester exam (ESE)	80 Marks	Duration: 03 hours
Internal Sessional exam (ISE)	20 Marks	20 Marks

Outline of Content: This course contains:

Unit - I

1	**No. of Lectures – 08, Marks: 16**	
	a	Introduction to Industrial Engineering, origin & growth, contribution of Taylor, Tools & Techniques of Industrial Engineering.
	b	Work study- Method Study- Aims, objectives, scope & applications.
	c	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
	d	Work Measurement Aims objectives scope and application
	e	Stop watch study- equipment and procedure, rating allowance and standard time; activity sampling- principle, procedure and applications.

Unit-II.

2	**No. of Lectures – 08, Marks: 16**	
	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 & factory operation.

Unit-III

3	**No. of Lectures – 08, Marks: 16**	
	a	Definition, concept, Aims, objectives and Scope of Industrial Psychology.
	b	Individual and Group, Individual differences in behavior
	c	Group Dynamics, Theory X and Y
	d	Hawthorne Experiment, Morale
	e	Motivation, Working Environmental Conditions
	f	Industrial Fatigue

Unit-IV

4	**No. of Lectures – 08, Marks: 16**	
	a	Definition of safety, safety engineering, human factor engineering, anthropometry
	b	Principles of safety management ,industrial hygiene and occupational health
	c	Safety education and training: Importance of training – identification of training needs, training methods, motivation communication, safety campaign
	d	Safety performance monitoring, safety audit ,accident investigation and reporting

Unit-V

5	**No. of Lectures – 08, Marks : 16**	
	a	Safety in chemical industries, food processing ,textile, explosives
	b	Safety in mines, nuclear plants ,cement plants
	c	Safety in hydro and thermal power plants, ship building and repair
	d	Safety in mechanical ,electrical industries' equipments"
	e	Disaster management

References:-

1) Maynard, Industrial Engineering. Hand book, McGraw Hill book company
2) ILO, Introduction to Work Study
3) Krishnan N.V. "Safety Management in Industry" Jaico Publishing House,
4) Khanna O.P. , Industrial Engineering. and Management, Dhanpat Rai Publication, New Delhi.
5) Factory Act -1948
6) Indian Boiler Act- 1923 (Revised 1983)
7) L.C. Jhamb " A text book of Industrial Engineering", Everest Publishing House, India.
8) Charles D Fleddermann, "Engineering Ethics", Prentice Hall, New Mexico, (1999.
9) M.Mahajan "Industrial Engineering and Production Management". Dhanpat Rai & CO (P)LTD Publication, New Delhi

Lab - Course Outline Cover Page

Computer Graphics **CG**

Course Title Short Title Course Code

Branch - Mechanical / Automobile Engineering **Year – Third Year**

Course Description: This course includes design and drafting related to mechanical elements. Lab's related to elementary level knowledge of drafting and Auto-LISP program. Sketching and computer aided design tools are used to create the various types of views needed for design and documentation.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Lecture	01	14	14	01
Practical	02	14	28	01

Purpose of Course: Degree Requirement

Prerequisite Course(s): Engineering Graphics, Essential Computer Knowledge Required.

Outline of Content: This course contains:

AUTOCAD

1	**No. of Lectures – 07**	
	a	Introduction to CAD. Advantages and Applications of CAD. Difference between conventional drafting methods and CAD.
	b	Introduction to Auto-cad (Latest Version). Details of various menu bars and tool bars, Drawing Area etc.
	c	Draw Toolbar- Line, Arc, Rectangle, Circle, Polygon, Text, Boundary Hatching etc.
	d	Modify Toolbar – Copy, Move, Erase, Mirror, Chamfer, Fillet, Array, Trim etc.
	e	Dimension Toolbar – Linear, Angular, Radius, Diameter, etc
	f	Properties Toolbar – Line Types, Colors, Line Weight, Text, etc
	g	Settings - Snap settings, Grid settings, parameter settings, print settings, etc

AUTO-LISP

2	**No. of Lectures – 07**	
	a	Introduction to Auto-LISP. Advantages and Applications of Auto-LISP .
	b	Auto-LISP commands
	c	Auto-LISP Programs for simple geometric shapes-line, circle, rectangle, pentagon, etc
	d	Auto-LISP Programs for elements geometric shapes such as circle in rectangle, triangle in rectangle, etc.
	e	Auto-LISP Programs for simple machine elements. (Nut, Bolt, Stud, Flange, etc)
	f	Auto-LISP Programs for simple machine elements. (Nut, Bolt, Stud, Flange, etc)
	g	Auto-LISP Programs for simple machine elements (Nut, Bolt, Stud, Flange, etc)

Course Objectives:

This course includes design and drafting related to mechanical elements. This lab related to elementary level knowledge of drafting and Auto-LISP program. Sketching and computer aided design tools are used to create the various types of views needed for design and documentation.

Course Outcomes: Upon successful completion of these practical the student will be able to

1. Demonstrate and understand the basic concepts of geometric modeling and computer graphics.
2. Design and Drafting of mechanical elements.
3. Programs for mechanical elements in Auto-LISP.

Assignment:

1. Two assignments on AutoCAD (preferably latest version).
2. Two assignments on Auto LISP (such as Design and drafting of any mechanical component through Auto LISP)

REFERENCES:

1. AutoCAD reference manual
2. Auto-LISP Developer's Guide
3. George Omura, ABCs of Auto LISP, BPB. Publication
4. H.G. Phakatkar, Engineering Graphics, Nirali publication

COURSE CONTENT

Industrial Training / EDP / Special Study	**IT/EDP/SS**	
Course Title	Short Title	Course Code

Semester-V — **Examination Scheme**

Total Semester Credits: 02 — **Internal Continuous Assessment (ICA): 25 Marks**

Industrial Training

- Student shall undergo industrial training for a minimum period **of two weeks** during summer vacations between fourth semester and fifth semester.
- The industry in which industrial training is taken should be a medium or large scale industry
- The paper bound report on training must be submitted by the student in the beginning of Fifth semester along with a certificate from the company where the student took training.
- Every student should write the report separately.
- Institute / Department/T&P Cell have to assist the students for finding Industries for the training.
- Students must take prior permission from Department before joining for Industrial Training.

OR

EDP (Entrepreneurship Development Program)

- Student has to participate in Entrepreneurship Development Program for a minimum period of **One week** during summer vacations between fourth semester and fifth semester.
- Every student must submit the paper bound report based on the program in the beginning of Fifth semester along with a certificate (Course / Program completion) from the program organizers.
- Every student should write the report separately.
- Institute / Department may arrange Entrepreneurship Development Program at their campus.
- Students must take prior permission from Department before attending any Entrepreneurship Development Program.

OR

Special Study

- Student has to submit name of three topics of his interest to the department.
- Special study in a group shall not be allowed.
- The three-member committee appointed by Head of Department shall allot one topic out

of the three topics submitted by the student.

- Every student must submit the paper bound report based on special study at the end of Firth semester.
- Department should allot guide to all such students, for monitoring their progress and guide them for literature survey / report writing etc.
- Evaluation of special study shall be done based on presentation made by student, followed by brief question answer session.

Evaluation of Industrial Training / EDP / Special Study

ICA: The Internal Continuous Assessment shall be based on the active participation of the students in the training / EDP / Special study and based on knowledge / skill acquired by the student. The three-member committee appointed by Head of Department shall assess the reports and award marks based on following:

(a) Report		10 marks.
(b) Presentation		10 marks.
(c) Viva-voce at the time of presentation		05 marks.
	Total:	**25 marks.**

Course Outline

Machine Design II	**MD-II**
Course Title	Short Title Course Code

Branch- Mechanical Engineering **Year- Third Year**

Course Description:

This course provides the knowledge of machine design. Course includes Design of Clutches, Design of Gears, Design of bearing & pressure vessels etc.

Teaching Scheme:

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Lecture	03	14	40	3
Practical	02	14	28	1

Examination Scheme:

End semester exam (ESE) 80 Marks Duration: 04 Hours

Internal Sessional Exam (ISE) 20 Marks

Prerequisite Course(s): This course is aimed at introducing the Design of various mechanical components e.g. - clutches, gears, pressure vessels, bearing etc to the undergraduate students. The background expected familiar with Strength of Material, Theory of machine & Machine Drawing etc.

Objectives:

1 Analyze the various modes of failure of machine components under different load patterns.

2 Design and prepare part and assembly drawings.

3 Use design data books and different codes of design.

4 Select standard components with their specifications from manufacturer’s catalogue.

UNIT-I

Friction Clutches and Brakes	No. of Lect.-8, Marks-16
a)	**Friction Clutches:** Classification and selection friction clutches, Torque transmitting capacities and Design of single-plate, multi-plate, cone and centrifugal clutches, Type of friction materials- their advantages, limitation and selection criteria.
b)	**Aesthetic and Ergonomic considerations in Design** Aesthetic considerations- Basic type of product form, 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.

UNIT-II

Pressure Vessels	No. of Lect.-8, Marks-16
a)	**Design of Cylinders and pressure vessels:** Thick and thin cylinders- Thin cylindrical and spherical vessels- Lame's equation- Clavarino's and Birnie's equation- Auto frottage and compound cylinders- Gasketed joints in cylindrical vessels. Unfired pressure vessels- Classification of pressure vessels as per I.S. 2825- categories and type of welded joints- weld joints efficiency- Corrosion, erosion and protection vessels, stresses induced in pressure vessels, material of construction. Thickness of cylindrical and spherical shells and design of end closures as per code- Nozzle and Opening in pressure vessels- Reinforcement of opening in shell and end closures. Area compensation method.

UNIT-II

Spur and Helical Gear Drives	No. of Lect.-8, Marks-16
a)	Classification of gears, Selection of type of gears, Standard system of gear tooth. **Spur Gears:** Number of teeth and face width, Type of gear tooth failure, Desirable properties and selection of gear material, Force analysis, Beam strength (Lewis) equation, Velocity factor, Service factor, Load concentration factor, Effective load on gear, Wear strength equation, Estimation of module based on beam and wear strengths, Estimation of dynamic tooth load by velocity factor and Buckingham's equation,
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.

UNIT-IV

Bevel and Worm Gear Drives	No. of Lect.-8, Marks-16
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 material for bevel gears,
b)	**Worm Gear** Worm and worm gear terminology and geometrical relationship, Standards dimension, 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, Thermal consideration in worm gear drive, Methods of Gears lubrication.

UNIT-V

Rolling Contact Bearings	No. of Lect.-8, Marks-16
a)	**Rolling contact Bearings** Type of rolling contact bearing, 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 bearing, Type of failure in rolling contact bearing- causes and remedies.
b)	**Statistical consideration in design** Frequency distribution-Histogram and Frequency polygon – Normal distribution. Standard variable – population combinations.

TERM WORK-

Practical: 2Hrs/week	ICA: 25 Marks ESE: 25 marks
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 dimension and the other sheet involving drawing with 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 calculation of the design of the 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 extensively for the selection of the component. 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", Printice Hall International.
3) Bhandari V.B., "Design of Machine elements", Tata McGraw Hill Pub. Co. ltd.
4) Black P.H. and O. Eugene Adams, "Machine Design", McGraw Hill Book Co. Ltd.
5) Willium C. Orthwine, "Machine Component Design", West Pub. Co. an Jaico Pub. House.
6) "Design Data", P.S.G. College of Technology, Coimbatore.
7) Juvinal R.C. "Fundamental of Machine Component 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

Lab - Course Outline

Machine Design-II	**MD-II LAB**
Course Title:	Short Title Course Code
Branch - Mechanical / Automobile Engineering	**Year – Third Year**

Course Description:

This lab includes different practical of Machine Design. The course aims at imparting knowledge of Machine Design procedure for different elements.

Teaching Scheme:

	Hours Per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	02	14	28	1

Evaluation scheme:

Internal Continuous Assessment (ICA)	25 Marks
End Semester exam (ESE) (Oral)	25 Marks

Prerequisite Course(s): Fundamental knowledge of Mathematics, Applied Mechanics, Strength of Materials, Engineering Materials and Theory of Machines, Manufacturing Process are essential. Subject aims at developing analytical abilities to give solutions to engineering design problems.

Outline of Content: This course contains:

1. Total five assignments (One on each unit - only Numerical)
2. Design Report: - The design project shall consist of two imperial size sheets- one involving assembly drawing with a part list and overall dimension and the other sheet involving drawing with of individual components & also using AUTO CAD on A3 size paper. Manufacturing tolerances, surface finish symbols and geometric tolerances should be specified so as to make it working drawing.

ESE (Practical Examination)

The Oral Examination will be based on the all five units of Machine Design – II.

Course Outline

Numerical Analysis & Computational Methods **NACM**

Course Title **Short title** **Course ode**

Branch: Mechanical Engineering Third Year

Course Description:

Course Objectives:

1. To introduce numerical methods for solving linear and non-linear equations.
2. To apply the knowledge of these methods to solve practical problems with suitable software.
3. To introduce numerical methods for evaluating definite integrals.

Course Outcome

At the end of the course the students are able to-

1. Identified, classified and choose the most appropriate numerical method for solving the problem.
2. Developed Numerical skills to Mechanical Engineering Problems.

Teaching Scheme

	Hrs per week	No. of weeks	Total hour	Semester Credits
Lecture	03	14	40	03
Tutorial	--	--	--	--

Examination Scheme:

End semester scheme(ESE)	**80 marks**	**Duration : 03 Hrs.**
Internal Sessional Examination (ISE)	**20 marks**	

Purpose of Course: Degree Requirement

Prerequisite Courses: Fundamental knowledge about the mathematics.

Outline of the content: This course contains:

Unit- I

1.	Title: Software development & Solution of transcendental equation **No. of Lecture:08 ,Marks: 16**	
	a	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

Unit- II

2.	Title: Numerical Integration & Solution of ordinary Differential Equation **No. of Lecture:08 ,Marks: 16**	
	a	Numerical Integration Trapezoidal rule, Simpson's 1\3rd rule, Simpson's 3\8th rule, Gauss Quadrature method: 2 point.
	B	Solution of ordinary Differential Equation Taylor's series method, Euler's method, Improved & modified Euler's method, Fourth order Range- Kutta method.

Unit- III

3	Title: Interpolation & Curve Fitting **No. of Lecture:08 ,Marks: 16**	
	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.

Unit- IV

4.	Title: Solution of Linear Algebraic Equation & Iterative method **No. of Lecture:08 ,Marks: 16**	
	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.

Unit- V

5	Title: Finite Element Analysis & FDM **No. of Lecture:08 ,Marks: 16**	
	a	Finite Element Method: Introduction, Steps used in finite element Analysis , general approach, interpolation function, & Finite element application on one dimension, Solution of elliptical equations for various boundary conditions, Solution of parabolic equation by explicit, implicit
	b	Introduction to Finite Difference method, Comparison with Finite Element Analysis, crank-Nicholson method,

References:

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 S. S. Shastri,” Introductory Method of Numerical Analysis “, Prentice Hill India.

6 Belegundupatla,” Introduction to Finite Element Method”,Prentice Hill India.

Course Outline

Metrology and Quality Control	**MQC**	
Course Title:	Short Title	Course Code

Branch - Mechanical Engineering	**Year**	**Third Year**

Course Description: This course introduces undergraduate students to Metrology and Quality Control. The background required includes a sound knowledge to Measurements, (calculus), applied thermodynamics, Industrial management at second year level.

Course Objective: The course aims at imparting knowledge of metrology and quality control. The course aims at to familiarize to understand the principles metrology of screw threads, gear measurement, study of measuring machines, recent trends in engineering metrology. To learn to use standard practices and standard data, learn to use statistical concept, control chart for variables, control chart for attributes, acceptance sampling

Teaching Scheme

	Hours Per Week	**No. of Week**	**Total Hours**	**Semester Credits**
Lecture	03	14	42	3
Practical	02	14	28	

Examination scheme:

End semester exam (ESE)	80 Marks	Duration: 03 hours
Internal Sectional exam (ISE)	20 Marks	
Internal Continues Assessment (ICA)	25 Marks	
End Semester Exam (ESE)	25 Marks	

Practical Examination

Purpose of Course: Degree Requirement

1.	**Metrology**	**No. of Lectures – 08, Marks: 16**
	a	Definition: Measurement, precision, accuracy, sensitivity, Classification of method of measurement
	b	Linear Measurement:-Standards, line standards, end standards, classification of standards, precision measurement, precision measuring instruments and their characteristics, slip gauge
	c	Straightness, flatness and squareness:-Surface plates, measurement of straightness, flatness testing, squareness testing, roundness testing, machine tool metrology, Measurement by light wave interference:- Basic principle, sources of light, optical

		flats, fringe patterns and their interpretation, testing of flat, convex and concave and irregular surface, checking of slip gauges.

UNIT:-II

2.	**Design of gauges &Metrology** **No. of Lectures – 08, Marks: 16**	
	a	Design of gauges:- Types of gauges, limits, fits, tolerences, Taylor's principle
	b	Comparators:-Characteristics, application, types, construction and working of different mechanical, optical, electrical, pneumatic comparators
	c	Angle measurement:-Sine bars, Sine centers, Use of sine bar, angle gauges, autocollimator angle dekkor, constant deviation prism, Measurement of surface finish:-Types of Surface texure, elements of surface texture, measuring surface finish by stylus probe, Tomlinson & Taly-surf

UNIT: - III

3.	**Metrology of Screw thread, Gear & recent trend in metrology.** **No. of Lectures – 08, Marks: 16**	
	a	Metrology of screw threads:-Terminology, errors and their effects, thread gauges, measurement of elements of external and internal threads, Gear measurement:-calipers measurements, involute testing, roller measurements, tool makers microscope, profile projectors
	b	Study of measuring machines:-Universal measuring machine, coordinate measuring machine, Errors in CMM, electronic inspection and measuring machine, Recent trend in engineering metrology:-precision instrument based on laser, probes, telemetric systems, Isometric viewing of surface defects, Machine vision

UNIT:-IV

4.	**Quality control** **No. of Lectures – 08, Marks: 16**	
	a	Introduction to quality :- factors controlling quality of design and conformance, balance between cost of quality and value of quality, Introduction to quality tools: Demings PDCA,PDSA cycles & Juran triology approach, Seven quality tools, Pareto

		analysis, cause &effect diagram, brainstorming, concurrent engineering
	b	Total quality management:, zero defect concept 5S,Kaizen,Kanban,,Poka yoke, TPM ,ISO 9000&TQM, Quality assurance ;-QFD, difference between inspection, quality control and quality assurance, quality survey

UNIT: - V

5.	**Statistical Quality Control** **No. of Lectures – 08, Marks: 16**	
	a	Statistic concept:-Concept of variation, variable & attribute data, the frequency distribution, quantitative description of distribution, normal curve, concept of six sigma, Control chart for variables:-definition of control chart, objective of control chart chart, R chart, Problems on X & R chart
	b	Control chart for attributes:-practical limitations of the control charts for variables charting chart chart, Problems on P & C chart
	c	Acceptance sampling:-Sampling inspection Vs hundred percent inspection, basic concept of sampling inspection, OC Curve, conflicting interests of consumer and producer, producer's and consumer's risk, AQL LTPD, Sampling plans

Recommended Books :

[1] R.K.Jain: Engineering Metrology: Khanna Publishers.

[2] Handbook to industrial metrology: ASTME: Printice Hall Pub

[3] G.M.Juran: Handbook of quality control, McGraw Hill Pub.

[4] M.Mahajan: Statistical quality control

[5] K.C.Jain:TQM & ISO 9000;Khanna publishers

[6] I.C.Gupta: A textbook of Engg Metrology: Khanna Publishers.

[7] M.Mahajan : A textbook of metrology :Dhanpat rai & co.

Lab - Course Outline

Metrology and Quality Control	**MQC**	
Course Title	Short Title	Course Code
Branch- Mechanical/Automobile Engineering	**Year**	**Third Year**

Course Description:
This lab includes performance practical and study practical related to metrology and quality control

Teaching Scheme:

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	2	14	28	1

Evaluation Scheme:

Internal Continuous Assessment (ICA) 25 Marks

End Semester Exam (ESE) (Oral) 25Marks

Prerequisite Course(s): General mathematics, 11t^{h} Physics & 12th physics

Outline of content:

This practical contains following experiments

1 Determination of linear/angular dimensions of part using precision & non precision instrument.

2 Machine tool alignment tests on any machine tool like Lathe,Drilling,Milling.

3 Interferometer-Study of surfaces using optical flat.

4 Surface finish measurement.

5 Measurement of roundness/circularity using mechanical comparator.

6 Measurement of screw parameters

7 Measurement of Gear parameters i) gear tooth thickness ii)constant chord iii)PCD

8Study and applications of tool makers microscope

9 Use of profile projector

10 Study and use of control charts

Note: Any EIGHT practical from Mechanical Measurement and Metrology Lab shall be conducted during 14 weeks available during semester.

ESE (Practical Examination)

• The Practical Examination will comprise of performing the experiment and viva on the practical's.

Course Outline

Turbo Machinery **Turbo M/C**

Course Title Short Title Course Code

Branch: - Mechanical Engineering **Year** **Third Year**

Course Description:-

This course introduces undergraduate students to Turbo Machinery. The background required includes a sound knowledge to Mathematics (Calculus), Engineering Thermodynamics, Applied Thermodynamics and Fluid Mechanics at Second Year Level. The Course aims at imparting knowledge of Turbo Machinery.

Teaching Scheme:-

	Hours per week	**No. of weeks**	**Total Hours**	**Semester Credits**
Laboratory	3	14	42	3
Practical	2	14	28	1

Evaluation Scheme:-

End Semester exam (ESE) 80 Marks Duration: 03 hours

Internal Sessional exam (ISE) 20 Marks

Prerequisite Course (S):- Mathematics (Calculus) at first year level and Engineering Thermodynamics, Applied Thermodynamics and Fluid Mechanics at Second Year Level.

Outline of Content:- The Course Contains :

UNIT-I

1.	**Steam Turbines** **No. of Lectures-08 Marks-16**	
	a	Types of turbines, Constructional details impulse turbine.
	b	Compounding of turbine, Velocity diagrams, Output efficiency.
	c	Reaction turbine, Velocity, Diagrams, Degree of reaction.
	d	Governing of turbines, Application of turbines, Losses in turbines.

UNIT-II

2.	**Gas Turbines** **No. of Lectures-08 Marks-16**	
	a	Theory and fundamentals of gas turbines, principles, classification.
	b	Joule's cycles, Assumptions for simple gas turbines, Cycle analysis, Work ratio, Concept of maximum and optimum pressure ratio, Actual cycle.
	c	Effect of operating variable on thermal efficiency, Regeneration, Intercooling, reheating, their effects on performance.
	d	Closed cycle and semiclosed cycles gas turbine plant, Applications of gas turbines.

UNIT-III

3.	**JET PROPULSION** **No. of Lectures-08 Marks-16**	
	a	Introduction, Theory of jet propulsion, Types of Jet Engines.
	b	Energy flow through Jet Engines, Thrust, Thrust power, and Propulsive efficiency.

	c	Turbo jet, Turbo Prop, Turbo fan engines, Pulse jet and ram jet engines.
	d	Performance characteristics of these engines, Thrust segmentation application of jet engines, Concept of rocket propulsion.

UNIT-IV

4.	**HYDRAULIC TURBINES** **No. of Lectures-08** **Marks-16**	
	a	Impulse momentum principle, Fixed and moving flat plate and curve vanes, Series of plates & vanes, Velocity triangles and their analysis, Work done, Efficiency etc.
	b	Classification of hydraulic turbines, Heads & various efficiencies.
	c	Impulse turbine: Main components and constructional features of pelton wheel,
	d	Velocity diagrams & work done, Condition for max. hyd. Efficiency, Number of buckets, Jets, Non dimensional parameters (speed ratio, jet ratio).

UNIT-V

5.	**HYDRAULIC TURBINES (REACTION TYPE)** **No. of Lectures-08** **Marks-16**	
	a	Reaction turbine, Main components & Constructional Features.
	b	Types of reaction turbine (Francis, Kaplan), Velocity Digrams.
	c	Unit quantities, Selection of turbine considering various factors, Specific speed, Types of characteristic curves.

	d	Draft tube types, Efficiency, Cavitations, Governing mechanisms for pelton wheel, Francis, Kaplan turbines.

References:-

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.

Lab: - Course Outline

Turbo Machinery	**Turbo M/C Lab**	
Course Title	Short title	Course code

Branch: - Mechanical Engineering

Course Description:-

This lab includes different practical of Turbo Machinery. The Course aims at imparting knowledge of Turbo Machinery.

Teaching Scheme:-

	Hours per week	**No. of weeks**	**Total Hours**	**Semester Credits**
Laboratory	2	14	28	1

Evaluation Scheme:-

Internal Continuous Assessment (ICA)	25 Marks
End Semester exam (ESE) (ORAL)	25 Marks

Prerequisite Course (S) :- Mathematics (Calculus) at first year level and Engineering Thermodynamics, Applied Thermodynamics and Fluid Mechanics at Second Year Level.

Outline of Content:- This Course Contains:

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. Study of various jet propulsion devices / engine.
11. Visit to hydraulic power plant.

Note: Lab file should contain at list EIGHT experiments from above mentioned list.

ESE (Oral Examination)

The Oral Examination will comprise of viva on the above Eight Experiments.

Course Outline

Project and Business Management	**PBM**	
Course Title	Short title	Course Code
Branch: Mechanical Engineering	**Year**	**Third Year**

Course Description: This course introduces undergraduate students to imparting knowledge of project & business management. The background required a sound knowledge of network technique, organization structure, Financial and material management.

Course Objectives

1. To provide about project and its management.
2. To develop knowledge about organization and impart knowledge about functioning of management.
3. To develop knowledge about financial management techniques.

Course Outcome

At the end of the course the students are able to-

1. Develop knowledge of project management and statistical tools used in its.
2. Helped to understand the various functions of management along with its types.
3. Develop knowledge about Capital cost and cost control.

Teaching Scheme

	Hrs per week	No. of weeks	Total hour	Semester Credits
Lecture	03	14	40	03

Examination Scheme:

End semester scheme(ESE)	**80 marks**	**Duration : 03 Hrs.**
Internal Sessional Examination (ISE)	**20 marks**	

Purpose of Course: Degree Requirement

Prerequisite Courses: Fundamental knowledge about the mathematics.

Outline of the content: This course contains:

Unit- I

1.	Title: **Project Management** **No. of Lecture:08 ,Marks: 16**	
	a	Introduction to project management, Concept of project management, Managerial function at different organizational levels, Types of projects,
	b	Project identification, scheduling, Monitoring, Control, Basic tool & techniques for projects scheduling Bar chart, Project life cycle curves, Line balancing, Problems on Line balancing.

Unit- II

2.	Title: **Project statistic technique** **No. of Lecture:08 ,Marks: 16**	
	a	Introduction of Network technique, Fundamental concept and network models, construction of network diagrams,
	b	Application of network analysis, definition of PERT and CPM, comparison between CPM and PERT, Critical path method with problem, programme evaluation and review techniques with problem, time cost problem (crash) with PERT.

Unit- III

3	**Business management** **No. of Lecture:08 ,Marks: 16**	
	a	Introduction to management, Concept of management, The function of management, importance of management Forms of business organsation, Concept of Ownership Organization, Types of ownership, Individual Ownership, Partnership organization, joint stock companies, types of stock companies,
	b	Co-operative Organisations, various types of co-operative societies, Public sector organization,State ownership, public cooperation, choice of form of organisation, comparative evaluation of different forms of business ownership.

Unit- IV

4.	Title: **Financial Management** **No. of Lecture:08 ,Marks: 16**	
	a	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, Sources of finance (Shares, debentures, loans from banks, trade credit public deposits financial institutions).
	b	Cost and cost control: Elements of cost, direct cost, indirect cost, variable and fixed cost, cost control technique, marginal costing, break even analysis.

Unit- V

5	Title: **Material & Purchase Management** **No. of Lecture:08 ,Marks: 16**	
	a	Scope of material management, function of material management, objectives of scientific purchasing, functions of purchase department, , 5R's Of Buying, Methods of buying, source selection (vendor),vendor rating, just in time purchasing
	b	Inventory management, Objective of inventory management, types of inventory, selective inventory technique (ABC,VED), Inventory model (Economic lot size with fixed price, EOQ with quantity discount).

References:

1) L.C.Jhamb ,"Production(Operation)Management", Everest publishing house
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) Chadra Presanna,"Fundamentals of Financial Management" Tata McGraw Hill New Delhi.,1994.
5) Kolter Philip,"Marketing Management",Prentice-hall of India,1988.
6) Vyuptakesh Sharan.,"Fundamental of Financial Management", Pearson Education
7) Martand telsang,"industiral engineering and production management",1st Edition reprint 2013- S.chand & company ltd. New Delhi.2013
8) S.M.Inamdar, "Cost and Management Acounting"
9) M.K.Khan &P.K.Jain,"Financial Management", Tata McGraw Hill Publishing Co. New Delhi.
10) J.P.Bose, S.Talukdar, "Business Management", New Central Agencies (P) Ltd.

Lab - Course Outline

COMPUTER PROGRAMMING IN C / C++ **C/C++**

Course Title Short title Course code

Branch - Mechanical / Automobile Engineering **Year – Third Year**

Course Description:

This course provides students with a comprehensive study of the C /C++ programming language. Introduction to program design and problem solving using the C /C++ programming language. Programming topics include control structures, functions, arrays, pointers, and file I/O.

Teaching Scheme:

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	2	14	28	1

Prerequisite Course(s): Algebra and Trigonometry

Outline of Content: This course contains

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.

COURSE CONTENT

Minor Project	**MIP**	
Course Title	Short Title	Course Code

Semester-VI

Laboratory	**Hours per Week**	**No. of Weeks**	**Total Hours**	**Semester Credits**
	2	**10**	**20**	**2**

Examination Scheme **Internal Continuous Assessment (ICA): 50 Marks**

- Every student shall undertake the Minor Project in semester VI.
- Each student shall work on an approved project, a group of **05 students (maximum)** shall be allotted for the each minor project.
- Minor project may involve fabrication, design or investigation of a technical problem that may take design, experimental or analytical character or combine element of these areas. The project work shall involve sufficient work so that students get acquainted with different aspects of fabrication, design or analysis.
- Each student is required to maintain separate log book for documenting various activities of minor project.
- The three-member committee appointed by Head of the department shall be constituted for finalizing the topics of minor project. Maximum four minor project groups shall be assigned to one teaching staff.
- Assessment of the project for award of ICA marks shall be done jointly by the guide and departmental committee as per the guidelines given in **Table-A.**
- Before the end of semester, student shall deliver a seminar and submit the seminar report (paper bound copy)in following format:
    - Size of report shall be of minimum 25 pages.
    - Student should preferably refer minimum five reference books / magazines/standard research papers.

- Format of report
    - Introduction.
    - Literature survey.
    - Theory (Implementation, Methodology, Applications, Advantages, Disadvantages. etc)
    - Future scope.
    - Conclusion.

Assessment of Minor Project

Name of the Project: ____

Name of the Guide: ____

Table-A

SN	Exam Seat No	Name of Student	Project Selection	Documentation	Design /Simulation/Logic	PCB/hardware/programming	Result Verification	Presentation	Total
			5	10	10	10	10	5	50

COURSE CONTENT

Seminar-I	**S-I**	
Course Title	Short Title	Course Code

Semester-VI

Laboratory	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	2	10	20	2

Examination Scheme **Internal Continuous Assessment (ICA): 25 Marks**

1. For Seminar-I 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 during the term.
2. The three-member committee appointed by Head of the department shall be constituted for finalizing the topics of Seminar-I. Seminar shall be related state of the art topic of his choice approved by the committee.
3. Seminar topic should not be repeated and registration of the same shall be done on first come first serve basis.
4. Topic of Seminar shall be registered within a two week from commencement of VI Semester and shall be approved by the committee.
5. Maximum six seminar supervision shall be allotted to each teacher.
6. Before the end of semester, student shall deliver a seminar and submit the seminar report (paper bound copy).

ASSESSMENT OF SEMINAR-I

Assessment of the Seminar-I for award of ICA marks shall be done by the guide and a departmental committee jointly, as per the guidelines given in **Table- B**

Title of Seminar: ____

Name of Guide: ____

Table-B

SN	Exam Seat No	Name of Student	Topic Selection	Literature survey	Report writing	Depth of understanding	Presentation	Total
			5	5	5	5	5	25

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	**Examination Scheme**
Lectures : 4 Hours/week	Theory Paper : 100 Marks
Practical : 2 Hours/week	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	**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 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
Lectures : 4 Hours/week

Examination Scheme
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
Lectures : 4 Hours/week

Examination Scheme
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
Lectures : 4 Hours/week

Examination Scheme
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
		Marks	Liter-ature survey	Topic Sele-tion	Docum-entation	Atten dance	To-tal	Evalua tion (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 (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	**Examination Scheme**
Lectures : 4 Hours/week	Theory Paper : 100 Marks
Practical : 4 Hours/week	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
Lectures : 4 Hours/week

Examination Scheme
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	**Examination Scheme**
Lectures : 4 Hours/week	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	**Examination Scheme**
Lectures : 4 Hours/week	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. --	--

Rules and Regulations Relating to Degree of Bachelor of Engineering / Bachelor of Technology (B.E. /B. Tech.)

(To Be Introduced from Academic Year, 2012-13)

Degree Course (Modified) with Effect from Academic Year 2012-13

(These rules and regulations will supersede earlier rules and regulations)

Preamble

The present education needs to improve its international competitiveness and the employability of its student community. In this age of information technology the education paradigm is shifting from teaching to learning and the role of teacher is a facilitator. The focus of education should be student centered and thrust should be on learning by the students than teaching by the faculty. The contact hours should be optimized so that student can approach to library, use Internet and take up self-study to improve his / her skills.

This curriculum structure has been framed by considering guidelines of National Knowledge Commission (NKC), which suggests appropriate importance of basic courses, core courses and interdisciplinary / elective courses to fulfill the varied needs of the industry.

Features of the CGPA system:

1) The degree course B.E. / B. Tech. being run under the faculty of Engineering and Technology shall be of **46** credits per year. There shall be total **184** credits allotted for **4** year degree course.

   Note: For lateral entry admitted students (Diploma and B.Sc. students), total no. of credits allotted shall be **138**. But B.Sc. student has to complete credits of courses of 'Elements of Civil Engineering & Engineering Mechanics' and 'Elements of Mechanical Engineering & Engineering Graphics' of F.E. in addition to **138** credits of SE to BE.

2) The credits shall be awarded as follows except for some special subjects:

   - **1** credit for **1** hour theory lecture.
   - **½** credit for **1** hour practical / tutorial.

3) The batch size for practical shall be as follows:

   - FE & SE: **18** to **22** students
   - TE & BE: **13** to **17** students

4) The batch size for Mini Project, Project, and Seminar shall be of **8** to **10** students. Each teacher can guide maximum **2-3** projects.

5) There shall be some credit courses having grade points and some audit courses having audit points. However audit points shall not be counted in calculation of final SGPA and CGPA.

6) The structure of syllabus from FE to BE shall be same for all branches of Engineering and Technology.

Course Title: Bachelor of Engineering / Bachelor of Technology

Abbreviation: B. E. / B. Tech.

Type of Course: A **4** year degree course divided into **8** Semesters.

Pattern: Semester

Number of Years and Semesters: 4 Years divided into **8** semesters with **2** semesters per year.

Nomenclature of Semesters:

The revised Rules, Regulations and Syllabus for four year courses in Engineering and Technology shall be introduced gradually as follows:

No	Year	Abbreviation	Semester	With effect from
1	First Year B.E. / B. Tech.	FE	I & II	A.Y. 2012-13
2	Second Year B.E. / B. Tech.	SE	III & IV	A.Y. 2013-14
3	Third Year B.E. / B. Tech.	TE	V & VI	A.Y. 2014-15
4	Final Year B.E. / B. Tech.	BE	VII & VIII	A.Y. 2015-16

Award of the Degree: Degree shall be awarded to students earning credits of all eight semesters (Minimum **184** Credits) and completing of minimum number of Audit Points as given in **Rule 11**.

Note: For lateral entry admission (Diploma and B.Sc. students), minimum number of credits shall be **138** and minimum number of Audit Points as given in **Rule 11**.

Duration of Semester: Each Semester shall be normally of **15** To **16 weeks** duration for class room teaching / laboratory work.

Definitions:

- **University:** North Maharashtra University, Jalgaon.
- **College / Institute:** Any college / Institute conducting B.E / B. Tech. course and affiliated to North Maharashtra University, Jalgaon.

- **State Government:** Government of Maharashtra.
- **Admission Authority:** Any authority to conduct admission process as prescribed by Government of Maharashtra.
- **DTE:** Directorate of Technical Education, Maharashtra State.

Rule 1: B.E. / B. Tech. Entry levels into the course, eligibility criteria, admission authority and procedures

Entry levels into the course shall be at the beginning of the Semester - I or at the beginning of the Semester - III.

Eligibility criteria, admission authority and procedures shall be Government of Maharashtra / Directorate of Technical Education and procedure shall be as per directions of admission authority prevailing at the time of admission.

Rule 2: B.E. / B. Tech. Examinations

Rule 2.1: The Examination conducting authority shall be North Maharashtra University, Jalgaon.

Rule 2.2: The examination at the end of each semester shall be normally held in November / December and April / May in each academic year.

Rule 3: Attendance Rule and Detention Rule

Rule 3.1: The student will not be allowed to appear for the examinations i.e. he / she shall be detained if he / she do not attend minimum **75** % classes of theory, practical etc.

The attendance rules will be governed by DTE rules and relevant ordinance of university as applicable at that time.

Rule 3.2: If a candidate is detained in first term of any year, he / she will not be allowed to register for second term. He / she will have to register for the same in succeeding year(s).

If a candidate is detained in second term of any year, he / she will have to register for the second term of succeeding year(s).

Rule 4: Passing Criteria for Theory Course

Rule 4.1: For the ESE in Theory courses, minimum passing marks are **32** out of **80**. No separate passing is required for ISE but the student has to score minimum **40** marks out of **100** to pass in theory course.

Rule 4.2: In ESE and ICA of all courses other than theory, minimum **40** % of total marks shall be required for passing.

Rule 5: Internal Sessional Examination (ISE)

To ensure uniform attention of the students of their work throughout each semester of their study, Internal Sessional Examinations (ISE) shall be conducted in each semester. Conducting authority shall be Institute where candidate is admitted. The institutional examination committee shall consist of Principal as a Chairman and four teachers nominated by the Principal. Internal Sessional Examinations (ISE) shall not have any passing criteria. Internal Sessional examinations shall normally be conducted in the middle of regular semester only.

Re-examination for ISE shall be allowed during current semester only. The institute must submit the ISE marks at the end of semester and there shall be no improvement test after the marks are sent to the university. Scaling down shall be done for ISE as per **Rule 5.1**.

No separate passing is required for Internal Sessional Examinations and if the candidate remains absent for the ISE, the candidate shall be just treated as not appeared for the test securing **zero** marks. The ISE marks obtained by the candidate shall be added to the marks obtained by the candidate in End Semester Examination (ESE) conducted by the University as given in Annexure - I.

Rule 5.1: Scaling Down Formula

Scaling down of Internal Sessional Examination (ISE) marks shall be done as per following formula

A - Marks obtained by a student in ESE.

B - Marks obtained by a student in ISE.

Scaled down marks= (A * (20 / 80)) + (20 % * 20)

For example:

Sr. No.	A (ESE)	B (ISE)	Scale Down B (ISE)
1	36	15	13
2	45	10	10

Note: There shall not be any scaling up scheme for ISE. If a student fails in any theory course (i.e. scores less than **32** marks) in ESE, scaling down, if required, will be done whenever the student passes in that course (i.e. scores **32** or more marks) in the ESE.

Rule 6: Internal Continuous Assessment (ICA)

ICA shall be based on continuous evaluation of student's performance throughout semester.

Rule 7: Eligibility Criteria for Admission in Next Year

Rule 7.1: Student has to complete minimum **32** Credits in an academic year to be eligible for admission to next year.

Rule 7.2: Student shall be admitted in **TE** provided he / she have earned all credits of **FE** and minimum **32** credits of **SE**. Similarly the student shall be admitted in **BE** provided he / she have earned all credits of **SE** and minimum **32** credits of **TE**.

Note: For latterly admitted B.Sc. students, credits against courses 'Elements of Civil Engineering & Engineering Mechanics' and 'Elements of Mechanical Engineering & Engineering Graphics' of FE shall not be considered while deciding eligibility for **TE** admission. These students shall be allowed for admission in **BE** only after earning credits of these courses.

Rules 7.3: If student does not complete ICA of any course, he / she shall be awarded '**I**' (**Incomplete**) grade. In case of **'I'** or '**F'** grade in ICA, student shall not be allowed to appear for ESE (Practical / Oral) of the same course, if there is an ESE for that course. In all cases, if the student secures **'I'** or **'F'** grade, he / she have to register for the same course in succeeding semester when the same course is offered. However if the institute offers the same course in next semester, the student can register for the same in the very next semester also.

Rule 7.4: If a student secures '**F**' or '**I'** grade in any course, his / her SGPA and CGPA shall not be declared till he / she earns the credit of that course.

Rule 8: Calculation of SGPA and CGPA

Semester Grade Point Average (SGPA):

The performance of a student in a semester is indicated by a number called SGPA. SGPA is the weighted average of the grade points obtained in all courses registered by the student during the semester. It shall be calculated as follows:

$$\boxed{\text{SGPA} = \frac{\sum_{i=1}^{n} C_i \ p_i}{\sum_{i=1}^{n} C_i}}$$

Where,

C_i = the number of credits earned in the i^{th} course of a semester for which SGPA is to be calculated

p_i = grade point earned in the i^{th} course.

i = 1, 2, 3......n, where 'n' represents the number of courses in which a student is registered in that semester.

The SGPA is rounded up to two decimal places.

Cumulative Grade Point Average (CGPA):

Up-to-date assessment of the overall performance of a student from the time of his / her first registration is obtained by calculating a number called Cumulative Grade Point Average (CGPA), which is weighted average of the grade points obtained in all courses registered by the student since he/she entered the institute. It shall be calculated as follows:

$$\boxed{\text{CGPA} = \frac{\sum_{j=1}^{m} C_j \; p_j}{\sum_{j=1}^{m} C_j}}$$

Where,

C_j = The number of credits offered in the j^{th} course up to the semester for which CGPA is to be calculated.

p_j = Grade point earned in the j^{th} course. A letter grade lower than E in a course shall not be taken into consideration for calculation of CGPA.

j = 1, 2, 3......m, where 'm' represent the number of courses in which a student is registered up to the semester for which the CGPA is to be calculated.

The CGPA is rounded up to two decimal places.

Rule 8.1: Conversion of CGPA to Percentage Marks and Vice-versa

CGPA = (% Marks + 7.5) / 10

Percentage Marks = (CGPA - 0.75) * 10 %

Rule 9: CGPA Improvement

A student shall be allowed to improve his / her CGPA by reappearing for the courses from VII and / or VIII Semesters of BE as per prevalent policy of the university.

Rule 10: Methodology for award of Grades

Details of Rule10 will be declared in due course of time.

Rule 11: Audit Courses

In addition to academic credits, student has to complete audit courses for obtaining audit points. The following audit courses shall be completed.

- Environmental Science
- Co-curricular activities

- Extra Curricular activities

Rule 11.1: Environmental Science Audit Course

It is compulsory to complete Environment Science audit course for all admitted students. ESE for Environmental Science shall be conducted as per the prevalent rules of the university. There shall be **6** audit points for the Environment Science audit course.

Rule 11.2: Co-curricular Activity

A minimum **16** Audit points for co-curricular activities shall be obtained by the student during his course of study distributed over at least **4** semesters. There is no limit on maximum audit points obtained by the student. The final grade sheet will include the actual number of audit points obtained by the student during his entire course of study.

Note: For lateral entry admission (Diploma and B.Sc. students), student shall obtain a minimum **12** Audit points for co-curricular activities distributed over at least **3** semesters.

No	Name of Activity	Audit Points
01	Technical Conference Attendance (Minimum State Level)	01
02	Technical Paper Presentation (Minimum State Level)	02
03	Award Winning Technical Paper Presentation	04
04	Technical Workshop for Minimum 2 Days	01
05	Technical Courses other than Curriculum for Each Course	02
06	Professional Society Membership (1 point for each membership)	01
07	Any Foreign Language Course (2 points for each course)	02
08	Any other Relevant Activity*	-

***Note:** If the institute wants to include any other activity, the details shall be sent to the university. The dean faculty of Engineering & Technology shall take the decision of approving the activity and allocating number of audit points for the activity.

Rule 11.3: Extra-curricular Activity:

A minimum **8** Audit points for Extra - curricular activities shall be obtained by the student during his course of study distributed over at least **4** semesters. There is no limit on maximum audit points obtained by the student. The final grade sheet will include the actual number of audit points obtained by the student during his entire course of study.

Note: For lateral entry admission (Diploma and B.Sc. students), student shall obtain a minimum **6** Audit points for Extra - curricular activities distributed over at least **3** semesters.

Sr. No.	**Name of Activity**	**Audit Points**
01	***Sports***	
	• Member of Inter College Team	01
	• Member of Inter University Team	02
	• Member of National Level Team	03
02	***Cultural Events***	
	• Inter College Level	01
	• Inter University Level	02
	• Inter State Level	03
03	Membership of NSS, NCC	01
04	Social Service Activities (Blood Donation, Tree Plantation, Adult Education etc.)	01
05	Any other Relevant Activity*	-

***Note:** If the institute wants to include any other activity, the details shall be sent to the university. The dean faculty of Engineering & Technology shall take the decision of approving the activity and allocating number of audit points for the activity.

Rule 11.4: The grade card in each semester shall contain the information about audit points obtained by the student as shown in the following table:

No	**Description**	**Audit Points Balance**	**Audit Points Obtained**	**Total Audit Points**
01	Environmental Science			
02	Co-curricular Activities			
03	Extra-curricular Activities			

The final grade card of a student shall contain the information about audit points obtained by the student as shown in the following table:

No	Audit Course	Grade	Audit Points	
			Minimum Required	Total Obtained
01	Environmental Science	CES / NCES	06	
02	Co-Curricular Activities	CCC / NCCC	16	
03	Extra-Curricular Activities	CEC / NCEC	08	
		Total	30	

Rule 11.5: Audit Point Report

The college shall send the audit point report of all admitted students in following format:

Sr. No.	Name of The Student	PRN	Exam Seat No	No of Audit Points Obtained	
				Co-Curricular Activity	Extra-Curricular Activity
01					
02					

The college shall keep the detailed record of audit points obtained by each student with documentary proof for verification till he / she shall completes the requirement of the degree.

Rule 12: Credit Groups

The syllabus of all branches shall be divided into 5 groups with credit distribution as given in the following table:

Sr. No.	Group Name	Group Code	Number of Credits
01	Basic Sciences	A	26
02	Basic Engineering & Skills	B	29
03	Humanities, Social Science & Management	C	13
04	Programme Core	D	101
05	Electives	E	15
		Total	184

Annexure - I

FE Semester – I

Name of the Course	Group	Teaching Scheme				Theory		Practical		Total	Credits
		Theory Hrs / week	Tutorial Hrs / week	Practical Hrs / week	Total	ISE	ESE	ICA	ESE		
Engineering Physics - I	A	3	---	---	3	20	80	---	---	100	3
Engineering Chemistry – I	A	3	---	---	3	20	80	---	---	100	3
Engineering Mathematics - I	A	3	1	---	4	20	80	---	---	100	4
Elements of Civil Engineering & Engineering Mechanics	B	3	1	---	4	20	80	---	---	100	4
Computer Programming	B	3	---	---	3	20	80	---	---	100	3
Engineering Science Lab - I	A	---	---	2*	2*	---	---	25	---	25	1
Computer Programming Lab	B	---	---	2	2	---	---	25	25 **(PR)**	50	1
Elements of Civil Engineering & Engineering Mechanics Lab	B	---	---	2	2	---	---	25	25 **(OR)**	50	1
Workshop Practice – I	B	---	---	2	2	---	---	25	---	25	1
Soft Skills – I	C	1	---	2	3	---	---	50	---	50	2
Total		**16**	**2**	**10**	**28**	**100**	**400**	**150**	**50**	**700**	**23**

ISE: Internal Sessional Examination **ESE: End Semester Examination** **ICA : Internal Continuous Assessment**

Note: For Engineering Science Lab, practical of Engineering Physics and Engineering Chemistry shall be conducted in alternate week.

FE Semester - II

Name of the Course	Group	Teaching Scheme									Credits
						Theory		Practical		Total	
		Theory Hrs / week	Tutorial Hrs / week	Practical Hrs / week	Total	ISE	ESE	ICA	ESE		
Engineering Physics – II	A	3	---	---	3	20	80	---	---	100	3
Engineering Chemistry - II	A	3	---	---	3	20	80	---	---	100	3
Engineering Mathematics - II	A	3	1	---	4	20	80	---	---	100	4
Elements of Electrical & Electronics Engineering	B	3	---	---	3	20	80	---	---	100	3
Elements of Mechanical Engineering & Engineering Graphics**	B	3	---	---	3	20	80	---	---	100	3
Engineering Science - II Lab	A	---	---	2*	2*	---	---	25	---	25	1
Elements of Mechanical Engineering & Engineering Graphics Lab**	B	---	---	4	4	---	---	25	25 **(OR)**	50	2
Elements of Electrical & Electronics Engineering Lab	B	---	---	2	2	---	---	25	25 **(PR)**	50	1
Workshop Practice - II	B	---	---	2	2	---	---	50	---	50	1
Soft Skills-II	C	1	---	2	3	---	---	25	---	25	2
Total		**16**	**1**	**12**	**29**	**100**	**400**	**150**	**50**	**700**	**23**

ISE: Internal Sessional Examination **ESE: End Semester Examination** **ICA: Internal Continuous Assessment**
Note: For Engineering Science Lab, practical of Engineering Physics and Engineering Chemistry shall be conducted in alternate week.
**** Subject to Revision/change by the committee appointed by academic council**

SE Semester - III

Name of the Course	Group	Teaching Scheme				Evaluation Scheme					Credits
						Theory			Practical	Total	
		Theory Hrs / week	Tutorial Hrs / week	Practical Hrs / week	Total	ISE	ESE	ICA	ESE		
TH	* A/D	3	1	---	4	20	80	---	---	100	4
TH	B	3	---	---	3	20	80	---	---	100	3
TH	D	3	1	---	4	20	80	---	---	100	4
TH	D	3	---	---	3	20	80	---	---	100	3
TH	D	3	---	---	3	20	80	---	---	100	3
Soft Skills – III	C	1	---	2	3	---	---	50	---	50	2
LAB	B	---	---	2	2	---	---	50	---	50	1
LAB	D	---	---	2	2	---	---	25	25	50	1
LAB	D	---	---	2	2	---	---	25	25	50	1
LAB	D	---	---	2	2	---	---	25	25	50	1
Total		**16**	**2**	**10**	**28**	**100**	**400**	**175**	**75**	**750**	**23**

ISE: Internal Sessional Examination **ESE: End Semester Examination** **ICA: Internal Continuous Assessment**

Note 1: For branches like Chemical Engineering and Biotech Engineering, two laboratory hours can be merged to form a four hour slot.

Note 2: Out of 3 practical ESE heads, at least 1 head should be practical.

*** E & TC, Mechanical, Automobile & Production Engineering branches shall have group D course and rest of the branches shall have group A course (e.g. Engineering Mathematics-III).**

SE Semester - IV

Name of the Course	Group	Teaching Scheme				Evaluation Scheme					Credits
						Theory		Practical		Total	
		Theory Hrs / week	Tutorial Hrs / week	Practical Hrs / week	Total	ISE	ESE	ICA	ESE		
TH	* A/D	3	---	---	3	20	80	---	---	100	3
TH	D	3	1	---	4	20	80	---	---	100	4
TH	D	3	1	---	4	20	80	---	---	100	4
TH	D	3	---	---	3	20	80	---	---	100	3
TH	D	3	---	---	3	20	80	---	---	100	3
LAB	B	1	---	2	3	---	---	50	---	50	2
LAB	D	---	---	2	2	---	---	50	---	50	1
LAB	D	---	---	2	2	---	---	25	25	50	1
LAB	D	---	---	2	2	---	---	25	25	50	1
LAB	D	---	---	2	2	---	---	25	25	50	1
Total		**16**	**2**	**10**	**28**	**100**	**400**	**175**	**75**	**750**	**23**

ISE: Internal Sessional Examination **ESE: End Semester Examination** **ICA: Internal Continuous Assessment**

Note 1: For branches like Chemical Engineering and Biotech Engineering, two laboratory hours can be merged to form a four hour slot.

Note 2: Out of 3 practical ESE heads, at least 1 head should be practical.

*** E & TC, Mechanical, Automobile & Production Engineering branches shall have group A course (e.g. Engineering Mathematics-III) and rest of the branches shall have group D course.**

TE Semester – V

Name of the Course	Group	Teaching Scheme				Evaluation Scheme					Credits
						Theory		Practical		Total	
		Theory Hrs / week	Tutorial Hrs / week	Practical Hrs / week	Total	ISE	ESE	ICA	ESE		
TH	D	3	---	---	3	20	80	---	---	100	3
TH	D	3	---	---	3	20	80	---	---	100	3
TH	D	3	---	---	3	20	80	---	---	100	3
TH	D	3	---	---	3	20	80	---	---	100	3
TH	C	3	---	---	3	20	80	---	---	100	3
LAB	D	---	---	2	2	---	---	25	25	50	1
LAB	D	---	---	2	2	---	---	25	---	25	1
LAB	D	---	---	2	2	---	---	25	25	50	1
LAB	D	---	---	2	2	---	---	25	25	50	1
LAB	B	1	---	2	3	---	---	50	---	50	2
Industrial Training / EDP / Special Study	D	---	---	---	---	---	---	25	---	25	2
Total		**16**	**---**	**10**	**26**	**100**	**400**	**175**	**75**	**750**	**23**

ISE: Internal Sessional Examination **ESE: End Semester Examination** **ICA : Internal Continuous Assessment**

Note 1: For branches like Chemical Engineering and Biotech Engineering, two laboratory hours can be merged to form a four hour slot.

Note 2: Out of 3 practical ESE heads, at least 1 head should be practical.

TE Semester – VI

Name of the Course	Group	Teaching Scheme				Evaluation Scheme					Credits
						Theory		Practical		Total	
		Theory Hrs / week	Tutorial Hrs / week	Practical Hrs / week	Total	ISE	ESE	ICA	ESE		
TH	D	3	--	---	3	20	80	---	---	100	3
TH	D	3	---	---	3	20	80	---	---	100	3
TH	D	3	---	---	3	20	80	---	---	100	3
TH	D	3	---	---	3	20	80	---	---	100	3
TH	C	3	---	---	3	20	80	---	---	100	3
LAB	D	---	---	2	2	---	---	25	25	50	1
LAB	D	---	---	2	2	---	---	25	25	50	1
LAB	D	---	---	2	2	---	---	25	25	50	1
LAB	B	---	---	2	2	---	---	25	---	25	1
Minor Project	D	---	---	2	2	---	---	50	---	50	2
Seminar - I	D	---	---	2	2	---	---	25	---	25	2
Total		**15**	**---**	**12**	**27**	**100**	**400**	**175**	**75**	**750**	**23**

ISE: Internal Sessional Examination **ESE: End Semester Examination** **ICA: Internal Continuous Assessment**

Note 1: For branches like Chemical Engineering and Biotech Engineering, two laboratory hours can be merged to form a four hour slot.

Note 2: Out of 3 practical ESE heads, at least 1 head should be practical.

BE Semester - VII

Name of the Course	Group	Teaching Scheme				Evaluation Scheme					Credits
						Theory		Practical		Total	
		Theory Hrs / week	Tutorial Hrs / week	Practical Hrs / week	Total	ISE	ESE	ICA	ESE		
TH	D	3	---	---	3	20	80	---	---	100	3
TH	D	3	---	---	3	20	80	---	---	100	3
Interdisciplinary Elective	E	3	---	---	3	20	80	---	---	100	3
Elective - I	E	3	---	---	3	20	80	---	---	100	3
TH	D	3	--	---	3	20	80	---	---	100	3
LAB	D	---	---	2	2	---	---	25	25	50	1
LAB	D	---	---	2	2	---	---	25	25	50	1
LAB#	E	---	---	2	2	---	---	25	25	50	1
Project – I	D	---	---	2	2	---	---	25	25	50	2
Seminar - II	D	---	---	2	2	---	---	25	---	25	2
Industrial Visit	D	---	---	---	---	---	---	25	---	25	1
Total		**15**	**---**	**10**	**25**	**100**	**400**	**150**	**100**	**750**	**23**

ISE: Internal Sessional Examination **ESE: End Semester Examination** **ICA: Internal Continuous Assessment**

#Lab for Elective-I

Inter Disciplinary Elective	Elective I
1	1
2	2
	3
	4

Note 1: For branches like Chemical Engineering and Biotech Engineering, two laboratory hours can be merged to form a four hour slot.

Note 2: Out of 3 practical ESE heads, at least 1 head should be practical.

Note 3: Interdisciplinary Elective shall be offered by the department to the students of other department. Students from one department can not register for Interdisciplinary Elective of the same department.

Note 4: At least 15 students should register for offering any elective.

BE Semester – VIII

Name of the Course	Group	Teaching Scheme				Evaluation Scheme					Credits
						Theory		Practical		Total	
		Theory Hrs / week	Tutorial Hrs / week	Practical Hrs / week	Total	ISE	ESE	ICA	ESE		
TH	D	3	---	---	3	20	80	---	---	100	3
TH	D	3	---	---	3	20	80	---	---	100	3
Elective - II	E	3	---	---	3	20	80	---	---	100	3
Elective - III	E	3	---	---	3	20	80	---	---	100	3
LAB	D	---	---	2	2	---	---	25	25	50	1
LAB	D	---	---	2	2	---	---	25	25	50	1
LAB#	E	---	---	2	2	---	---	25	25	50	1
Industrial Lecture*	C	---	---	1*	1	---	---	50	---	50	2
Project - II	D	---	---	4	4	---	---	75	75	150	6
Total		**12**	**---**	**11**	**23**	**80**	**320**	**200**	**150**	**750**	**23**

ISE: Internal Sessional Examination **ESE: End Semester Examination** **ICA: Internal Continuous Assessment**

#Lab for Elective-II
*** Minimum 6 lectures to be delivered by experts from the industry in alternate weeks. Next week group discussion on the lecture delivered.**

Elective II	Elective III
1	1
2	2
3	3
4	4

Note 1: For branches like Chemical Engineering and Biotech Engineering, two laboratory hours can be merged to form a four hour slot.

Note 2: Out of 3 practical ESE heads, at least 1 head should be practical.

Note 3: Interdisciplinary Elective shall be offered by the department to the students of other department. Students from one department can not register for Interdisciplinary Elective of the same department.

Note 4: At least 15 students should register for offering any elective.

North Maharashtra University, Jalgaon

First year term I
ME Civil Engineering (Environmental Engineering)
Examination scheme and structure with effect from year 2010 – 11
First Year Term – I

Sr. No.	Subject	Teaching Scheme per week		Examination Scheme				
		L	P	Paper Hr.	Paper	TW	PR	OR
1	Environmental Engineering Microbiology	3	--	3	100	--	--	--
2	Design operation and maintenance of water supply and sewerage system	3	--	3	100	--	--	--
3	Air pollution	3	--	3	100	--	--	--
4	Environmental Engineering Chemistry	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) Environmental Sanitation
2) Remote Sensing GIS and its environmental application
3) Rural water supply and sanitation

ME Civil Engineering (Environmental Engineering)
First Year Term – II

Sr. No.	Subject	Teaching Scheme per week		Examination Scheme				
		L	P	Paper Hr.	Paper	TW	PR	OR
1	Advanced Water Treatment Technology	3	--	3	100	--	--	--
2	Advanced Waste Water treatment Technology	3	--	3	100	--	--	--
3	Industrial water and waste water Management	3	--	3	100	--	--	--
4	Water shed management	3	--	3	100	--	--	--
5	Elective-II	3	--	3	100	--	--	--
	Laboratory Practice-II	--	6	--	--	100	--	50
	Seminar-II	--	4	--	--	100	--	--
	Total	15	10	--	500	200		50
	Grand Total	**25**		**750**				

Elective II

1) Design of Water Supply and Waste Water structure
2) Environmental impact Assessment
3) Solid Waste and Management

ME Civil Engineering (Environmental Engineering)
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**				

ME Civil Engineering (Environmental Engineering)
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**				

North Maharashtra University, Jalgaon

ME Civil Engineering (Environmental Engineering)

Examination scheme and structure with effect from year 2010 – 11

First year term I

1) ENVIRONMENTAL ENGINEERING MICROBIOLOGY

Lectures – 03 Hours / Week	Theory 100 marks
Tutorial - 01Hours/week	Min passing 40 marks
Term work 50 marks	Duration - 03Hours

Role of microorganisms in environmental engineering. Microorganism classification, bacteria, Algae, Fungi, Protozoa, Crustacea, Rolifers, Oligochaeta, Parasites. Observation of microbes. Biochemical reactions. Metabolic activities. Role of enzymes. Pure and mix culture. Biodegradibilty. Factors affecting biodegradability, ph, temperature, nutrition, salt concentration, toxicity, osmotic pressure etc. Optimum conditions for growth, oxygen requirement.

Bacterial metabolism- oxidation of carbohydrates Protein and fats under aerobic and anaerobic conditions, Carbon, Nitrogen and Sulfur cycles in nature.

Role and micro-organisms in the treatment of sewage and industrial wastes by different methods.

Synthesis, growth and death of microorganisms, population dynamics.

Role and significance of bacteria and viruses in potable water, occurrence of water borne diseases and their prevention, Bacterial indicators of pollution.

M. P. N. techniques and bacterial colony counting, M. F. technique – principle, procedure, limitation of test, Interpretation of analytical results. Bacteriological standards for raw and treated waters.

Applied microbiology of domestic sewage and industrial wastewater. Anaerobic and aerobic metabolic pathways.

Microbial inner look into various wastewater treatment systems including trickling filter, activated sludge process, oxidation ponds, anaerobic digesters.

Role of microorganisms in solid waste disposal, pathogenic aspects of landfilling and composting, microbiological factors affecting performance of landfills and composting plants.

Effect of radioactivity on microorganisms. Milk and food sanitation. Air born disease, spread and control of air born diseases. Biological indicators of pollution. Control of Algae and other Biological growth in water supplies.

Term work:

1. Determination of MPN index of a given sample of water.
2. Study of optical microscope and its setting.
3. Preparation of culture media.
4. Acclimatization of bio mass and its concentration under aerobic conditions.
5. Determination of B Coli count of water by membrane filtration method.
6. Study of microbes under microscope and staining of microorganisms.
7. Study of heavy metals on microorganisms.
8. Five Assignments based upon above syllabus.

Books:

1. Microbiology for sanitary engineer by McKinney.
2. Sanitary microbiology by Gauddy and Gauddy.
3. Microbiology by Pelzar.

2. ENVIRONMENTAL ENGINEERING CHEMISTRY

Lectures – 03 Hours / Week
Tutorial - 01Hours/week
term work 50 marks

Theory 100 marks
min passing 40 marks
Duration - 03Hours

Basic concepts from general chemistry- elements, atomic weights, gram atomic weights, compounds, mole, avagadro's number, valancy, oxidation state, nomenclature, chemical equations and weight relationship, oxidation-reduction, gas laws, solutions, Le Chatelier's principal, , ionization, common ion effect,
shifting chemical equillibria, amphotermic substances.

Basic concepts from physical chemistry- thermodynamic aspects, energy, enthalpy, entropy, Gibb's free energy, vapor pressure, surface tension, solution of solids in liquids, osmosis, dialysis, solvent extraction, electrochemistry, chemical kinetics, catalysis, adsorption,.

Basic concepts from organic chemistry- carbon atom, isomerism, hydrocarbons, alcohols, aldehydes, ketones, acids, esters, ethers, alkyl halides, amines, amides, cyclic aliphatic compounds, aromatic compounds, phenols, heterocyclic compounds, dyes, common foods, trace organics, detergents, pesticides.

Basic concepts from equilibrium chemistry- limitations of equlibrium calculations, ion activity coefficients, acids and bases, buffers, solubility, complex formation, oxidation-reduction, preliminary numerical treatment with these topics.

Basic concepts from colloid chemistry- colloid, methods of formation, dispersion of colloids in liquids, dispersion in air.

Basic concepts from biochemistry chemistry- enzymes, cofactors, temperature dependence, pH, trace elements, biochemistry of protines, biochemistry of fats, biochemistry of carbohydrates, energetics and bacterial growth.

Standard methods of examination of waters and wastewaters, standard solutions, primary and secondary standards, colorimetry.

LIST OF PRACTICALS:

1. Preparation of standard solutions.
2. Determination of conductivity
3. Kijedahl Nitrogen determination.
4. Calcium, magnesium and total hardness.
5. Determination of Iron using spectro photometry
6. Determination of chromium using spectro photometry
7. Determination of fluoride using spectro photometry
8. Residual chlorine determination..
9. Determination of Dissolved oxygen of a given sample of water.
10. Determination of Biochemical oxygen demand of a given sample of wastewater using acclimatized bio mass..
11. Determination of TOC of a given sample of wastewater.
12. Determination of IOD of a given sample of wastewater.

Any ten experiments out of the twelve experiments given above must be performed.

Books:

1. Chemistry for environmental engineering: Sawyer and McCarty, TMC Publication N Delhi.
2. Physical chemical and organic chemistry by Bahal and Tuli, Khanna publication New Delhi.

3. DESIGN OPERATION AND MAINTENANCE OF WATER SUPPLY AND SEWERAGE SYSTEM.

Lectures – 03 Hours / Week Theory 100 marks
Tutorial - 01Hours/week min passing 40 marks
term work 50 marks Duration - 03Hours

Importance of sewerage system. General History of water supply and sewerage system in India. Development in different five year plans, Future scope.
Estimation of water requirements and flow into sewers.

Sources of water, Surface and underground sources. Intake structures, construction and maintenances of wells and infiltration galleries. design of intake structures.

Transmission of water, Types and materials of conduits, Hydraulic characteristics, Water hammer appurtenances, Pumping of water, types, design and selection.
Types of pumps, Economics of pumps and rising main.
Distribution of water, Pressure and capacity requirement of systems. Field and office analysis of distribution network, Service reservoir. Maintenance of distribution system. Emergency disinfections of mains.

Sewerage System : Patterns of sewerage systems, kinds of sewer.

Design of sewerage systems : Hydraulics of sewers. Flow at sewer transitions. Length of side weirs and capacity of street inlets, Estimates of sewage flow. Storm water runoff.
Design and layouts of sanitary and combined sewerage systems. Maintenances of sewers.

Sewer Appurtenance : Manholes, flushing tanks. Inverted siphons, Regulators., design and working principal

Pumping of sewage: Necessity, Types and characteristics of pumps. Typical problems in sewage pumping.

Plumbing requirements of tall buildings: design of water supply and sewerage for houses, numerical treatment.

Term work: term work shall be based upon ten assignments based upon the above mentioned syllabus. The assignments should base upon following topics:

a. Significance of sewerage and eater supply systems and their history. (one assignment)

b. Design of intake structure. (one assignment)

c. Design of pressure mains (one assignment)

d. Materials, layout and maintenance of pipes network. (two assignments)

e. Design of pipe network. (two assignments)

f. Estimation of run off and sewerage (one assignment)

g. Design of sewer (two assignments)

h Lay out and maintenance of sewers (one assignments).

Books:-

1. Water & Wastewater Technology:- Mark J. Hammer
2. Pumping and collection of wastewater, Meclaf and eddy Inc.
3. Water supply & Wastewater engineering :-B.S.N. Raju
4. Water supply engineering :-Dr. P. N. Modi.

4. AIR POLLUTION

Lectures – 03 Hours / Week
Tutorial - 01Hours/week
term work 50 marks

Theory 100 marks
min passing 40 marks
Duration - 03Hours

Definitions, energy environment relationship.

Importance of air pollution studies in modern world, elements of air pollution, sources of air pollution, effects of air pollution on human beings, plant, animals, property. Economic effects of air pollution. Global and local effects of air pollution. Case studies of India and world. Permissible air pollution. Ambient and effluent standards.

Nature's cleaning mechanism. Point source. Atmospheric conditions and dispersion of air pollution, various types of plume behaviors, Guassian dispersion equations, their limitations, numerical treatment. Estimation of dispersion of air pollution from a given height of stack under given atmospheric conditions, plume rise estimation, estimation of maximum concentration under given conditions, calculation of required height for permissible concentration. Concept of line source.

Air pollution from thermal power plant, their characteristics and control.

Air sampling methods and equipments. Analytical methods for air pollution studies, smoke survey, planning an air pollution survey.

Particulate matter and its control by equipments. Working principal, advantages, Disadvantages, design and applications of various types of particulate control devices. Concept of bio filters.

Automobile air pollution, types, control methods, effect of A/F ratio.

Photochemical smog formation, bad effects, control.

Control of air pollution : strategy, effect of town planning, road conditions, vehicle condition etc. history of air pollution legislation in India. Life style and air pollution.

Glance over present day global and Indian scenario of air pollution.

Term work:

1. Ten assignments based upon above syllabus.

   The assignments shall be based upon following topics:

   a. Automobile air pollution and its control (one assignment)
   b. Meteorological factors and their influence on air pollution dispersion, plume behavior (two assignments)
   c. Life style and air pollution control (one assignment)
   d. Energy utilization and environmental degradation (one assignment)
   e. Estimation of effective height of stack (one assignment)
   f. Estimation of required height of stack for pollution control under given environmental conditions (two assignments)
   g. Global environmental phenomenon (two assignments).

2. Visit to a site where air pollution control device is working.
3. Practical:
   a. Air pollution sampling using high volume sampler.
   b. Automobile air pollution sampling using auto exhaust analyzer.
   c. Study of functioning of air pollution control devices installed at sites.

Books:-

1. Air pollution:- A C Stern.
2. Air pollution :-M N Rao & H V N Rao
3. Air pollution engineering by Perkins.
4. Air pollution control technology: Wark and Warner.

5. *ELLECTIVE-I*

1. ENVIRONMENTAL SANITATION

Lectures – 03 Hours / Week
Tutorial - 01Hours/week
term work 50 marks

Theory 100 marks
min passing 40 marks
Duration - 03Hours

Definitions, environment and its effect on public health, global environmental sanitation history, problem of environmental sanitation in India.

Refuse Collection And Disposal: generation, storage and Composition of refuse, quantity, house treatment, Administration of collection and disposal. Socio economic and cultural aspect associated with refuse management problem.

House sanitation: importance of house sanitation, indoor pollution, importance of sun light, Heating, cooling, ventilation, air conditioning, lighting. Noise-hazards of noise, protection against noise, fly and mosquito control. Architectural aspects for house sanitation.

Communicable Disease: Disease and immunity, communicable, diseases source, Mode of transfer, Control of communicable diseases

Sanitation of public places: Problems of sanitation of the following public places and their solutions : Swimming pools and bathing places, Bus and railway station, Hospitals, Cinema houses, Campus, fairs and festival.
Milk Food Sanitation: Essentials of dairy farm and cattle shed sanitation. Tests for milk and dairy products. Food epidemics, food poisoning, Botulism.

Parasitology: Tropical health, Health problems of under develop countries. Disease due to parasite infestation. Physiological effects, specific examples of region. Engineering control.

Term work: Ten assignments based upon above syllabus as on following topics:

a. Importance of environmental sanitation and historical back ground (one assignment)
b. Traditional Indian practices for environmental sanitation and health protection. (one assignment)
c. Refuse problem and its cultural aspects (two assignment)
d. Refuse collection and socio economic aspects.(two assignment)
e. Disease transmission and its prevention, role of individual and community (two assignments)
f. Sanitation of public places (two assignment)

In addition to above, students must do a minor project based upon above syllabus the project must be a case study of field.

Books:-

1. Municipal & Rural Sanitation:- Ehlens &Steel
2. Environmental Management:- G.N. Pandey
3. Environmental Sanitation:- B.S. Kapoor

2. REMOTE SENSING, GIS AND ITS ENVIRONMENTAL APPLICATIONS

Lectures – 03 Hours / Week	Theory 100 marks
Tutorial - 01Hours/week	min passing 40 marks
term work 50 marks	Duration - 03Hours

Fundamental principals of remote sensing, electromagnetic energy and its atmospheric interactions, remote sensing systems.

Elements of remote sensing systems, Indian remote sensing program.

Principles of Ariel survey, ariel photography, scale, types of photographs, over lapping, drift and drag, air photo interpretation, equation of parallex, stereoscopic vision, air base distance, areil points.

Satellite imageries, stationary and geo-stationary satellites, global positioning system and its application in environmental engineering. Indian satellite program.

Geographical information system, fundamentals, applications, characteristics. Different types of sensors, data interpretation.

Integrated application of remote sensing and GIS in environmental engineering, resource management, monitoring and evaluation, modeling.

Term work:

1. Practice with GIS software.
2. Minor project using GIS
3. Study of areil photographs and satellite imageries.
4. Five assignments based upon above syllabus. The assignments should include following topics:
    a. Principles of remote sensing (one assignments)
    b. GIS, its scope and applications (Two assignments).
    c. History and development of GIS (one assignment)
    d. Digital data interpretation (one assignment).

Books:

1. Remote sensing, principles and interpretation by W H & Freeman & Co. NY.
2. Remote sensing by Gupta R P.
3. Introductory digital image processories by Jensen J R, Pentice Hall, NZ.

3. Rural Water Supply and Sanitation

Lectures – 03 Hours / Week | Theory 100 marks
Tutorial - 01Hours/week | min passing 40 marks
term work 50 marks | Duration - 03Hours

Importance of village community in India , conditions of Indian villages with special regard to economic ,social and health aspect. Quality of water needed for village community. Sources of water for village water supplies. Types of wells of sanitary aspects in well construction. Disinfections of wells. Different types of pumps used for village wells. Treatment of water. Hydrological aspects of source and its impact on water quality. Strengthening of source.

Engineering project and role of engineer. Steps in project development report. Feasibility of the project both technical and financial. Alternative project construction. Cost comparison, scientific management and relationship , Rationalization, Qualities of good manager , office organization. Organization and management of stores. Present worth annuities, sinking funds, capitalized cost, annual expense, depreciation salvage value Rate structure, sources of money. General principles of financing, capital improvements and operating water works. Benefit cost ratio analysis, life of scheme, history, development and management of water supply and sanitary engineering projects in India. Design of rural water supply scheme. Cost estimation of rural water supply scheme.

Term work: Five assignments based upon above-mentioned syllabus. The above assignments shall include following topics:

a. Importance, history and economic aspect of rural water supply in India. Five year development plans (one assignment).
b. Project management techniques applied to rural water supply engineering (two assignments)
c. Automation of small water supply schemes and limitation (two assignments)

In addition to above, the candidate must do a minor project based upon rural water supply schemes. It may be a case study or a design.

Books:-

1. Water supply Engineering:- S.K. Garg
2. Management of water projects:- Oxford &IBH publishing Co.
3. Pumping and Collection of water by MetCalf and Eddy TMC publications.

Laboratory Practice I

All assignments are compulsory

1. Assignment No I – Environmental Engineering Microbiology
2. Assignment No 2 – Design operation and maintenance of water supply and sewerage system
3. Assignment No 3 – Air pollution
4. Assignment No 4 – Elective I

Experiment (Minimum Four)

1. Determination of Microbial quality of water by standard Plate count
2. Determination of coli form density by MPN method
3. Membrane Filter Test
4. Determination of NO_x/SO_x
5. Determination of chloride content
6. Determination of C O D
7. Determination of Oil and Grease

ME Civil Engineering (Environmental Engineering)

TERM II

1. ADVANCED WATER TREATMENT TECHNOLOGY

Lectures – 03 Hours / Week	Theory 100 marks
Tutorial - 01Hours/week	min passing 40 marks
term work 50 marks	Duration - 03Hours

Quality of water: Standards of raw and treated waters. Sources of water and their natural quality. Protection of sources. Effects of water quality. Water ecology, water demand, fluctuation, water supplies.

Water treatment: Requirements of water treatment facilities. Process design and hydraulic design.
Unit operations and process, kinetic theory of reactors, plug flow and completely mixed reactor, dye tracing, efficiency of reactors, reactors in series, partially mixed reactors.
Sedimentation and flotation: General equation for settling or rising of discrete particles. Hindered settling. Effect of temperature, viscosity. Efficiency of an ideal settling basin, Reduction in efficiency due to various causes. Sludge, Storage and removal. Design criteria of settling tanks.

Coagulation: theories of chemical coagulation, coagulation aids. Mixing arrangement design of mechanical flocculator. Mean velocity gradient, effect of temperature.

Filtration: Theory of filtration. Size & shape characteristics of filter media. Preparation of filter sand. Hydraulics of filtration through homogenous and stratified media. Hydraulics of filter washing. Design of filter elements. Filter appurtenances, multimedia filters.

Disinfection: importance of disinfections, Methods of disinfections. Factors affecting disinfections. Destruction of bacteria, virus. Methods of dosing. Safety measures. Bad effect of chlorination.

Aeration: Principles of aeration methods.

Softening of water: types of hardness, effects, permissible limits, Langelier index, Methods of softening.

Miscellaneous water purification processes: Removal of Iron and manganese, Removal of taste and odor. Removal of Fluorides. Treatment of saline water.

Corrosion: Theory and principles of corrosion, Factors influencing corrosion. Methods of protection.

Latest methods of water treatment.

Complete design of water treatment plant as per prevailing Indian standard codes of practice with cost estimation.

Term work:

1. Five assignments based upon above-mentioned syllabus. The assignments should include following topics:
    a. Design of primary settling tank with all components
    b. Design of secondary settling tank with all components
    c. Design of coagulation units with all components
    d. Design of Filtration unit with all components
    e. Design of disinfection unit with all components.

2. Visit to a water treatment plant and its report.
3. Complete design of water treatment plant with all details, drawings and cost estimation.

Books:-

1. Water supply and sanitary engineering: E W Steel.
2. Water treatment technology: Walter J Weber
3. Water treatment manual by CPHEEO

2. ADVANCED WASTEWATER TREATMENT TECHNOLOGY

Lectures – 03 Hours / Week Theory 100 marks
Tutorial - 01Hours/week min passing 40 marks
term work 50 marks Duration - 03Hours

Sewage characteristics: Characteristics of domestic sewage, storm and combined sewage. Constituents of Sewage. Sampling and storage of sewage. Decomposition of organic materials. Biodegradability. Biochemical oxygen demand. BOD satisfaction rate constant. Population equivalent. Chemical oxygen demand.
Monod's equation for substrate utilization. Kinetic coefficients of microbial decomposition of wastewater under aerobic and anaerobic conditions. Determination of kinetic coefficients. Mathematic relationship between coefficients. Kinetic theory applied to aerobic and anaerobic suspended growth mixed biological reactor, Kinetic theory applied to aerobic and anaerobic attached growth biological reactor.

Sewage disposal: Disposal methods. Self Purification of natural bodies of water. Oxygen balance and oxygen sag. Critical time and critical distance, mathematical treatment. Sewage farming.

Sewage treatment: Object of sewage treatment. Process design and hydraulic design. Screening and Grit Removal: Design and operation of screens. Disposal of screening. Principles of sedimentation applied to grit chamber. Velocity control. Disposal of grit.

Oil and grease separation: Sedimentation Primary , intermediate and final clarification. Design of tanks. Removal of sludge and scum . Sedimentation aided by chemical. Principle and theory of biological methods of treatment. Design of facilities for biological treatment of wastewater, activated sludge process, trickling filters, anaerobic and aerobic lagoons, oxidation ditch, oxidation ponds, septic tanks.
Sludge production, removal, handling, disposal methods, bio gas generation, design of bio gas reactor, sludge drying beds and their design. Aerobic digesters.

Miscellaneous Treatment: Disinfections of sewage. Coagulation of sewage.
Non biodegradable organics, their occurrence, bad effects, conventional removal methods introduction to photocatalysis theory for non biodegradable organics.

Complete design of wastewater treatment plant with all components, details, drawings and cost estimation.

Term work:

1. Five assignments based upon above-mentioned syllabus. The assignmenst should include following topics:
    a. Design of preliminary treatment system.
    b. Design of primary treatment system.
    c. Design of Biological treatment system
    d. Design of tertiary treatment system
    e. Design of advance wastewater treatment methodology.
2. Visit to a wastewater treatment plant and visit report.
3. Complete design of wastewater treatment plant with all components, details, drawings and cost estimation.

Books:-

1. Wastewater treatment, disposal and reuse: Metcalf & Eddy Inc.
2. Wastewater treatment technology by S J Arceiwala.
3. Wastewater treatment system by Hammer.
4. Wastewater treatment manual by CPHEEO

3. INDUSTRIAL WATER AND WASTEWATER MANAGEMENT

Lectures – 03 Hours / Week	Theory 100 marks
Tutorial - 01Hours/week	min passing 40 marks
term work 50 marks	Duration - 03Hours

Special problems of Industrial wastewater, water quality index and its application for industrial wastewater recalculation and reuse, industrial ecology, integrated approach for industrial water and wastewater management.
Water requirements of various industries. General idea of manufacturing process in various industries. Sources of wastewaters.

Legal aspects of industrial wastewater management, Regulatory agencies, Standards for treatment.

Reuse and recovery of bye products from industrial wastewaters. Volume reduction and waste reduction approach for pollution control, concept of end of pipe and cleaner technology.
Combine effluent treatment plants, combined domestic and industrial wastewater treatment plants.
Acclimatization of bio mass for industrial wastewater treatment, addition of nutrients.
Case studies of various industries including textile industry, distilleries, sugar industry, paper and pulp mills, oil and petroleum, dairy, food processing industries.

Books:-

1. Liquid waste of industry- theory practice and treatment: Nelson J Nemerow
2. Industrial water pollution control: W W Eekenfelder
3. Industrial wastewater management by R Mahajan TMC publication
4. Manual of Industrial wastewater by NEERI

Term work:

Five assignments based upon above syllabus. The assignments shall include following topics:

a. Characteristics of wastewater of major industries in India.
b. Pollution impact of major industries on wet land and soil.
c. Integrated water and wastewater management of major industries.
d. Typical problems with wastewater treatment of major industries.
e. Advance treatment methodology for major industrial wastewaters.

In addition to above, students should visit to at least three industrial wastewater treatment plants and submit a report.

4. WATERSHED MANAGEMENT

Lectures – 03 Hours / Week	Theory 100 marks
Tutorial - 01Hours/week	min passing 40 marks
term work 50 marks	Duration - 03Hours

Introduction: scope, objectives significance.

Water in the atmosphere: global distribution and availability of water, precipitation and evaporation, factors affecting them.

Hydrology and water resources development: analysis of runoff and rain fall, storage and regulation of run off, safe yield of streams, estimation of storage requirements. Pollution monitoring in watershed and its control, watershed hygiene.

Hydrology of ground water: common aquifers, exploration of ground water, hydraulics of ground water, measurement of permeability. Design construction and maintenance of wells and infiltration galleries. Salt water infiltration and prevention, ground water recharge.

Watershed development and management: definitions, need, scope, characteristics of watershed criteria survey, basic data collection and interpretation, establishment of watershed resource evaluation and management. Urban watershed management strategy and its necessity in present time. Town planning aspect for watershed management.

Irrigation technology: integrated farming system, prospects of watershed management, methodology for modifying water resource environment, watershed management and large scale changes.

Practice of watershed management: rehabilitation, protection and enhancement.

Rain water harvesting: necessity, methods of rainwater harvesting, community participation, role of NGOs, municipal corporation, Government. Limitations. Quality assurance of storage water. Traditional water harvesting techniques and their relevance.

Design of structures for watershed management including small bandhara, percolation tanks, minor dam.

Term work: Seven assignments based upon above-mentioned syllabus. Site visit to an existing rainwater harvesting site. The assignments should be based upon following topics:

a. Water in the atmosphere
b. Hydrology and water resources development
c. Hydrology of ground water
d. Watershed development and management
e. Irrigation technology
f. Practice of watershed management
g. Rain water harvesting
h. Design of structures for watershed management

In addition to above the candidate should do a case study or design of a watershed management scheme.

Books:

1. Watershed hydrology: Peter E Black.
2. Water resources systems: planning and management: R N Chaturvedi.
3. Watershed Management strategy by S P Shah TM C publication.

ME Civil Engineering (Environmental Engineering)

ELLECTIVE II

1 DESIGN OF WATER SUPPLY AND WASTEWATER STRUCTURES.

Lectures – 03 Hours / Week	Theory 100 marks
Tutorial - 01Hours/week	min passing 40 marks
term work 50 marks	Duration - 03Hours

Introduction to IS codes for practice for steel and concrete tanks and pipes.

Conduits: Stresses in pipes, strength of conduits, Design of concrete and steel pipe for internal and external loads. Anchor blocks.

Tanks: Design of various types of underground tanks, safety analysis, retaining wall and floor junction. Surface resting rectangular and circular tanks in R.C.C. and steel. Over head rectangular and circular tanks in R.C.C. and steel. Intze tanks. Steel and concrete staging.

Treatment Units: Design clarifiers, flocculators, filter house, Hopper bottom tanks. Digesters.

Books:

1. Design of steel structures:- S. Ramamurtham
2. Design of concrete structures: S Ramamrtham
3. Design of concrete structures: Syal and Goel

Term work:

1. Design and detailing with drawings of circular water tank on surface.
2. Design and detailing with drawings of rectangular water tank on surface.
3. Design and detailing with drawings of bracings for overhead water tank.
4. Design and detailing with drawings of Intze type water tank.
5. Design and detailing with drawings of rectangular water tank under ground.
6. Design and detailing with drawings of flocculation unit.
7. Design and detailing with drawings of filtration unit.

Any five assignments of above.

2 ENVIRONMENTAL IMPACT ASSESMENT

Lectures – 03 Hours / Week | Theory 100 marks
Tutorial - 01Hours/week | min passing 40 marks
term work 50 marks | Duration - 03Hours

Development and environment, need for environmental impact assessment, concept of EIA, elements of EIA, environmental attributes, nature of impacts- primary, secondary, tertiary, short term and long term, local and regional, reversible and irreversible impacts.

Overview of impacts- directly and indirectly measurable impacts with respect to air, noise, water, land, biological and socio economic environment.

Screening and scooping in EIA: terms of reference for conducting EIA, methodologies of EIA- check list, matrices, overlays, cost benefit analysis adaptive environment and management network.

Frame work of EIA: scope of EIA, base line data collection, prediction of impacts, evaluation of impacts, Battelle environmental evaluation system, environmental management plan, green belt development, environmental quality monitoring, budgetary provisions for implementing control measures.

Environmental appraisal of project, MOEF questionnaire for environmental clearance, elements of public participation and hearing, case study on EIA of industrial, mining, highway and water resources projects, critical environmental issues and formulation of strategies for EMP for this project.

Environmental legislation- basic concepts, critical issues, civil liabilities, various enactments and their provisions- water act (1974, 1978), forest conservation act (1980), air pollution control act (1981, 1988), water (cess) act 1977, environmental protection act 1986, public liability and insurance act.

Environmental audit- definition, concept of EA, types of environmental audits, benefits of EA, scope and objectives, environmental statement, procedural aspects of conducting EA pre-audit phase, onsite audit phase and post audit phase, water audit, energy audit, raw material audit and health & safety audit. Conservation of energy and water, waste minimization, economic benefits of EA.

Sustainable development and environmental management: concept of carrying capacity, assimilative and supportive capacity, carrying capacity based developmental planning process, regional EIA and preparation of regional EMP, , development of action plan for critical environmental areas, training needs in EM and Environmental Educational Programs. Environmental management in India.

Resource management: types of resources, terrestrial (soil) resource, mineral plants and animal (biotic) resources, marine fresh water, air and bio energy resources, resource utilization, renewable and non-renewable resources. Optimal use of resources. Depletion of resources, causes and effects.

Human resources: importance of socio economic studies in development projects.

Books:

1. Environmental Impact Assessment by Rau and Woofes.
2. Environmental Impact Assessment by W F Canter, TMC publication.
3. Hand books of pollution control act, central pollution control board, New Delhi.
4. The new environmental age by R K Sapra, S Bhardwaj, Ashish publication house New Delhi.

Term Work:

Five assignments based upon above syllabus. Assignments shall include following topics:

1. Development and environment
2. Overview of impacts
3. Frame work of EIA:
4. Environmental appraisal of project
5. Environmental legislation

In addition to this the candidate must do a minor project of EIA of any industry or any other development project.

3. SOLID WASTE AND MANAGEMENT

Lectures – 03 Hours / Week
Tutorial - 01Hours/week
term work 50 marks

Theory 100 marks
min passing 40 marks
Duration - 03Hours

General: Importance of solid waste, historical background. Over view of solid waste management

Generation of solid waste, quantity of solid waste, sampling of solid waste, characterization of solid waste, characteristics of solid waste, three phase diagram.

Storage systems, multi-bin storage system, levying on solid waste weight, climatic factors, cultural factors, removal of solid waste.

Transportation of solid waste, route optimization, numericals on route optimization and optimum number of transportation facility..

Recovery and reuse of solid waste, waste minimization. Numericals on chemical characteristics of SW.

Disposal methods of solid waste: land filling site selection, advantages and disadvantages of land filling, leachets control, fly and mosquito control at land fill side.

Composting of solid waste, Indore and Banglore methods, future of composting, limitations of composting method.

Vermicomposting: introduction and significance.

Incineration of solid waste: application, design of incinerator.

Dumping of solid waste in sea, grinding and dumping into sewers, hog feeding.

Hazardous wastes.

Socio economic and cultural aspects in solid waste management.

Management of thermal power plant waste, reuse of flyash, economic considerations.

Biomedical waste management, safety precautions, standards, disposal methods.

Term work: ten assignments based upon above syllabus. Visit to a solid waste site.

Books:-

1. Handbook of solid waste management:- Frank Kreith
2. Management of solid waste in developing countries:- Frank Flintoff
3. Solid waste management:- D. Joseph Hagerty, Joseph L.Pavoni

Laboratory Practice II

All assignments are compulsory

1. Assignment No I – Advanced Water Treatment Technology
2. Assignment No 2 – Advanced Waste Water treatment Technology
3. Assignment No 3 – Industrial water and waste water Management
4. Assignment No 4 – Water shed management
5. Assignment No 5- Elective II

Experiments (Minimum Three)

1. Estimation of Hardness
2. Estimation of Ammonia/Nitrogen
3. Estimation of Phosphate
4. Estimation of Heavy metal
5. Estimation of pesticide residue

North Maharashtra University

CIVIL ENGINEERING DEPARTMENT

MASTERS OF ENGINEERING

CIVIL ENGINEERING

(ENIVIRONMENT ENGINEERING)

With effect from Academic year 2010 -2011

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

M.E. COMPUTER SCIENCE & ENGINEERING 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" 6^{th} 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.	

M.E. COMPUTER SCIENCE & ENGINEERING 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.	

North Maharashtra University, Jalgaon

M. E. (Electrical Power System)

Examination Scheme & Structure with Effect from Year 2012-13

FIRST YEAR TERM – I

Sr. No.	Subject	Teaching Scheme per week		Examination Scheme				
		L	P	Paper Hrs.	Paper	TW	PR	OR
1	Power System Optimization Techniques	3	--	3	100	--	--	--
2	Microprocessor and Microcontroller	3	--	3	100	--	--	--
3	Power System Planning & Reliability	3	--	3	100	--	--	--
4	Power System Dynamics	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. FACTs & Power Quality
2. Artificial Intelligence and its Applications in Power Systems
3. Renewable Energy Sources
4. Power Sector Economics, Management and Restructuring

FIRST YEAR TERM – II

Sr. No.	Subject	Teaching Scheme per week		Examination Scheme				
		L	P	Paper Hrs.	Paper	TW	PR	OR
1	Computer Methods Power System Analysis	3	--	3	100	--	--	--
2	Digital Signal Processing	3	--	3	100	--	--	--
3	Power System Modeling & Control	3	--	3	100	--	--	--
4	High Voltage Power Transmission	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. Advanced Power System Protection
2. Power Electronics Applications in Power Systems
3. EHV Transmission Systems
4. Power System Design

North Maharashtra University, Jalgaon

M. E. (Electrical Power System)

Examination Scheme & Structure with Effect from Year 2012-13

SECOND YEAR TERM – I

Sr. No.	Subject	Teaching Scheme per week		Examination Scheme				
		L	P	Paper Hrs.	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 Hrs.	Paper	TW	PR	OR
1	Progress Seminar	--	--	--	--	50	--	--
2	Project Stage – II	--	18	--	--	150	--	100
	Total	**--**	**18**	**--**	**--**	**200**	**--**	**100**
	Grand Total	**18**		**300**				

SEMESTER-I

1. Power System Optimization Techniques

Teaching Scheme:
Lectures: 3 Hrs. /Week

Examination Scheme:
Theory Paper: 100 Marks
Duration: 3 hours

1) Introduction to optimization and classical optimization techniques, Linear Programming: Standard form, geometry of LPP, Simplex Method P.F. solving LPP, revised simplex method, duality, decomposition principle, and transportation problem.

2) Non-Linear Programming (NLP): One dimensional methods, Elimination methods, Interpolation methods Unconstrained optimization techniques-Direct search and Descent methods, constrained optimization techniques, direct and indirect methods.

3) Dynamic Programming: Multistage decision processes, concept of sub-optimization and principle of optimality, conversion of final value problem into an initial value problem. CPM and PERT

4) Genetic Algorithm: Introduction to genetic Algorithm, working principle, coding of variables, fitness function. GA operators; Similarities and differences between GAs and traditional methods; Unconstrained and constrained optimization.

5) Applications to Power system: Economic Load Dispatch in thermal and Hudro-thermal system using GA and classical optimization techniques, Unit commitment problem, reactive power optimization. Optimal power flow, LPP and NLP techniques to optimal flow problems.

Reference books:

a. “Optimization - Theory and Applications”, By S.S.Rao, Wiley-Eastern Limited
b. “Introduction of Linear and Non-Linear Programming”, By David G. Luenberger, Wesley Publishing Company
c. “Computational methods in Optimization “,By Polak, Academic Press
d. “Optimization Theory with Applications” By Pierre D.A., Wiley Publications
e. “Operations Research” By D. S. Hira & P. K. Gupta , S Chand Publications

2. Microprocessor and Microcontroller

Teaching Scheme:	***Examination Scheme:***
Lectures: 3 Hrs. /Week	*Theory Paper: 100 Marks*
	Duration: 3 hours

1) Overview of 8086 : Architecture, instruction including I/O instructions, Addressing modes, interrupt structure, ISR minimum and maximum mode, Assembly Language Programmes on 16-bit multiplication, 16-bit by 8-bit division, bubble sort, palindrome. **Hardware and Software debugging aids**: 1 Pass and 2 Pass assemblers, cross assemblers, circuit emulators, simulators, linkers, loaders, compiler, cross compiler, Types of interfacing devices-→Latches(74373), Buffers(74244/245).

2) **8051 Architecture**: 8051 Microcontroller Hardware, Input/output. Pins, ports, and circuits, External Memory, Counter and Timers, Serial Data input/ output, Interrupts **Assembly language programming concepts :** The mechanics of programming, The assembly language programming process, PAL instructions, Programming tools and techniques, Programming the 8051 **Moving Data :** Addressing modes, external data moves, code memory read only data moves, push and pop -op codes, data exchanges

3) **Logical Operations :** Byte level logical operations, bit level logical operations, rotate and swap operations **Arithmetic Operations :** Flags, incrementing and decrementing, addition, subtraction, multiplication and division, decimal arithmetic **Jumps and Call Instructions :** The jump and call program range, jumps, calls and subroutines, interrupts and returns

4) **8051 Microcontroller Design :** Microcontroller specification, microcontroller design, testing the design, timing subroutines, look up tables for the 8051, serial data transmission

5) **Applications:** Keyboard, displays→LED & LCD, pulse measurement, D/A and A/D conversion, multiple interrupts **Serial Data Communication:** Network Configuration, 8051 Data Communication.

Reference books:

a. "The 8051 Micro Controller : Architecture, Programming," By Kenneth J.Ayala, Penram International, Mumbai.
b. Intel Embeded Micro Controller Data Book, Intel Corporation.
c. "Microprocessor and Digital Systems" By D.V.Hall, ELBS Publication, London.
d. "Advance Microprocessors and Micro Controllers" By B.P.Singh,, New Age International, New Delhi.
e. "Microprocessors and Interfacing" By D.V.Hall, Tata McGraw Hill Publication, New Delhi.
f. "Microcomputer Systems: the 8086/8088 Family, Architecture, Programming and Design" By Y.C.Liu, Gibson, Prentice Hall of India Publications, New Delhi.
g. "Introduction to Microprocessor, Software, Hardware and Programming" By Lance A. Leventhal,
h. "Microprocessor Architecture, Programming and Applications with the 8085" By Ramesh S.Gaonkar, Penram International, Mumbai.
i. "8051 microcontroller and embedded system" By Muhammad Ali Mazidi, Janice Mazidi, Rollin McKinlay, Pearson Second Edition

3. Power System Planning & Reliability

Teaching Scheme:
Lectures: 3 Hrs. /Week

Examination Scheme:
Theory Paper: 100 Marks
Duration: 3 hours

1) **Load Forecasting :** Introduction, Factors affecting Load Forecasting, Load Research, Load Growth Characteristics, Classification of Load and Its Characteristics, Load Forecasting Methods - (i) Extrapolation (ii) Co-Relation Techniques, Energy Forecasting, Peak Load Forecasting, Reactive Load Forecasting, Non-Weather sensitive load Forecasting, Weather sensitive load Forecasting, Annual Forecasting, Monthly Forecasting, Total Forecasting.

2) **System Planning :** Introduction, Objectives & Factors affecting to System Planning , Short Term Planning, Medium Term Planning, Long Term Planning, Reactive Power Planning.
   Reliability : Reliability, Failure, Concepts of Probability, Evaluation Techniques (i) Markov Process (ii) Recursive Technique, Stochastic Prediction of Frequency and Duration of Long & Short Interruption, Adequacy of Reliability, Reliability Cost.

3) **Generation Planning and Reliability :** Objectives & Factors affecting Generation Planning, Generation Sources, Integrated Resource Planning, Generation System Model, Loss of Load (Calculation and Approaches), Outage Rate, Capacity Expansion, Scheduled Outage, Loss of Energy, Evaluation Methods. Interconnected System, Factors Affecting Interconnection under Emergency Assistance.

4) **Transmission Planning and Reliability:** Introduction, Objectives of Transmission Planning, Network Reconfiguration, System and Load Point Indices, Data required for Composite System Reliability.

5) **Distribution Planning and Reliability:** Radial Networks – Introduction, Network Reconfiguration, Evaluation Techniques, Interruption Indices, Effects of Lateral Distribution Protection, Effects of Disconnects, Effects of Protection Failure, Effects of Transferring Loads, Distribution Reliability Indices. Parallel & Meshed Networks - Introduction, Basic Evaluation Techniques, Bus Bar Failure, Scheduled Maintenance, Temporary and Transient Failure, Weather Effects, Breaker Failure

Reference Books :

a. “Modern Power System Planning” By X. Wang & J.R. McDonald, McGraw Hill
b. “Electrical Power Distribution Engineering” By T. Gönen, McGraw Hill Book Company
c. “Generation of Electrical Energy” By B.R. Gupta, S. Chand Publications
d. “Electrical Power Distribution” By A.S. Pabla, Tata McGraw Hill Publishing Company Ltd.
e. “Electricity Economics & Planning” By T.W.Berrie, Peter Peregrinus Ltd., London.
f. “Power System Planning” By R.N. Sulivan , McGraw Hill

4. ***Power System Dynamics***

Teaching Scheme:
Lectures: 3 Hrs. /Week

Examination Scheme:
Theory Paper: 100 Marks
Duration: 3 hours

1) Requirement of reliable power system, Basic concepts of stability, Reliable electrical power service, Stability of Synchronous machines, Tie line oscillations, Method of simulation.

2) Synchronous Machines: Review of synchronous machine equations, parameters, Equations in a-b-c phase co-ordinates and Park's co-ordinates, Representation of external system, Low and High order state models, Choice of state variables. Initial state equivalent circuit, Phasor diagram p.u. reactance. 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, Pre calculated Swing curves and their use.

3) 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.

4) 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 with delay Distribution of power impacts.

5) Effect of Excitation on Stability: Effect of excitation on generator power limits, transients 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.

Reference Books :

a. "Synchronous Machines" By C.Concordia, John Wiley & Sons.
b. "Power System Stability" By E.W.Kimbark, Dover Publication, Vol.-3
c. "Power System Control & Stability" By Anderson, Galgotia Publ.
d. "Power System Stability" By S.B. Crary, John Wiley & Sons.
e. "Modern Power System Analysis" By Nagrath I. J. & Kothari D. P.,Tata McGraw Hill Publication New Delhi

ELECTIVE-I

i. __FACTs & Power Quality__

Teaching Scheme:
Lectures: 3 Hrs. /Week

Examination Scheme:
Theory Paper: 100 Marks
Duration: 3 hours

1) Steady state and dynamic problems in AC systems, Flexible AC transmission systems (FACTS), principles of series shunt compensation.

2) Description of static var compensation (SVC), thyristor controlled series compensation (TCSC) static phase shitters (SPS), static condenser (STATCON), static synchronous series compensator (SSSC) and unified power flow controller (UPFC), modeling and analysis of FACTS controllers, control strategies to improve system stability.

3) Power quality problems in distribution systems, Harmonics, Harmonics creating loads, modeling.

4) Harmonic propagation, series and parallel resonance, harmonic power flow, mitigation of harmonics, filters, passive filters, active filters, shunt and series hybrid filters, voltage sag and swells.

5) Voltage flicker, mitigation of power quality problems using power electronics conditioners, IEEE standards.

__Reference Books :__

a. "Understanding FACTS" By Hingorani & Gyugui, IEEE press.
b. "FACTS Controllers in Transmission & Distribution" By K. R. Padiyar. New Age Publication.
c. "Power Quality" By G.T.Heydt , Stars in a Circle Publication, Indiana, 1991.
d. "Static Reactive Power Compensation" By E.J.E.Miller John Wiley & Sons, New York, 1982.
e. Recent Publications on Power Systems and Power Delivery.

ii. Artificial Intelligence and its Applications in Power Systems

Teaching Scheme:	***Examination Scheme:***
Lectures: 3 Hrs. /Week	*Theory Paper: 100 Marks*
	Duration: 3 hours

1) **Introduction to Artificial Intelligence:** Introduction, Fuzzy systems, Artificial Neural Network (ANN), Expert Systems, Genetic Algorithm, Evolutionary Programming. Biological neurons: Function of single biological neuron, function of artificial neuron, Basic terminology related to artificial neuron. Characteristics of ANN, Typical applications of ANN such as classification, pattern recognition, forecasting Properties, strength of NN.

2) **Different Architectures of ANN and Learning Processes :** Different architectures of Neural Network, types of activation function, concept of Learning with a Teacher, Learning without a Teacher, Learning Tasks (Any two learning methods and applications)

3) **Single Layer Network and Multi-layer Network :** Single Layer Perception: architecture – training algorithm, Least – Mean square algorithm, learning curves, Learning Rate, Annealing techniques. Feed forward Neural Network(MLP) , Back propagation algorithm. Limitation of Back propagation algorithm. Concept of learning rate, momentum coefficient, Generalization capacity

4) **Fuzzy Mathematics :** Basic concept of Fuzzy Logic, Fuzzy set – Basic definition – Mambership function, Operations of fuzzy sets.

5) **Fuzzy Theory :** Fuzzy relations - Fuzzy graphs - Fuzzy analysis – Propositional logic, predictive logic, Fuzzy set theory.
   AI Applications in Power Systems : Application of ANN and Fuzzy logic in Power System Planning, Operation and control – load forecasting, Unit Commitment, Load Dispatch and Protection.

Reference Books:

a. "Neural Networks, Fuzzy Logic & Genetic Algorithms Synthesis & Applications" By S. Rajsekaram, G. A. Vijayalaxmi Pai, Practice Hall India
b. "Introduction to Neural Network Using MATLAB 6.0" By S. N. Sivanandam, S. Sumathi, S. N. Deepa, , Tata McGraw Hill
c. "'Fuzzy Sets, Uncertainty and Information" By George Klir & Tina. A. Folger, Prentice Hall of India Pvt. Ltd
d. "Artificial Intelligence" By G. F. Luger and W. A. Stubblefield, Redwood City, CA: Benjamin Cummings, 1993.
e. "Fundamentals of Artificial Neural Network" By Mohamed H. Hassoun, Practice Hall India.
f. "Introduction to Artificial Intelligence" By Eugene Charniat, Drew McDermott, Pearson Education.
g. "An Introduction to Neural Networks" By James A. Anderson, Practice Hall India Publication.

iii. Renewable Energy Sources

Teaching Scheme: | ***Examination Scheme:***
Lectures: 3 Hrs. /Week | *Theory Paper: 100 Marks*
Duration: 3 hours

1) **Energy Scenario:** Classification of Energy Sources, Energy resources (Conventional and nonconventional), Energy needs of India, and energy consumption patterns. Worldwide Potentials of these sources. Energy efficiency and energy security. Energy and its environmental impacts. Global environmental concern, Kyoto Protocol, Concept of Clean Development Mechanism (CDM) and Prototype Carbon Funds (PCF). Factors favoring and against renewable energy sources.

2) **Solar Energy:** Solar thermal Systems: Types of collectors, Collection systems, efficiency calculations, applications. Photo voltaic (PV) technology: Present status, - solar cells , cell technologies, characteristics of PV systems, equivalent circuit, array design , building integrated PV system, its components , sizing and economics. Peak power operation. Standalone and grid interactive systems.

3) **Wind Energy:** Wind Energy : wind speed and power relation, power extracted from wind, wind distribution and wind speed predictions. Wind power systems: system components, Types of Turbine, Turbine rating Choice of generators, turbine rating, electrical load matching, Variable speed operation, maximum power operation, control systems, system design features, stand alone and grid connected operation.

4) **Other energy sources:** Biomass – various resources, energy contents, technological advancements, conversion of biomass in other form of energy – solid, liquid and gases. Gasifires Biomass fired boilers, Co firing, Generation from municipal solid waste, Issues in harnessing these sources. Hydro energy – feasibility of small, mini and micro hydel plants scheme layout economics. Tidal and wave energy, Geothermal and Ocean-thermal energy conversion (OTEC) systems – schemes, feasibility and viability.

5) **Energy storage and hybrid system configurations:** Energy storage: Battery – types, equivalent circuit, performance characteristics, battery design, charging and charge regulators. Battery management. Fly wheel energy relations, components, benefits over battery. Fuel Cell energy storage systems. Ultra Capacitors.
Grid Integration : Stand alone systems, Hybrid systems – hybrid with diesel, with fuel cell, solar wind, wind –hydro systems, mode controller, load sharing, system sizing. Hybrid system economics. Grid integration with the system: Interface requirements, Stable operation, Transient-safety, Operating limits of voltage, frequency, stability margin, energy storage, and load scheduling. Effect on power quality - harmonic distortion, voltage transients and sags.

Reference Books :

a. “Wind and solar systems” By Mukund Patel, CRC Press.
b. “Solar Photovoltaics for terrestrials” By Tapan Bhattacharya.
c. “Wind Energy Technology” By Njenkins, John Wiley & Sons,
d. “Non Conventional Energy Resources” by D.S. Chauhan and S.K.Srivastava,.
e. “Solar Energy” By S.P. Sukhatme, Tata McGraw Hill.
f. “Solar Energy” By S. Bandopadhay, Universal Publishing.

iv. Power Sector Economics, Management and Restructuring

Teaching Scheme:
Lectures: 3 Hrs. /Week

Examination Scheme:
Theory Paper: 100 Marks
Duration: 3 hours

1) **Power Sector in India**
   Introduction to various institutions in Indian Power sector such as CEA, Planning Commissions, PFC, Ministry of Power, state and central governments, REC, utilities and their roles. Critical issues / challenges before the Indian power sector, Salient features of Electricity act 2003, Various national policies and guidelines under this act.
2) **Power sector economics and regulation**
   Typical cost components and cost structure of the power sector, Different methods of comparing investment options, Concept of life cycle cost , annual rate of return , methods of calculations of Internal Rate of Return(IRR) and Net Present Value(NPV) of project, Short term and long term marginal costs, Different financing options for the power sector. Different stakeholders in the power sector, Role of regulation and evolution of regulatory commission in India, types and methods of economic regulation, regulatory process in India.
3) **Power Tariff**
   Different tariff principles (marginal cost, cost to serve, average cost), Consumer tariff structures and considerations, different consumer categories, telescopic tariff, fixed and variable charges, time of day, interruptible tariff, different tariff based penalties and incentives etc., Subsidy and cross subsidy, life line tariff, Comparison of different tariff structures for different load patterns. Government policies in force from time to time. Effect of renewable energy and captive power generation on tariff. Determination of tariff for renewable energy.
4) **Power sector restructuring and market reform**
   Different industry structures and ownership and management models for generation, transmission and distribution. Competition in the electricity sector- conditions, barriers, different types, benefits and challenges Latest reforms and amendments. Different market and trading models / arrangements, open access, key market entities- ISO, Genco, Transco, Disco, Retailco, Power market types, Energy market, Ancillary service market, transmission market, Forward and real time markets, market power.
5) **Electricity Markets Pricing and Non-price issues**
   Electricity price basics, Market Clearing price (MCP), Zonal and locational MCPs. Dynamic, spot pricing and real time pricing, Dispatch based pricing, Power flows and prices. Optimal power flow Spot prices for real and reactive power. Unconstrained real spot prices, constrains and real spot prices. Non price issues in electricity restructuring (quality of supply and service, standards of performance by utility, environmental and social considerations) Global experience with electricity reforms in different countries.

Reference Books :

a. “Know Your Power”, A citizens Primer On the Electricity Sector, Prayas Energy Group, Pune
b. Sally Hunt, “Making Competition Work in Electricity”, 2002, John Wiley Inc
c. Electric Utility Planning and Regulation, Edward Kahn, American Council for Energy Efficient Economy

LABORATORY PRACTICE-I

Teaching Scheme:	***Examination Scheme:***
Practical: 6 Hrs. /Week	*Term Work: 100 Marks*
	Oral: 50 Marks

Term work shall consist of record of minimum eight experiments using Engineering Computation Software such as MATLAB, SCILAB, PSCAD, ETAP, with moderate to high complexity /assignments based on syllabus of subjects from Semester-I

SEMINAR-I

Teaching Scheme: ***Examination Scheme:***
Practical: 4 Hrs. /Week *Term Work: 100 Marks*

Each student is required to deliver a seminar in first semester on the topic of his/her own choice. The topic of the seminar should be out of the syllabus and relevant to the latest trends in Electrical Power Systems.

The topic will be decided by the student, Guide and Head of department. Each student will make seminar presentation with audio/video aids, for the duration of 45 minutes and seminar work shall be in format of report to be submitted by the student at the end of semester.

The report copies must be duly signed by Guide and Head of department. (One copy for institute, one copy for guide and one copy for candidates for certification). The student is expected to submit the seminar report in standard format. Attendance of all students for all seminars is compulsory.

SEMESTER-II

1. ***COMPUTER METHODS IN POWER SYSTEM ANALYSIS***

Teaching Scheme:	***Examination Scheme:***
Lectures: 3 Hrs. /Week	*Theory Paper: 100 Marks*
	Duration: 3 hours

1) Representation of power systems for computerized analysis: Mathematical models of synchronous generator for steady state and transient analysis, Transformer with tap changer, transmission line, phase shifter and loads.

2) Topology of Electric Power System-Network Graphs, Incidence matrices, fundamental loop and cutset matrices, primitive impedance and admittance matrices, equilibrium equations of networks. Singular and nonsingular transformation of network matrices.

3) 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. Three phase network elements-transformation matrix - incidence and network matrices for three phase network. Algorithm for formulation of three - phase bus impedance matrix.

4) Short Circuit Studies: Three phase network, Symmetrical components. Thevenin's theorem and short circuit analysis of multi node power systems using bus impedance matrix. Short circuit calculations for balanced and unbalanced short circuits bus impedance and loop impedance matrices, Stability studies- Solution of state equation by modified Eular method and solution of network equations by Gauss-Seidal interactive method

5) Load flow studies : Slack bus, load 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. Multi area power flow analysis with the line control.

Reference Books :

a. "Computer Methods in Power System Analysis" By G.W. Stagg, A.H.Elabiad, McGraw Hill Book Co.
b. "Computer Techniques in Power System Analysis" By M.A. Pai, Tata McGraw Hill Publication.
c. "Electric Energy System Theory" By O.I.Elgard, Tata McGraw Hill Publication.
d. "Computer Aided Power System Operation and Analysis" By R.N.Dhar, Tata McGraw Hill Publication.
e. "Modern Power System Analysis" By I.J.Nagrath, D.E.Kothar, Tata McGraw Hill, New Delhi.

2. ***Digital Signal Processing***

Teaching Scheme:
Lectures: 3 Hrs. /Week

Examination Scheme:
Theory Paper: 100 Marks
Duration: 3 hours

1) Characterization & Classification of Digital Signals. Digital Signal Processing of continuous signals. Discrete time signals - sequences, representation of signals on orthogonal basis, sampling, aliasing, quantization & reconstruction of signals.

2) Discrete systems-attributes, z-transform, analysis of LTI system. Frequency analysis, inverse systems, Discrete Fourier transforms, Fast Fourier implementation of discrete time system.

3) Digital filters - structures, sampling, recursive, non-recursive A to D & D to A conversion. FIR, IIR & lattice filter structures, Design of FIR digital filters. Window method, Park-McCellan's method. Design of IIR digital filters. Butterworth, Chebyshev.

4) Elliptic approximations, low-pass, band-pass, band-stop & high-pass filters. Effect of finite register length in FIR filter design. Multirate signal processing-motivation-application, decimation & interpolation, sample rate conversion, polyphase implementation of sampling rate conversion, Filter bank theory-DFT filter banks, Adaptive filtering theory.

5) DSP Processors and Applications - DSP Microprocessor architectures, fixed point, floating point precision, algorithm design, mathematical, structural and numerical constraints, DSP programming, filtering, data conversion; communication applications. Real time processing considerations including interrupts.

Reference Books :

a. "Digital Signal Processing Principles, Algorithm and Applications" By J.G.Proakis and D.G.Manolakis '' Prentice Hall 1997
b. "Discrete Time Signal Processing" By A.V.Oppenheim, R.W.Schafer, John Wiley.
c. "Introduction to Digital Signal Processing" By J.R. Johnson,Prentice Hall 1992
d. "Digital Signal Processing" By D.J.Defatta, J.G.Dulas. Hodgekiss, J. Wiley and Sons Singapore, 1988
e. "Theory & Applications of Digital Signal Processing" By L.R.Rabiner & B. Gold , Prentice Hall, 1992
f. "Digital Signal Processing:A Practical Approch" By Emmanuel Ifeachor, Prof. Barrie Jervis, Prentice Hall

3. Power System Modeling & Control

Teaching Scheme:
Lectures: 3 Hrs. /Week

Examination Scheme:
Theory Paper: 100 Marks
Duration: 3 hours

1) Transient response and concept of stability in Electrical Power System. Modelling of Power System. Control of voltage, frequency and tie-line power flows, Q-V and P-f control loops, mechanism of real and reactive power control.

2) Mathematical model of speed governing system. Turbine governor as affecting the power system dynamics. Transient and steady state response in the interconnected power systems. Excitation systems. Transformation model of exciter system. Analysis using block diagrams.

3) Power systems stabilizers. Dynamic stability (small disturbances), effect of excitation control and turbine dynamics, characteristic equation, method of analysis of the stability of power system. Multi machine systems, Flux decay effects. Multi machine systems with constant impedance loads, matrix representation of a passive network in the transient state, converting to a common reference frame. Converting machine co-ordinates to system reference, relation between machine current and voltages, system order, machine represented by classical methods.

4) Net interchange tie-line bias control. Optimal, sub-optimal and decentralized controllers. Discrete mode AGC. Time - error and inadvertent interchange correction techniques. On-line computer control. Distributed digital control.

5) Data acquisition systems. Emergency control, preventive control, system, System wide optimization, SCADA. Self excited electro-mechanical oscillations in power system and the means for control.

Reference Books :

a. “Transient Processes in Electrical Power System” By V.Venlkov ,Mir Publication, Moscow.
b. “Electric Energy Systems Theory” By Olle I.Elgard , Tata McGraw Hill Pub. Co., New Delhi.
c. “Power System Control and Stability” By Anderson P.M. & Foaud A.A., Galgotia Pub.
d. “Modern Power System Analysis” By Nagrath I.J., Kothari D.P. , Tata McGraw Hill Pub. Co., New Delhi.

4. ***High Voltage Power Transmission***

Teaching Scheme:
Lectures: 3 Hrs. /Week

Examination Scheme:
Theory Paper: 100 Marks
Duration: 3 hours

HIGH VOLTAGE AC TRANSMISSION

1) **Engineering Aspects of EHV AC Transmission System:** Principles, configuration, special features of high voltage AC lines, power transfer ability, reactive power compensation, audible noise, corona bundle conductors, electric field, right of way, clearances in a tower, phase to phase, phase to ground, phase to tower, factors to be considered, location of ground wire, angle of protection, tower configuration. Principles of radio interference, origin of radio interference, method of propagation, factors to be considered in line design.

2) **Power System Transients:** Introduction, circuit closing transients, sudden symmetrical short circuit of alternator, recovery transients due to removal of short circuit, traveling waves on transmission lines, wave equation, surge impedance and wave velocity, specifications of traveling waves, reflection and refraction of waves, typical cases of line terminations , equivalent circuit for traveling wave studies, forked lines, reactive termination, successive reflections, Bewley lattice diagram, attenuation and distortion, arcing grounds, capacitance switching, current chopping, lightning phenomenon, over voltages due to lightning, line design based on direct strokes, protection of systems against surges, statistical aspects of insulation co-ordination.

HIGH VOLTAGE DC TRANSMISSION

3) **General Background :** EHV AC versus HVDC Transmission, power flow through HVDC link, equation for HVDC power flow, effect of delay angle and angle of advance, bridge connections, waveform of six pulse and twelve pulse bridge converter, commutation, phase control, angle of extinction, control of DC voltage, connections of three phase six pulse and twelve pulse converter bridges, voltage and current waveforms.

4) Bipolar HVDC terminal, converter transformer connections, switching arrangements in DC yard for earth return to metallic return, HVDC switching system, switching arrangements in a bipolar HVDC terminal, sequence of switching operations, HVDC circuit breakers, DC current interruption, commutation principle, probable types and applications of HVDC circuit breakers, multi-terminal HVDC systems, parallel tapping, reversal of power, configurations and types of multi-terminal HVDC systems, commercial multi terminal systems.

5) Faults and abnormal condition in bipolar, two terminal HVDC system, pole-wise segregation, protective zones, clearing of DC line faults and reenergizing, protection .of converters, transformer, converter valves, DC yards, integration of protection and controls, hierarchical levels of control, block diagram, schematic diagram, current control, power control, DC voltage control, commutation channel, master control, station control, lead station, trail station, pole control, equidistant firing control, synchronous HVDC link, asynchronous HVDC Link.

<u>Reference Books:</u>

a. “An Introduction to High Voltage Engineering” By Subir Ray, Prentice Hall of India Private Limited, New Delhi – 110 001.
b. “HVDC Transmission” By Adamson C., Hingorani N.G., IEEE Press
c. “Power Transmission” By DC Uhimann E.
d. “HVAC and HVDC Transmission, Engineering and practice” By S. Rao, Khanna Publisher, Delhi.
e. “Electric Power Systems” By B.M. Weddy and B.J.Cory, John Wiely and Sons, Fourth edition (2002)
f. “Power System Analysis and Design” By J.Duncan Glover, Mulukutla S.Sarma, Thomson Brooks/cole /Third Edition (2003)
g. “Power System Analysis and Design” By B.R. Gupta, S.Chand and Company (2004)

ELECTIVE-II

i. Advanced Power System Protection

Teaching Scheme:
Lectures: 3 Hrs. /Week

Examination Scheme:
Theory Paper: 100 Marks
Duration: 3 hours

1) Review of principles of power system equipments protection, configuration of various solid state protection scheme, evolution of digital relays from electromechanical relays,

2) performance & operational characteristics of digital protection, Basic elements of digital filtering, analog multiplexers, conversions of system: the sampling theorem, signal aliasing error, sample & hold circuit, multiplexers, analog to digital conversion, digital filtering concepts, A digital relay. Hardware & Software.

3) Mathematical background to protectional algorithm, first derivative (Mann & Morrison) algorithm, Fourier algorithm- full cycle window algorithm, fractional cycle window algorithm,

4) Walsh function based algorithm, least square based algorithm, differential equation based algorithm, travelling wave based technique.

5) Digital differential protection of transformer, digital line differential protection, recent advances in digital protection of power system.

Reference Books:

a. "Digital Protection for Power System" By A.T.Johns and S.K.Salman, Peter, Published by Peter Peregrinus Ltd. on behalf of the IEE, London, U.K.
b. "Power System Protection and Switchgear" By Badri Ram and D.N.Vishvakarma, Tata McGraw Hill, New Delhi.
c. "Transmission Network Protection" By Theory and Practice, Y.G.Paithankar, Marcel Dekker, New York, U.S.A.
d. "Fundamentals of Power System Protection" By Y.G.Paithankar and S.R. Bhide, Prentice Hall of India, New Delhi.

ii. Power Electronics Applications in Power Systems

Teaching Scheme:	***Examination Scheme:***
Lectures: 3 Hrs. /Week	*Theory Paper: 100 Marks*
	Duration: 3 hours

1) **Power Electronic Controllers**: Basics, challenges and needs, static power converter structures, AC controller based structures, D.C. link converter topologies, converter output and harmonic control, power converter control issues.

2) **Shunt Compensation**: SVC and STATCOM: Operation and control of SVC, STATCOM configuration, control & applications.
Series Compensation: Principle of operation, application of TCSC for damping of electromechanical oscillations, application of TCSC for mitigation of sub-synchronous resonance, TCSC layout and protection, static synchronous series compensator (SSSC).

3) **Unified Power Flow Controller:** Steady state operation, control and characteristics, introduction to transient performance, power flow studies in UPFC embedded systems, Operational constraints on UPFC.

4) **Other FACTS Controllers:** Circuit, model and operating features of Dynamic Voltage Regulator(DVR), Thyristor Controlled Braking Resistors (TCBR), Thyristor Controlled Phase Angle Regulator(TCPAR), comparison of all FACTS controllers.

5) **Control Strategies and co-ordination :** Conventional control, Hysterisis control, Artificial Neural Network, fuzzy logic controls, comparison between different control schemes, co-ordination between different FACTS controllers.

Reference Books:

a. "Flexible A.C. Transmission Systems (FACTS)" By Yong Hua Song and Johns (IEE Power and Energy Series 30)
b. "Thyristor based FACTS controllers" By Mathur & Verma (IEEE Press, New York)
c. "Sub-synchronous Resonance" By K.R. Padiyar, B.S. Publications, Hyderabad.
d. "FACT's Controllers in Transmission & Distribution" by K.R. Padiyar New Age Publishers ,Delhi, May 2007

iii. EHV Transmission Systems

Teaching Scheme:
Lectures: 3 Hrs. /Week

Examination Scheme:
Theory Paper: 100 Marks
Duration: 3 hours

1) Basic Aspects of A.C. Power Transmission, Power-Handling Capacity and Line Loss, Surface Voltage Gradient on 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 of Traveling Waves. Transient Response of Systems with Series and Shunt Lumped Parameters. Principles of Traveling-Wave Protection

2) Lightning & Lightning Protection, Insulation Coordination Based on Lightning

3) Over Voltages in EHV Systems Caused by Switching Operations, Origin of Over Voltages and their Types, Over Voltages Caused by Interruption of Inductive and Capacitive Currents, Ferro-Resonance Over Voltages, Calculation of Switching Surges, Power Frequency Voltage Control and Over Voltages, Power Circle Diagram.

4) Reactive Power Flow and Voltage Stability in Power Systems. Steady - State Static Real Power and Reactive Power Stability, Transient Stability, Dynamic Stability. Basic Principles of System Voltage Control. Effect of Transformer Tap Changing in the Post- Disturbance Period, Effect of Generator Excitation Adjustment, Voltage Collapse in EHV Lines, Reactive Power Requirement for Control of Voltage in Long Lines. Voltage Stability.

5) Power Transfer at Voltage Stability Limit of EHV Lines, Magnitude of Receiving End Voltage at Voltage Stability Limit. Magnitude of Receiving End Voltage During Maximum Power Transfer. Magnitude of Maximum Power Angle at Voltage Stability Limit. Optimal Reactive Power at Voltage Stability Limit.

Reference Books:

a. "Performance, operation & control of EHV power transmission system" A. Chakrabarti, D.P. Kothari, A.K. Mukhopadhyay, wheeler publications
b. "Extra high-voltage A.C. transmission Engineering" By Rakash Das Begamudre, New Age International Pvt. Ltd.
c. "EHVAC & HVDC Transmission Engineering & Practice" By S. Rao, Khanna Publications

iv. Power System Design

Teaching Scheme:
Lectures: 3 Hrs. /Week

Examination Scheme:
Theory Paper: 100 Marks
Duration: 3 hours

1) Power System Components, Location of Main Generating Stations and Substations, Interconnections, Load Dispatch Centers

2) Design of Transmission Lines, Selection of Voltage, Conductor Size, Span, Number of Circuits, Conductor Configurations, Insulation Design, Mechanical Design of Transmission Line, Towers, Sag- Tension Calculations

3) Design of EHV Transmission Line Based Upon Steady State Limits and Transient Over Voltage, Design Factors Under Steady States, Design of 400kV, 1000MW Medium and Long Transmission Line Without and with Series Capacitance Compensation and Shunt Reactors at Both Ends, 750KVLong Transmission Line with Only Shunt Reactors. Extra High Voltage Cable Transmission, Design Basis of Cable Insulation, Search Performance of Cable Systems, Laying of Power Cables

4) Vigorous Solution of Long Transmission Line, Interpretation of Long Line Equations, Ferranti Effect, Tuned Power Lines, Equivalent Circuit of Long Line, Power Flow Thorough Transmission Line and Methods of Voltage Control

5) Power System Earthing, Earth Resistance, Tolerable and Actual Step and Touch Voltages, Design of Earthing Grid, Concrete Encased Electrodes, Tower Footing Resistance, Impulse Behavior of Earthing System

Reference Books:

a. “Electrical Power System Design” By M.V. Deshpande, Tata McGraw Hill
b. “Power System Analysis and Design” By B.R.Gupta, Wheeler Publishing co.
c. “Power System Engineering” By I.J.Nagrath & D. P. Kothari, Tata Mc Graw Hill
d. “Extra high-voltage A.C. transmission Engineering” By Rakosh Das Begamudre, New Age International Pvt. Ltd.
e. “EHV AC & HVDC Transmission Engineering & Protection” By S.S.Rao, Khanna Publishers

<u>LABORATORY PRACTICE-II</u>

Teaching Scheme:	***Examination Scheme:***
Practical: 6 Hrs. /Week	*Term Work: 100 Marks*
	Oral: 50 Marks

Term work shall consist of record of minimum eight experiments using Engineering Computation Software such as MATLAB, SCILAB, PSCAD, ETAP, with moderate to high complexity /assignments based on syllabus of subjects from Semester-II

SEMINAR-II

Teaching Scheme: ***Examination Scheme:***

Practical: 4 Hrs. /Week *Term Work: 100 Marks*

Each student is required to deliver a seminar in second semester on the topic of his/her own choice. The topic of the seminar should be out of the syllabus and relevant to the latest trends in Electrical Power Systems.

The topic will be decided by the student, Guide and Head of department. Each student will make seminar presentation with audio/video aids, for the duration of 45 minutes and seminar work shall be in format of report to be submitted by the student at the end of semester.

The report copies must be duly signed by Guide and Head of department. (One copy for institute, one copy for guide and one copy for candidates for certification). The student is expected to submit the seminar report in standard format. Attendance of all students for all seminars is compulsory.

SEMESTER-III

SEMINAR-III

Teaching Scheme:
Practical: 4 Hrs. /Week

Examination Scheme:
Term Work: 50 Marks
Oral: 50 Marks

Each student will select a topic in the area of electrical engineering, related to M. E. Project Stage-I.

The topic will be decided by the student, guide and Head of department. Each student will make seminar presentation with audio/video aids, for the duration of 45 minutes and seminar work shall be in format of report to be submitted by the students at the end of semester.

The report copies must be duly signed by guide and Head of department. (One copy for institute, one copy for guide and one copy for candidates for certification). The student is expected to submit the seminar report in standard format. Attendance of all students for all seminars is compulsory.

PROJECT STAGE-I

Teaching Scheme:
Practical: 18 Hrs. /Week

Examination Scheme:
Term Work: 100 Marks

Project Stage – I is the integral part of the dissertation project. The project should be based on the knowledge acquired by the student during the coursework and should contribute to the needs of the society.

The project aims to provide an opportunity of designing and preparing complete system or subsystems in an area where the student like to acquire specialized skills. The student should present the progress of the project. It will consist of problem statement, literature survey; project overview and scheme of implementation (block diagram, algorithm, program, PERT chart, etc.)

The term work should be continuously evaluated as per the norms/guidelines.

SEMESTER-IV

PROGRESS SEMINAR

Examination Scheme:
Term Work: 50 Marks

Each student will select a topic in the area of electrical engineering, related to M. E. Project Stage-II.

The topic will be decided by the student, guide and Head of department. Each student will make seminar presentation with audio/video aids, for the duration of 45 minutes and seminar work shall be in format of report to be submitted by the students at the end of semester.

The report copies must be duly signed by guide and Head of department. (One copy for institute, one copy for guide and one copy for candidates for certification). The student is expected to submit the seminar report in standard format. Attendance of all students for all seminars is compulsory.

PROJECT STAGE-II

Teaching Scheme:
Practical: 18 Hrs. /Week

Examination Scheme:
Term Work: 150 Marks
Oral: 100 Marks

The project work will start in second year (Continue to project stage-I).

The term work should be continuously evaluated as per the norms/guidelines.

The project work (dissertation) should be presented in a standard format.
The oral examination shall be conducted with the help of approved external examiner, appointed by university.

STRUCTURE OF

M.E. Electronics & Telecommunication
(Digital Electronics)

W.E.F. 2010-2011

The scheme of teaching & examination as per university syllabus applicable to ME Electronics & Telecommunication (Digital Electronics) will be as follows.

STRUCTURE OF
M.E. ELECTRONICS AND TELECOMMUNICATION
(DIGITAL ELECTRONICS)
First Year Term-I

Sr. No.	Subject	Teaching Scheme Hours/week		Examination Scheme				
		L	P	Paper duration hours	Maximum marks			
					Paper	TW	PR	OR
1	Advanced Instrumentation System	3	-	3	100	-	-	-
2	Advanced Digital Signal Processing	3	-	3	100	-	-	-
3	Digital System Design	3	-	3	100	-	-	-
4	VLSI Design	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**			

List of Subjects for Elective – I

1. Parallel Computing
2. Biomedical Instrumentation
3. Wireless & Mobile Communication

STRUCTURE OF
M.E. ELECTRONICS AND TELECOMMUNICATION
(DIGITAL ELECTRONICS)
First Year Term-II

Sr. No.	Subject	Teaching Scheme Hours/week		Examination Scheme				
		L	P	Paper duration hours	Maximum marks			
					Paper	TW	PR	OR
1	Image Processing & Pattern Recognition	3	-	3	100	-	-	-
2	Embedded System Design	3	-	3	100	-	-	-
3	Microelectronics Circuit Design	3	-	3	100	-	-	-
4	Advanced Computer Network	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**			

List of Subjects for Elective – II

1. Advanced Digital Communication.
2. Artificial Intelligence
3. Modeling and Simulation Techniques

STRUCTURE OF
M.E. ELECTRONICS AND TELECOMMUNICATION
(DIGITAL ELECTRONICS)
Second Year Term-I

Sr. No.	Subject	Teaching Scheme Hours/week		Examination Scheme				
		L	P	Paper duration hours	Maximum marks			
					Paper	Term work	Practical	Oral
1	Seminar –III	-	04	-	-	50	-	50
2	Project Stage - I	-	18	-	-	100	-	-
Total		**-**	**22**	**-**	**-**	**150**	**-**	**50**
Grand Total		**22**		**200**				

STRUCTURE OF
M.E. ELECTRONICS AND TELECOMMUNICATION
(DIGITAL ELECTRONICS)
Second Year Term-II

Sr. No.	Subject	Teaching Scheme Hours/week		Examination Scheme				
		L	P	Paper duration hours	Maximum marks			
					Paper	Term work	Practical	Oral
1	Project Seminar	-	-	-	-	50	-	-
2	Project Stage - II	-	18	-	-	150	-	100
Total		**-**	**18**	**-**	**-**	**200**	**-**	**100**
Grand Total		**18**		**300**				

Grand Total : 2000

M.E. ELECTRONICS AND TELECOMMUNICATION (DIGITAL ELECTRONICS) First Year Term-I	
Subject Laboratory Practice-I	
Practical: 6 Hrs Per week	**Term work:** 100 Marks **Oral:** 50 Marks
Detailed syllabus	
Experiment/ Assignments based on 1. Advanced Instrumentation System 2. Advanced Digital Signal Processing 3. Digital System Design **Note:** The concern subject incharge in consultation with H.O.D, should frame minimum of six laboratory assignments, two from each subject.	
Subject Seminar-I	
Practical: 4 Hrs Per week	**Term work:** 100 Marks
Detailed syllabus	
Seminar on related state of art topic of students of own choice approved by the department. **Term work** The Term work and presentation will be evaluated by departmental committee consisting of two faculty members of the department appointed by Principal as per the recommendation of the Head of the Department.	

M.E. ELECTRONICS AND TELECOMMUNICATION (DIGITAL ELECTRONICS) First Year Term-II	
Subject Laboratory Practice-II	
Practical: 6 Hrs Per week	**Term work:** 100 Marks **Oral:** 50 Marks
Detailed syllabus	
Experiment / Assignments based on 1. Image Processing & Pattern Recognition 2. Embedded System Design 3. Advanced Digital Communication. **Note:** The concern subject incharge in consultation with H.O.D, should frame minimum of six laboratory assignments, two from each subject.	
Subject Seminar-II	
Practical: 4 Hrs Per week	**Term work:** 100 Marks
Detailed syllabus	
Seminar on related state of art topic of students of own choice approved by the department. **Term work** The Term work and presentation will be evaluated by departmental committee consisting of two faculty members of the department appointed by Principal as per the recommendation of the Head of the Department.	

M.E. ELECTRONICS AND TELECOMMUNICATION
(DIGITAL ELECTRONICS)
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 and implementation). This can be a theoretical study or practical implementation approved by the guide and department.

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 the examiners appointed by University, one of which should be 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 the Second Year Term-I to the University.

Subject Project Stage-I

Practical: 18 Hrs Per week	**Term work:** 100 Marks

Detailed syllabus

Project stage-I It is the integral part of the dissertation project. The project should be based on the knowledge acquired by the student during the course work and should contribute to the needs of the society. The project aims to provide an opportunity of designing and building, complete system or subsystem in an area where the student like to acquire specialized skills. Project will consist of a system development in Software/ Hardware. The student should present the progress report of the project. It will consist of problem statement, literature survey; project overview and scheme of implementation.

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 the Director/Principal of the college as per the recommendation of the Head of the Department.

M.E. ELECTRONICS AND TELECOMMUNICATION
(DIGITAL ELECTRONICS)
Second Year Term-II

Subject Project Seminar

	Term work: 50 Marks

1. The Project Seminar should be conducted at the middle of Second Year Term-II
2. The Project 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 Project Seminar report in the form of soft bound copy.
4. The marks of seminar-III should be submitted at the end of the Second Year Term-I to the University.

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 Electronics and Telecommunication Engineering principles and practices is expected. It should be 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 the Project Stage-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.
2. The Project Stage-II oral will be evaluated by the examiners appointed by University, one of which should be guide.

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Term – I

ADVANCED INSTRUMENTATION SYSTEM

Teaching scheme:
Lectures: 3 hrs / week

Examination scheme:
Theory Paper : 100 Marks (3 Hours)

Digital Instruments:- Introduction, Digital Panel Meters, Digital Frequency Meters, Basic Circuit for Frequency measurements, High Frequency measurements, Digital Measurements of time, Period Measurement, Ratio and Multiple Ratio Measurement, Universal Counter, Digital Measurement of Mains Frequency.

Signal Analyzer :- Wave Analyzer, Harmonic Distortion Analyzer, Spectrum Analyzer, Network Analyzer, Logic Analyzer, Protocol Analyzer.

PC Based Data Acquisition System: - PC Based Instrumentation System, Introduction to PC Based Data Acquisition System.
Introduction to Smart Sensors:- Digital Sensors, Case Studies of Real Time PC Based Instrumentation System, Virtual Instruments, Intelligent Instruments.

Automated Measurement System :- Need And Requirement Automatic Test Equipments (ATE) Computer Based And Computer Controlled ATE Switches in ADTE , ATE For PCB Testing, ATE for Component Testing, IEEE- 488 Electronic Instruments BUS Standards.

Computer Control :- Hierarchy of Computer Control For Industry , Direct Digital Control, Distributed Digital Control, Supervisory Control And Data Acquisition System (SCADA), NC, CNC.

Introduction to process control :- Control System, Process Control Principles, Servo mechanism, Discrete Control System, Process Control Block Diagram , Anlog and Digital Processing , Feedback Control, Basic Principle of Single Loop Controller , Two Position Control, Mutiposition Control, Proportional ,Integral , Derivative Controller (Overview), Multivariable Control , Cascade Control, Ratio Control , Feed Forward Control.
Control Modes:- Close loop Response , Control loop transfer function, Analysis of Chemical Reactor.

Intelligent Controller :- Programmable Logic Controller, PLC Programming Technique , Fuzzy Logic Controller.
Industrial Control Application:- Cement Plant , Thermal Power Plant, Irrigation Cannal Management, Steel Plant.

References :

1. Clyde E. Coombs, Electronic Instruments Handbook(3/e), McGraw Hill International.
2. Mc Lachlan & Buchla, Applied Electronic Instrumentation & Measurement , 1992, Prentice Hall International..
3. Pallas Areny & Webstor, Sensors & Signals Conditioning , (2/e)1994, J.Wiley & sons
4. Critis Johnson, Process control Instrumentation Technology, PHI
5. H.S.Kalasi, Electronic Instrumentation (2/e), Tata McGraw Hill International
6. Bela G. Liptak, Butterworth Heinemann, Instrument Engineer's Handbook (3/e) Process Control,
7. Aibert D. Helfric, William D. Cooper, Modern Electronic Instrumentation And Measurement Technique
8. Krishna Kant, Computer Based Industrial Control.

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Term – I

ADVANCED DIGITAL SIGNAL PROCESSING

Teaching scheme:	Examination scheme:
Lectures: 3 hrs / week	Theory Paper : 100 Marks (3 Hours)

Discrete time signal & systems, its representation, types of discrete time system,DFT, IDFT, FFT(DIF&DIT). Realization of FIR and IIR filter

Multirate digital signal processing-decimation by factor D, interpolation, filter design & implementation, sampling rate conversion, application of multirate signal processing.

Power spectral estimation- parametric & nonparametric method for power spectral estimation, minimum variance, and realization of FIR & IIR filters.

Least mean square Adaptive filter: Overview of the structure, operation of the LMS algorithm, LMS adaptive algorithm, statistical LMS theory, Comparison of the LMS algorithm with the steepest Descent algorithm, Computer experiment on adaptive prediction, Computer experiment on adaptive equalization, Computer experiment on a minimum- variance distortion less response beam former, Directionality of convergence of the LMS algorithm for Nonwhite Inputs, Robustness of the LMS filter, Upper bound on the step size Parameters for Different Scenarios, Transfer function approach for deterministic input summary problems.

Design of digital filters-symmetric & antisymmetric, linear phase, optimum, Equiripple, FIR differentiation, Hilbert's transformers.

Design of IIR filters-impulse invariance, bilinear transformation, matched transformation, frequency transformation in analog & digital domain.

Design of digital filters based on least square method.

Application of DSP to speech processing & radar signal processing.

Introduction to TMS320c62XX DSP processors.

References :

1. John Proakis, Digital Signal Processing Prentice Hall
2. A.V.Oppenhiem & R.W.Schafer, Digital Signal Processing - Prentice Hall
3. L.R.Rabiner & B.Gold,Theory & application of digital signal processing- Prentice Hall
4. A.Antiniou, Digital Filters; analysis, design & application- Mcgraw Hill
5. Salivahanan,vallavaraj,gnanapriya, Digital Signal Processing-TMH
6. S.K.Mitra, Digital Signal Processing - TMH

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Term – I

DIGITAL SYSTEM DESIGN

Teaching scheme:
Lectures: 3 hrs / week

Examination scheme:
Theory Paper : 100 Marks (3 Hours)

Design of synchronous and asynchronous sequential logic circuits working in the fundamental mode and pulse mode. Essential hazards Unger's theorm. Map entered variable and synthesis of random logic. Fault detection and error correction.
Register- transfer level systems, Execution Graph, Organization of System, Implementation of RTL Systems, Analysis of RTL Systems, Design of RTL Systems.
Data Subsystems, Storage Modules, Functional Modules, Data paths, Control Subsystems, Micro programmed Controller, Structure of a micro programmed controller, Micro instruction Format, Micro instruction sequencing, Micro instruction Timing, Basic component of a micro system, memory subsystem.
I/O subsystem, Processors, Operation of the computer and cycle time. Binary Decoder, Binary Encoder, Multiplexers and Demultiplexers, Floating Point Arithmetic-Representation of Floating Point Number, Floating Point Multiplication.
Logic simulation: General fault simulation techniques, statistical fault analysis. Testing for single stuck fault: Basic issues, ATG for SSF in combined circuits. ATG for SSFs in sequential circuits. PLA testing.
Design for Testability: Classical testability scan design, compressing tech. built in self test logic level diagnosis, self checking design.
Specific digital system: Deign such as digital IS tester Microcontroller cards, PC add on cards design, PLA based product design.

References:

1. M. Ercegovac, T. Lang and L.J. Moreno, "Introduction to Digital Systems", Wiley,2000
2. John F. Wakerly,"Digital Design principles and practices",3rd edition, PHI publications.
3. Melvin A Breuer, Arthur D Friedmen, MironAbra MOVICI jaico Publishing.
4. House- Digital system testing and testable design.
5. B Holdsworth Digital Logic Design.
6. Puri V.K Digital Electronics
7. Z. Navabi, " VHDL-Analysis and Modeling of Digital Systems", TMH

8. Norman - Digital Logic design principal John Wiley Pub.
9. Samual – Digital Circuit logic design –PHI.
10. Charles H. Roth, ”Digital system design using VHDL”, Thomson Publication.
11. Balabanian,”Digital logic design principles”,Wiley publication.
12. Stephen Brown, “Fundamentals of digital logic”, TMH publication.

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Term – I

VLSI DESIGN

Teaching scheme:
Lectures: 3 hrs / week

Examination scheme:
Theory Paper : 100 Marks (3 Hours)

Review of VHDL Verilog Programming, Hardware modeling with Verilog / VHDL, different verilog /VHDL constructs, and Logic Synthesis. Levels of abstraction, Elements (Data flow, Behavioral, Structural, Mixed and switch level Description).

simulation process, types of simulators FSM modeling, test benches, generics & attributes, synthesis tools features & optimization in VHDL, Synthesis guidelines, Timing issues: terminology, flow diagram, clock, gated clock, setup & hold time, violation,Meta stability, Static & Dynamic timing analysis.

CMOS & Bi-CMOS logic families & PLD architecture, Power dissipation, noise and ESD issues, clock distribution, signal connections, synchronous and asynchronous design features, and memory system design. CMOS systems Design, CMOS Testing. Classification of CPLD architecture, CPLD 9500 series, Xilinx FPGA –XC4000 series,

Designing steps in ASIC, Physical Design flow, Different type of ASIC, CAD Tools, System Partitioning, Estimating ASIC size, Power dissipation, FPGA partitioning methods,

Floor planning, Placement Physical design flow; Information Formats; global routing, detailed routing; special routing; circuit extraction and DRC

References :

1. Douglas Perry, VHDL - McGraw Hill Publication
2. Janic Bergerson, VHDL Using Testbenches
3. Yu. Chin Hsu, K. Tsai, VHDL Modeling for Digital Design Synthesis.- Kluwer publishers.
4. Xilinx PLD data manual
5. Michael John sebastiab smith, “Application specific IC”, Addison Wesley publication.

6. K. K. Parhi , “VLSI Digital signal processing systems Design & Implementation” John Wiley & Sons
7. Neil Weste and Eshraghian, “Principles of CMOS VLSI Design “(Second Edition) Pearson Education Asia (Addison – Wesley Publication Company)
8. James E Buchnan – BiCMOS-CMOS system design McGraw Hill Publication.

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Term – I

Elective – I

PARALLEL COMPUTING

Teaching scheme:	Examination scheme:
Lectures: 3 hrs / week	Theory Paper : 100 Marks (3 Hours)

Parallel Computer Models: The state of computing, Multiprocessors and multi-computers, Multivector and SIMD computers, Architectural development tracks
Program And Network Properties: Conditions of parallelism, Data and resource dependences, Hardware and software parallelism, Program partitioning and scheduling, Grain size and latency, Program flow mechanisms, Control flow versus data flow, Data flow architecture, Demand driven mechanisms, Comparisons of flow mechanisms
System Interconnect Architectures: Network properties and routing, Static interconnection networks, Dynamic interconnection Networks, Multiprocessor system interconnects, Hierarchical bus systems, Crossbar switch and multiport memory, Multistage and combining network.
Processors and Memory Hierarchy: Advanced processor technology, Instruction-set Architectures, CISC Scalar Processors, RISC Scalar Processors, Superscalar Processors, VLIW Architectures, Vector and Symbolic processors Memory Technology: Hierarchical memory technology, Inclusion, Coherence and Locality, Memory capacity planning, Virtual Memory Technology.
Backplane Bus System: Backplane bus specification, Addressing and timing protocols, Arbitration transaction and interrupt, Cache addressing models, direct mapping and associative caches.
Pipelining: Linear pipeline processor, Nonlinear pipeline processor, Instruction pipeline design, Mechanisms for instruction pipelining, Dynamic instruction scheduling, Branch handling techniques, Arithmetic Pipeline Design, Computer arithmetic principles, Static arithmetic pipeline, Multifunctional arithmetic pipelines.
Vector Processing Principles: Vector instruction types, Vector-access memory schemes.
Synchronous Parallel Processing: SIMD Architecture and Programming Principles, SIMD Parallel Algorithms, SIMD Computers and Performance Enhancement

References:

1 Kai Hwang, "Advanced Computer Architecture", Parallelism, Scalability, Programmability", McGraw Hill Inc. Ed. 1993.
2 V. Rajaranam & C.S.R.Murthy, "Parallel Computer"; PHI.
3 William Stallings, "Computer organization & Architecture", PHI, New Delhi, 6th edition.
4 Dezso'Sima, "Kalsuk'Advanced computer Architectures", Terence Fountain & Peter Pearson's Edation. (2nd Edition)
5 Hwang and Degroot, "Parallel Processing for Supercomputers and AI", (Eds) McGraw Hill.
6 J. P. Hayes, "Computer Architecture And Organization"; MGH.
Harvey G. Cragon, "Memory System and Pipelined Processors"; Narosa Publication.
7 R. K. Ghose, Rajan Moona & Phalguni Gupta, "Foundation of Parallel Processing"; Narosa Publications. Kai Hwang and Zu, "Scalable Parallel Computers Architecture"; MGH.

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Term – I

Elective - I

BIOMEDICAL INSTRUMENTATION

Teaching scheme:	Examination scheme:
Lectures: 3 hrs / week	Theory Paper : 100 Marks (3 Hours)

Measuring, Recording and Monitoring Instruments

Anatomy and Physiology, Physiological Systems of the Body, Basic Medical Instrumentation System, Performance Requirements of Medical Instrumentation System, Intelligent Instrumentation System, General Constraints in Design of Medical Instrumentation System, Regulation of Medical Devices.

Physiological transducers: Displacement, position and motion transducers, Pressure transducers, Transducers for Body Temperature Measurement, Photoelectric transducers, Optical Fibre sensors, Biosensors

Recording systems: Basic Recording systems, Biomedical signal Analysis Techniques, Signal Processing Techniques, Potentiometric Recorders, Digital Recorders, Instrumentation tape Recorders,

Biomedical Recorders: Electrocardiograph, Vectorcardiograph (VCG), Phonocardiograph (PCG), Electroencephalograph (EEG), Electromyograph (EMG), Other Biomedical Recorders, Biofeedback Instrumentation

Patient Monitoring Systems: Bedsides Patient Monitoring Systems, Central Monitors, Measurements of Heart Rate, Measurements of Pulse Rate, Blood Pressure Measurement, Measurement of Temperature, Measurement of Respiration rate

The Matched Filter, Detection of the P Wave,Homomorphic Filtering, Application- ECG Rhythm Analysis, Identification of Heart Sounds, Waveshape and waveform Complexity, Analysis of Event-related Potentials, Morphological Analysis of ECG Waves, Envelope Extraction and Analysis of Activity, Application- Normal and Ectopic ECG Beats, Analysis of Exercise ECG.

Modern Imaging Systems: X-ray Machines and Digital Radiography Portable and mobile X-ray units, Digital Radiography, X-ray Computed Tomography, Computed Tomography, System components, Gantry Geometry, Patient Dose in CT Scanners, Nuclear Medical Imaging System, Radiation Detectors, Pulse Height Analyzer, Uptake Monitoring Equipment, Radio-isotope Rectilinear Scanner, The Gamma Camera, Emission Computed Topography (ECT) Single Photon Emission Computed Topography (SPECT), Positron Emission Topography (PET scanner)
Ultrasonic Imaging Systems: Diagnostic Ultrasound, Medical Ultrasound, Basic Pulse-echo Apparatus, A-Scan, B-Scanner.
Laser Applications In Biomedical Field: The laser, Pulsed Ruby laser, ND-YAG laser, Helium –Neon Laser, Argon Laser, CO2 Laser, Excimer Lasers, Semiconductors Laser, Laser Safety

References:

1. Cromwell - Biomedical Instrumentation, Pearson
2. Khandpur - Handbook of Biomedical Instrumentation
3. Webster - Biomedical Instrumentation, Wiley
4. R. M. Rangayyan "Biomedical Signal Analysis- A case study approach", Wiley Publications.
5. Eugene N Bruce "Biomedical signal processing and signal modeling", Wiley publications.

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Term – I

Elective - I

WIRELESS & MOBILE COMMUNICATION

Teaching scheme:	Examination scheme:
Lectures: 3 hrs / week	Theory Paper : 100 Marks (3 Hours)

Basics: History of wireless communication, and future trends, Wireless Generations and Standards, Cellular Concept and Cellular System Fundamentals, Trunking Cell Splitting and Sectoring, Mobile Radio signal propagation, path loss and channel models.

Speech coding for wireless system and application like PCM, DPCM, DM, Vocoder & Linear Predictive coding. Performance comparison.

Wireless LAN

IEEE802-11Hiper LAN, Bluetooth, Adhoc Network: Characteristic, Performance issue, Routing in mobile host.

Wireless Networking:

Difference between wireless & fixed telephone n/w, development, transmission hierarchies, traffic routing, wireless data services, common channel signaling, ISDN, SS7, global cellular network, Interoperability, PCS/PCNs, Protocols for n/w access and n/w data base, UMTS.

Wireless systems and standards:

AMPS, ETACS, United state of digital cellular, (IS 54 and IS 136) GSM, CDMA (IS95), CT2 Standards for cordless telephone, Digital European cordless telephone , PACs, PDC, Personal handy phone systems, US PCS & ISM bands, US wireless cable TV, IEEE802.11.

References:

1. Walker, J.: Mobile Information Systems. Artech House, Inc. 1990, Boston London
2. Mehrotra, A.: GSM System Engineering. Artech House, Inc. 1997, Boston London

3. Redl, S.M., Weber, M.K., Oliphant, M.W.: An Introduction to GSM. Artech House, Inc. 1995, Boston London
4. Feher, Wireless Digital Communication- 1991, PHI.
5. Vijay K. Garg, and J.E. Wilkes, Principles & applications of GSM –1999 – Prentice hall PTR.
6. Roger L. Freeman, Telecom Transmission handwook 4th ed 1998 John Wiley & Sons. Inc. New York.
7. Lee, Mobile Cellular Telecomm, 1995 Mc Graw Hill Inc.
8. J. Schiller, Mobile Communication, Addision Wiley
9. William C.Y. Lee, Mobile Comm. Design Fundamental. John wiley.
10. Mark Ceampa, Design & Implementation of Wireless LANs, Thomson Learning.

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M.E. ELECTRONICS AND TELECOMMUNICATION (Digital Electronics)
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Term – I I

IMAGE PROCESSING AND PATTERN RECOGNITION

Teaching scheme:	Examination scheme:
Lectures: 3 hrs / week	Theory Paper : 100 Marks (3 Hours)

Digital Image fundamentals : Basic Image Processing steps, image acquisition, presentation of gray scale and modeling. Human visual perception, sampling and quantization, basic relationships between pixels. Histogram analysis and equalization, geometric image

Applications of pattern recognition, statistical decision theory, image processing and analysis.
Probability: Introduction, probability of events, random variables, Joint distributions and densities, moments of random variables, estimation of parameters from samples, minimum risk estimators Statistical Decision Making: Introduction, Baye's Theorem, multiple features, conditionally independent features, decision boundaries, unequal costs of error, estimation of error rates, the leaving-one—out technique. Characteristic curves, estimating the composition of populations.
Nonparametric Decision Making: Introduction, histograms, Kernel and window estimators, nearest neighbor classification techniques, adaptive decision boundaries, adaptive discriminate Functions, minimum squared error discriminate functions, choosing a decision making technique.
Clustering: Introduction, hierarchical clustering, partitional clustering Artificial Neural Networks, PCA, ICA, SVM.

References:

1) R. C. Gonzalez & Woods, "Digital Image Processing" – Addison Wesley IIIrd Ed.
2) A. K. Jain, "Fundamentals of Digital Image Processing"– Prentice Hall Inc.
3) Robert Jschalkoff, "Digital Image Processing & Computer vision : An introduction to theory & Implementation"– John wiley & Sons Inc.
4) K. R. Castleman, "Digital Image Processing" – PHI
5) W. K. Pratt, "Digital Image Processing" .(3 Ed.) John.Wiley.
6) B. Chanda and D.Mujumdar,"Digital Image Processing & Analysis".-PHI, New Delhi, 2000.

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Term – I I

EMBEDDED SYSTEM DESIGN

Teaching scheme:	Examination scheme:
Lectures: 3 hrs / week	Theory Paper : 100 Marks (3 Hours)

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

System Architecture:
ARM7/ARM9 architecture, instruction set, thumb Instruction set, Pipeline, memory management, Bus architecture, Programming concepts, Embedded programming in c and C++.

Multiprocessors Scheduling: Model of multiprocessor & distributed systems, Multiprocessor priority ceiling protocol, Elements of scheduling algorithms for end-to-end periodic tasks, Schedulability of fixed priority end-to-end periodic tasks, end-to-end tasks in heterogeneous systems.

Real Time systems: Characterizing real time systems & tasks, Performance measures, Estimating program runtimes, Task assignment & scheduling, Real time operating systems (RTOS), Task management, Race condition, Inter-task communication, Implementation aspects & estimation modeling in embedded systems, Validation & debugging of embedded systems, Real time communication, Hardware-software co-design in an embedded system, Applications of Real time systems.

References:

1. Krishna & Shin, Real -Time Systems, (McGraw Hill International)
2. Rajkamal, Embedded systems, (Tata - McGraw Hill)
3. Valvano, Embedded Microcomputer systems, (Thomson Delmar publishing)
4. Atmel/ARM Data books.
5. Iyer &Gupta, Embedded Real Time Systems Programming, (Tata McGraw Hill)

6. Lewis Daniel, Fundamentals of Embedded software, (Prentice Hall India)
7. Jane Liu, Real Time Systems, (Pearson India low cost edition)

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Term – I I

MICROELECTRONICS CIRCUIT DESIGN

Teaching scheme:
Lectures: 3 hrs / week

Examination scheme:
Theory Paper : 100 Marks (3 Hours)

Types of modeling, Models of diode, BJT and FET, CMOS device modeling: Simple MOS Large-signal Model, Simple MOS Small-signal Model,
Analog IC Design : Differential Amplifier, Cascode Amplifer, Current Amplifiers, Output Amplifers, High gain amplifier Architecture,
Operation Amplifier Design of CMOS op-amp, Compensatio of op-amps,
Design of two stage op-amps, PSRR of two stage op-amps, Cascode op-amps, Simulation and Measurement of Op-amps, Micromodels of Op-amps, Switch Capacitor Circuits, Switch Capacitor Amplifiers, Switch Capacitor Integrator, z Domain Models of two phase switched capacitor circuits, First and Second order switched capacitor circuits, Switched capacitor filter.
High frequency amplifier, Mixer, R.F. Power amplifier, Phase- Locked Loops.

References:

1) Phillip E. Allen and Douglas R. Holberg, CMOS Analog Circuit Design,2nd ed. New York : Oxford University Press, 2004
2) Thomas H. Lee, “The Design of CMOS Radio – Frequency Integrated Circuit”, Cambridge University Press
3) B. Razavi “RF Microelectronics” PHI 1998
4) R. Jacob Baker, H.W. Li, D.E. Boyce “ CMOS Circiut Design, layout and Simulation” PHI 1998
5) Y.P. Tsividis “Mixed Analog and Digital Devices and Technology” TMH 1996

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Term – I I

ADVANCE COMPUTER NETWORK

Teaching scheme:	Examination scheme:
Lectures: 3 hrs / week	Theory Paper : 100 Marks (3 Hours)

Review of computer networking concepts
Topology, LAN, WAN, MAN, Internet, OSI/ISO, TCP/IP reference models, Point to point protocols. ARQ: Retransmission strategies. Functional elements : Multiplexing, Switching , Networks Management & traffic controls. Delay models in Data Networks Switching techniques: Performance measures & architectural issues.

Internetworking
TCP/IP Internet architecture, IPV4, IPV6, IP addressing & related issues, IP address resolution techniques (ARP). IP datagram & forwarding, routing algorithms.

Multiple access techniques
ALOHA, CSMA, CSMA/CD, CSMA/CA, CDMA, OFDM, Delay throughput characteristics, WLAN-Protocols, multiple access, Ad-hoc networks, Bluetooth Specifications, WAP.

Network security issues
Ciphers, DES, Public key cryptography, RAS algorithm, Digital Watermarking, Attacks and Counter Measures , Service Authentication Performa.

References:

1) Dimitri Bertisekas & Robert Gallager, “Data Networks” PHI
2) Gerd E Kieser, “Local Area Networks”,– Mc-Graw-Hill
3) D.E.Comer, “Computer Networks and Internetworking” Pearson Education
4) William Stallings, “Cryptography and Network Security: Principles and Practice”, Pearson Education
5) Steele, “GSM, CDMA and 3G Systems” , Wiely Students Edition
6) Anurag kumar, D. Manjunath & Joy Kuri– Morgn, “Communication Networking” An analytical approach” – Kaufmann publishers

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Term – II

Elective - II

ADVANCED DIGITAL COMMUNICATION

Teaching scheme:
Lectures: 3 hrs / week

Examination scheme:
Theory Paper : 100 Marks (3 Hours)

Signal spectra & Random Processes:
Basics of Fourier series & Fourier transform, Probability, Random Variables and processes, Digital PAM & PAM formats, Line coding spectral representation, AT & T and CCITT hierarchies.

Digital CW modulation an overview, BPSK, DPSK, DEPSK, OPSK, M'ary PSK, QASK constellation pattern, BFSK, GMSK, Doubinary encoding, QPR coherent & non coherent systems, Bandwidth & spectrum representation, error probabilities in BPSK, DPSK, QPSK, FSK, 16 QAM, MSK, their performance evaluation in presence of AWGN.

Matched correlation, optimum filters, Integrate & Dump, their transfer function, error probabilities, error rate etc.

Spread spectrum techniques: DS, FH, CDMA based system, Performance of DS-SS & FH-SS, generation of PN sequence code.

Error Control Coding**:** Introduction to algebra**,** Group rings, Galois field, two arithmetic GF, Linear block codes: Structure matrix description, Syndrome decoding, Hamming codes, Perfect & Quest, perfect odes, Cyclic codes: Polynomial description, division algorithm, matrix description, fire codes, golay codes, cyclic Redundancy check codes, circuit implementation of cyclic codes.

Encoding and Decoding of BCH and RS codes, MDS Codes, Nested codes, Convolutional Encoders, Tree & Trellis diagram, Veterbi decoding algorithms, Sequential decoding algorithms.

References :

1. J. G. Prokais, "Digital Communications", McGraw Hill Inc.

2. Bernad Sklar, “Digital Communication: Fundamentals & Applications”, Pearson Education Asia (LPE).
3. A. B. Carlson, “Communication System”, Mc Graw Hill Inc.
4. Amitabh Bhattacharya, “Digital Communication”, TMH.
5. T. S. Rappaport, “Wireless Communication”, Pearson Education.
6. Simon Haykin, “Digital Communications”, John Wiley & Sons
7. Taub &Schilling, “Principle of Communication System”, TMH.

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Term – I I

Elective - II

ARTIFICIAL INTELLIGENCE

Teaching scheme:
Lectures: 3 hrs / week

Examination scheme:
Theory Paper : 100 Marks (3 Hours)

Fuzzy Logic Introduction to Fuzzy sets, Fuzzy set Theory, Fuzzy relation, Membership functions, fuzzification, defuzzification, fuzzy rule based system fuzzy inference system.

Fuzzy Decision Making, Fuzzy modeling, Fuzzy reasoning, compositional rules of inference, Fuzzy systems as function estimators, Fuzziness as multivalence, Adaptive neuro fuzzy inference system, cognitive neurofuzzy modelling, Neuro fuzzy control, Application of neuro fuzzy control

Neural Network Fundamental of Artificial Neural Network : Artificial Neuron model. Learning process, Single layer and multilayer feed forward network, training by back propagation, Hop-field model basic concept of
Bidirectional associative memory, self organization map, optimization model.
Recurrent Networks, Hamming Net and MAXNET, Feature mapping, counter propagation networks, cluster discovery Network (ART),
Applications of Neural Network Characters Recognition Network, Neural Network control Application, Network for Robot kinematics, Hand written Numeral recognition.

References:

1 Limin Fu , "Neural Networks in Computer Intelligence", McGraw Hill Inc., 1994.
2 N. K. Bose, P. Lling , "Neural Network Fundamentals", McGraw Hill.
3 Zurada "Artificial Neural Networks",
4 Timothy J. Ross , " Fuzzy Logic with Engg. Applications", McGraw Hill.
5 Jang, Sun, Mezutani "Neuro Fuzzy and Soft computing", TMH
6 Bart Kasko, "Fuzzy Engineering", PHI
7 S. Hykin , "Neural Networks", Pearson Education.
8 J.A.Freeman and B.M.Skapure, "Neural Networks, Algorithms Applications and programming Techniques", Addison – Wesely, 1990

9 Laurence Fausett, “Fundamental of Nerual Networks: Architecture, algorithms and application”,Prentice Hall, 1994.

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Term – II

Elective - II

Modeling and Simulation Techniques

Teaching scheme:	Examination scheme:
Lectures: 3 hrs / week	Theory Paper : 100 Marks (3 Hours)

Introduction Models and their applications, Common types of mathematical models used for engineering systems, Derivation of models from physical relations, Model determination from input- output observation, Basic principle of simulation, Analog and digital simulation techniques, Models: Structural, Process, Continuous, Discrete, Deterministic,Random, input/output, static, dynamic, multilevel.

Classical and Semi-classical models:
Boltzmann transport equation, classical semiconductor equations- drift diffusion approximation, generation and recombinations, different generation and recombination mechanisms, limitations of drift-diffusions, energy transport, semiclassical and hot electron models, hydrodynamic and semi-classical semiconductor equations, modeling of semiconductor laser diode, general aspects, static models and dynamic models, model verification and validation.

Numerical Techniques: Finite difference methods, first order and second order derivatives and discrimination, finite element method, solution of poison's equation, solution of steady state continuity equation for electrons and holes, advantages and disadvantages of finite element method, Monte Carlo simulation techniques, basic concepts, Random variables, random number generation and testing, analysis of simulation results, confidence intervals, variance reduction techniques. Case studies of analytical and simulation studies

Modeling of Semiconductor Devices p-n junction, p-n junction C-V characteristics, breakdown, Schottky diodes, Hetero-structure diodes, Simulation of above device characteristics in graphical format, Simulation of simple laser diode and plot its characteristics by considering appropriate materials and parameters, PIN diode, Avalanche Photodiode, Quantum transport modeling, 1D models, discretized Schrodinger equation, Transmission matrix formation, I-V characteristics.

Universal FET modeling

sub threshold regime, unified charge control model, short channel effects, I-V modeling.Capacitance modeling (Ward Dutton and Meyer models) Universal models for MOSFET,MESFET, HFET and TFT.

References:

1. Modeling of CMOS G.Gordon, 'System Simulation', 2nd ed., Prentice Hall
2. Narsing Deo, 'System Simulation with Digital Computers', Prentice Hall
3. R. Leigh, 'Modelling and Simulation', Peter Peregrims Ltd.,. 1983.
4. M.Law, W.D.Kelton, 'Simulation Modelling and Analysis, Mcgraw Hill, 1982.
5. Raj Jain, The Art of Computer Systems Performance Analysis, John Wiley and Sons, New York, USA, 1991
6. Trivedi, K.S, Probability and Statistics with Reliability, Queueing and computer science Applications, Prentice Hall of India, Reprinted in 1990.

NORTH MAHARASHTRA UNIVERSITY, JALGAON (M.S.)

MASTER OF ENGINEERING (M.E.)

(MECHANICAL ENGINEERING)
(MACHINE DESIGN)

W.E.F.: 2010-11

North Maharashtra University, Jalgaon
M.E. (Machine Design)
Examination scheme and Structure with effect from Year 2010-11
First Year Term I

Sr No	Subject	Teaching Scheme per week		Examination Scheme				
		L	P	Paper Hr.	Paper	TW	PR	OR
1	Advanced Mechanical Engineering Design of Equipment	3	-	3	100	-	-	-
2	Computer Methods in Mechanical Design	3	-	3	100	-	-	-
3	Vibration Engineering	3	-	3	100	-	-	-
4	Tribology	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) Design of Pressure Vessel
2) Instrumentation and Automatic Control System
3) Design of Material Handling Equipment

First Year Term II

Sr No	Subject	Teaching Scheme per week		Examination Scheme				
		L	P	Paper Hr.	Paper	TW	PR	OR
1	Design and synthesis of Mechanism	3	-	3	100	-	-	-
2	Optimization Techniques in Design	3	-	3	100	-	-	-
3	Machine Tool Design	3	-	3	100	-	-	-
4	Mechatronic Product Design	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) Automotive Design
2) Robotics
3) Design for Manufacture and Assembly

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				

NORTH MAHARASHTRA UNIVERSITY, JALGAON
M.E. (MACHINE DESIGN)
W.E.F.: 2010-11
FIRST YEAR TERM I

ADVANCED MECHANICAL ENGINEERING DESIGN OF EQUIPMENT

Exam Scheme :

Lectures – 03 hours/week.

Theory – 100 marks
Min passing – 40 marks
Duration – 3 Hours

Material selection in Mechanical design: - Design process, Engineering material and their properties, Material property charts, material selection procedure and case studies, Process selection procedure & case studies, Multiple constraints & objectives, selection of shape, designing hybrid materials.
Advanced Design: - Load analysis for two & three dimensional static, dynamic and vibrating loading, Deflection in beam, Castigliano's method, Torsion, Combined stress, Stress concentration, Failure theories, Von Mises – Hencky theory, Fracture mechanics, fatigue failure mechanism & models, Notches & stress concentration, Residual stress, design for high cycle fatigue, design for fully reversed uniaxial stress, Design for fluctuating uniaxial stress, Design for multiaxial stress

Reference:

1) Machine Design By Robert L Norton
2) Mechanical Engineering Design By J.E.Shigley & C R Mischke
3) Selection of engineering material by Gladius Levis

NORTH MAHARASHTRA UNIVERSITY, JALGAON
M.E. (MACHINE DESIGN)
W.E.F.: 2010-11
FIRST YEAR TERM I
COMPUTER METHODS IN MECHANICAL DESIGN

Exam Scheme :

Lectures – 03 hours/week.

Theory – 100 marks
Min passing – 40 marks
Duration – 3 Hours

Advanced Computer Graphics: - review of 2D & 3D geometric transformation, Modeling of curves, cubics, splines, beziers and b-splines, Modelling of surface, modeling of solids, brep, CSG, octree, feature based modeling, Windowing and view porting
Finite Element Analysis : - Principle of potential energy, 1D elements, Derivation of stiffness & mass matrices for a bar, beam and shaft, solution for static problems,
Case studies in stress analysis of mechanical components, FEA using 2D & 3D elements, plain strain & stress problems, FEA using plate & shell, Finite element mesh, Automatic meshing technique, case studies using FE for design of geometrics such as tapered bar, plate with hole, spanner etc. Introduction to dynamic analysis, Basic equation,undamped free vibration, damping, Harmonic response analysis, thermal problem, formulation procedure, 1D & 2D heat transfer problems.

Reference:

1) Introduction to finite element method by C S Desai & J.F Abel
2) Concept & application of finite Element Analysis by Robert Cook
3) CAD/CAM by Groover & Zimmer

NORTH MAHARASHTRA UNIVERSITY, JALGAON
M.E. (MACHINE DESIGN)
W.E.F.: 2010-11
FIRST YEAR TERM I

VIBRATION ENGINEERING

Exam Scheme :

Lectures – 03 hours/week.

Theory – 100 marks
Min passing – 40 marks
Duration – 3 Hours

Introduction to vibration , free vibration and forced response solution of single and multiple degree freedom, of numerical method of finding natural frequencies and mode shape , vibration instrumentation ,vibration design and control, vibration isolation , passive control of , vibration absorber , active control of vibration , whole body vibration perception ,health effect of whole body vibration, motion sickness .

Reference:

1.Engineering vibration By Daniel .J. Inman
2.Mecanical vibration control engineering By S.Rao
3.Noise &vibration control engineering By Ver Beranek

NORTH MAHARASHTRA UNIVERSITY, JALGAON
M.E. (MACHINE DESIGN)
W.E.F.: 2010-11
FIRST YEAR TERM I
TRIBOLOGY

Exam Scheme :

Lectures – 03 hours/week.

Theory – 100 marks
Min passing – 40 marks
Duration – 3 Hours

Friction & Wear : -Types of wear ,theories of friction & wear, dry friction & boundary friction
Viscosity:- Petroff's law, Hagen Poisenille law, variation of viscosity ,
Hydrodynamic Lubrication: - Reynold's Eq. Solution for short & long finite bearing, load carrying capacity, flow rate, hydrodynamic thrust bearing, behaviour under variable laod, squeeze film, thermal equilibrium of sliding system, elasto hydrodynamic lubrication
Hydrostatic Lubrication: -Pressure distribution in hydrostatic thrust bearing, pumping power & capacity, hydrostatic formal & thrust bearing
Gas Lubrication: -Merits & Demerits, aerodynamic and aerostatic journal bearing ,Reynolds equation.

Reference:

1) Principles of tribology by J.Hamrock
2) Tribology in machine Design by T A solarski
3) Principles of Tribology by J.Hasting

NORTH MAHARASHTRA UNIVERSITY, JALGAON
M.E. (MACHINE DESIGN)
W.E.F.: 2010-11
FIRST YEAR TERM I
ELECTIVE – I

DESIGN OF PRESSURE VESSEL

Exam Scheme :

Lectures – 03 hours/week.

Theory – 100 marks
Min passing – 40 marks
Duration – 3 Hours

Introduction: Revision of stress and strain in thick and thin cylinder and pressure vessel.
Criteria in vessel design, excessive elastic deformation, plastic instability, brittle, rupture, creep
Design of pressure vessel, internal pressure, construction feature, code, design of shell, types of heads, thickness of heads.
Design of storage vessel, storage of non volatile liquids and gases, code for storage, bottom and shell design
Design of vessel under external pressure, vacuum stress analysis, stiffness , design of circumferential stiffeners, design of covers, pipes and tubing
Design of High Pressure Vessel, autoclave
Support for vessel, types, leg support skirt, support design.

Reference:

1) Process Equipment Design by N.V .Joshi
2) Process equipment design by L.E.Browr ,E.H.Yovng
3) Introduction to process Equipment Design by B.C. Bhattacharya

NORTH MAHARASHTRA UNIVERSITY, JALGAON
M.E. (MACHINE DESIGN)
W.E.F.: 2010-11
FIRST YEAR TERM I
ELECTIVE – I
INSTRUMENTATION AND AUTOMATIC CONTROL SYSTEM

Exam Scheme :

Lectures – 03 hours/week.

Theory – 100 marks
Min passing – 40 marks
Duration – 3 Hours

Classification and representation of control systems,Influence of type control on steady state and transient responce,Time and frequency domain analysis,Stability analysis using Rough Phi Nyquist criteria,Root locus method,Modern control theory,Sequence control and programmable logic controllers,Control components,Comparators,Hydraulie,Neumatic and Electrical type of controllers,Servomotors.
Computer bvased data aquisition system,A-D and D-A convertors,Microprocessor application in measurement and control,Static and dynamic analysis of instrument system,FFT analysers,Current development in measurement and control of motion ,Force torque,pressure,temperature,floe,noice

Reference:

1.Measurement System By Ernest O Josbelin
2.Modern Control Systems ByRichard C Dorf, Robert H Bishop

NORTH MAHARASHTRA UNIVERSITY, JALGAON
M.E. (MACHINE DESIGN)
W.E.F.: 2010-11
FIRST YEAR TERM I
ELECTIVE – I

DESIGN OF MATERIAL HANDLING EQUIPMENT

Exam Scheme :

Lectures – 03 hours/week.

Theory – 100 marks
Min passing – 40 marks
Duration – 3 Hours

Introduction to material handling equipment, interplant transporting facilities, types of equipment,
Working principle, Construction and Design of: - Flexible hoisting application, pulley system,load handling equipment, arresting gears,hoisting gears,traveling gears, luffing gear,various types of drives, crane frame structure, stability of crane, elevators, electromagnetic hoisting equipment, various types of conveyors .

Reference:

1) Material handling equipment by Rudenko
2) Material handling equipment by John R Immer

NORTH MAHARASHTRA UNIVERSITY, JALGAON
M.E. (MACHINE DESIGN)
W.E.F.: 2010-11
FIRST YEAR TERM I
LABORATORY PRACTICE - I

Exam Scheme :

Practical's – 06 hours/week.

Term-work – 100 marks
Oral- 50 marks

Experiments/Assignments based on

1) Computer Methods in Mechanical Design
2) Vibration Engineering
3) Tribology

The concerned subject in-charge should frame minimum of six laboratory Experiments / Assignments, two from each subject.

Note: Oral will be based on the prescribed term-work presented in the form of certified journal.

NORTH MAHARASHTRA UNIVERSITY, JALGAON
M.E. (MACHINE DESIGN)
W.E.F.: 2010-11
FIRST YEAR TERM I
SEMINAR-I

Practical's – 06 hours/week. Term-work – 100 marks

Seminar-I should be based on the literature survey on any topic relevant to Design Engineering. It may be leading to selection of a suitable topic of dissertation. Each student has to prepare a write-up of about 25 pages. The report typed on A4 sized sheets and bound in the necessary format should be submitted after approved by the guide and endorsement of the Head of Department. The student has to deliver a seminar talk in front of the teachers of the department and his classmates. The Guide based on the quality of work and preparation and understanding of the candidate shall do an assessment of the seminar

The report copies must be duly signed by the guide and Head of department (one copy for institute, one copy for guide and one copy for the candidate for certification). Attendance of all students for all seminars is compulsory

NORTH MAHARASHTRA UNIVERSITY, JALGAON
M.E. (MACHINE DESIGN)
W.E.F.: 2010-11
FIRST YEAR TERM II

DESIGN & SYNTHESIS OF MECHANISM

Exam Scheme :

Lectures – 03 hours/week.

Theory – 100 marks
Min passing – 40 marks
Duration – 3 Hours

Kinematics analysis of planer mechanism, graphical & analytical methods of velocity & acceleration analysis
Curvature Theorem, fixed & moving centroids, inflection circle, Euler Savary equation, Bobillier construction, cubic & stationary curvature, dwell mechanism
Kinematic synthesis, Dimensional synthesis, function generation, path generation, accuracy point, Chebychev spacing, graphical synthesis for function generation with two, three, four accuracy points, Bermester points
Analytical Synthesis of four bar and slider crank mechanism, Frendenstein equation.
Coupler Curves: - Equation of coupler curves, Robber Chebychev theorem, kinematics analysis of spatial mechanism, Denavit Hartenberg parameters, matrix method.

Reference:

1) Design of Machaniry- An introduction to synthesis & analysis of mechanics & machines by R.L.Norton
2) Mechanism Design - Analysis & synthesis by A.G.Edman & G.N.Sandor
3) Theory of Mechanics & Mechanism by J.E.Shigley & J.J.Ucker

NORTH MAHARASHTRA UNIVERSITY, JALGAON
M.E. (MACHINE DESIGN)
W.E.F.: 2010-11
FIRST YEAR TERM II

OPTIMIZATION TECHNIQUES IN DESIGN

Exam Scheme :

Lectures – 03 hours/week.

Theory – 100 marks
Min passing – 40 marks
Duration – 3 Hours

Optimum design formulation,Problem formulation process;Graphical optimisation;optimum design concepts,Global and local minima,Unconstrained optimum design problems,Constrined optimum design problems,Postoptinality analysis,Linear programming methods for optimum design numerical methods for unconstrined optimisation,Numerical method for constrained optimisation;Multiobjective optimum design concepts and methods,Genetic algorithms,Weighted sum method,Weighted minimum-maximum method;Global optimisation concepts and methods for optimum design,Deterministic method,Stochontic method

Reference:

1.Mechanical design of mechanical element-R.C.Thomson
2.Optimisation concept and application in engineering-Balegundu & Chandrupatla
3.Engineering optimisation-S.S.Rao

NORTH MAHARASHTRA UNIVERSITY, JALGAON
M.E. (MACHINE DESIGN)
W.E.F.: 2010-11
FIRST YEAR TERM II
<u>MACHINE TOOL DESIGN</u>

Exam Scheme :

Lectures – 03 hours/week.

Theory – 100 marks
Min passing – 40 marks
Duration – 3 Hours

Introduction, trends in machine tool design, design specification, working principle,
Kinematics of machine tool, different drives, cutting speeds, gear boxes, ray diagram,
Force analysis, forces for different machining operation, design of beds, columns, tables, support, rigidity consideration,
Vibration in machine tool, vibration of column beds, vibration damping,
Design of side ways & guide ways, types of guide, pressure distribution, wear, accuracy, lubrication .
Design of power screws, design features, strength, rigidity, efficiency, backlash,
Design of spindles, balancing of spindles, strength & wear resistance,
CNC machine tool, CAD/CAM system, programming.

Reference:

1) Machine tool design by N.K.Mehta
2) Design principles of metal cutting—machine tool by F Koenigs Berger

NORTH MAHARASHTRA UNIVERSITY, JALGAON
M.E. (MACHINE DESIGN)
W.E.F.: 2010-11
FIRST YEAR TERM II
MECHATRONIC PRODUCT DESIGN

Exam Scheme :

Lectures – 03 hours/week.

Theory – 100 marks
Min passing – 40 marks
Duration – 3 Hours

Introduction to mechanical system, principles of basic electronics, microprocessor and their application, integrated, circuits, sensors, actuators, other electrical / electronic hardware in mechatronic system communication .

Interfacing DA & AD converters, software and hardware principles and tools to build mechatronic system. Design and selection of mechatronic elements namely sensors like encoders and resolvers stepper and servomotor.

Role of controls in mechatroincs role of modeling in mechatronics design, design optimizations of mechatronics systems.System interface, Data acquisition, Instrumentation system.

Reference:

1) Mechatronics by W. Bolton
2) Mechatronics System Design by Shetty D and Kolk R. A.

NORTH MAHARASHTRA UNIVERSITY, JALGAON
M.E. (MACHINE DESIGN)
W.E.F.: 2010-11
FIRST YEAR TERM II
ELECTIVE – II
AUTOMOTIVE DESIGN

Exam Scheme :

Lectures – 03 hours/week.

Theory – 100 marks
Min passing – 40 marks
Duration – 3 Hours

Design requirements of automobile, engines as a system and its subsystem, lubrication system, fuel injection system, cooling system. Design requirements of automobile transmission, automatic transmission; Dynamic consideration in designing of suspension system, modern system of suspension, kinematic requirements of steering mechanism, need for power steering, braking requirements of automobile. Brake materials, modeling and simulation of different subsystems, instrumentation and control, microprocessor controlled units, safety and comfort in automotive component design.

Reference:

1) Design of Machinery By Robert L Norton
2) Machine Component Design By Willian Orthweein.

NORTH MAHARASHTRA UNIVERSITY, JALGAON
M.E. (MACHINE DESIGN)
W.E.F.: 2010-11
FIRST YEAR TERM II
ELECTIVE – II

ROBOTICS

Exam Scheme :

Lectures – 03 hours/week.

Theory – 100 marks
Min passing – 40 marks
Duration – 3 Hours

Introduction: - Historical perspective, advantage, application
Basic component: -Manipulator sensory devices, controller, power conversion unit
Mechanical system: - translation & linear motion, motion conversion, modeling kinetic chain, end effectors
Control of actuator: - Closed loop control, control of robotics joint, stepper motor, direct drive, hydraulic actuator
Sensory devices: - Non-optical position sensor, optical position sensor, velocity sensor, accelarometer, proximity sensors, touch & slip sensor
Vision of robotics system: - Imaging component, picture coding, object recognition
Computer: -Hardware & software

Reference:

1) Robotics engineering by Richard Klafter
2) Robotics for Engineer by Yoram Korem
3) Robot Control by spong, lewis, Abdallah

NORTH MAHARASHTRA UNIVERSITY, JALGAON
M.E. (MACHINE DESIGN)
W.E.F.: 2010-11
FIRST YEAR TERM II
ELECTIVE – II
DESIGN FOR MANUFACTURE AND ASSEMBLY

Exam Scheme :

Lectures – 03 hours/week.

Theory – 100 marks
Min passing – 40 marks
Duration – 3 Hours

Life cycle of mechanical equipment design, Requirement of life cycle personnel like customer, management, marketing, manufacturing, transportation etc. Need to meet constraints of manufacturing, Advantages of designing for manufacturing and assembly to improve product quality, cost and time to market, Design for manufacture & assembly (DFMA) strategies, DFMA application and case studies, product design for manual assembly, Design for high speed automatic & robot assembly, design for machining, design for injection moulding, die casting and powder metal processing, Design for sheet metal for mechanical system design

Reference:

1) Process and Design for manufacturing by Sherif D EL Wakil
2) Manufacturing, Planning and control systems by Thomas E Vollmann, Willam L Beroy
3) Automation, Production System and Computer Integrated Manufacturing by Mikell P Groover.

NORTH MAHARASHTRA UNIVERSITY, JALGAON
M.E. (MACHINE DESIGN)
W.E.F.: 2010-11
FIRST YEAR TERM II
LABORATORY PRACTICE - II

Exam Scheme :

Practical's – 06 hours/week.

Term-work – 100 marks
Oral- 50 marks

Experiments/Assignments based on

1) Mechatronic Product Design
2) Design and Synthesis of Mechanism
3) Optimization Techniques in Design

The concerned subject in-charge should frame minimum of six laboratory Experiments / Assignments, two from each subject.

Note: Oral will be based on the prescribed term-work presented in the form of certified journal.

NORTH MAHARASHTRA UNIVERSITY, JALGAON
M.E. (MACHINE DESIGN)
W.E.F.: 2010-11
FIRST YEAR TERM II
SEMINAR-II

Exam Scheme :

Practical's – 06 hours/week. Term-work – 100 marks

Seminar-II should be based on the literature survey on any topic relevant to Design Engineering. It may be leading to selection of a suitable topic of dissertation. Each student has to prepare a write-up of about 25 pages. The report typed on A4 sized sheets and bound in the necessary format should be submitted after approved by the guide and endorsement of the Head of Department. The student has to deliver a seminar talk in front of the teachers of the department and his classmates. The Guide based on the quality of work and preparation and understanding of the candidate shall do an assessment of the seminar

The report copies must be duly signed by the guide and Head of department (one copy for institute, one copy for guide and one copy for the candidate for certification). Attendance of all students for all seminars is compulsory

NORTH MAHARASHTRA UNIVERSITY, JALGAON
M.E. (MACHINE DESIGN)
W.E.F.: 2010-11
SECOND YEAR TERM I
SEMINAR-III

Exam Scheme :

Practical's – 04 hours/week.

Term-work – 50 marks
Oral – 50 marks

Seminar - III should be based on the literature survey on any topic relevant to Design Engineering. It may be leading to selection of a suitable topic of dissertation. The report shall contain some contribution by the candidate in the form of experimental results, deductions, compilation and inferences etc.

Each student has to prepare a write-up of about 25 pages. The report typed on A4 sized sheets and bound in the necessary format should be submitted after approved by the guide and endorsement of the Head of Department. The student has to deliver a seminar talk in front of the teachers of the department and his classmates. The Guide based on the quality of work and preparation and understanding of the candidate shall do an assessment of the seminar.

The report copies must be duly signed by the guide and Head of department (one copy for institute, one copy for guide and one copy for the candidate for certification). Attendance of all students for all seminars is compulsory

NORTH MAHARASHTRA UNIVERSITY, JALGAON
M.E. (MACHINE DESIGN)
W.E.F.: 2010-11
SECOND YEAR TERM I
PROJECT STAGE - I

Exam Scheme :
Practical's – 18 hours/week. Term-work – 100 marks

The candidate shall submit the synopsis of the dissertation work to the evaluation committee at the starting of FIRST YEAR TERM III.

It shall include the problem definition, literature survey, approaches for handling the problem, finalizing the methodology for the dissertation work and design calculations / experimental design etc.

A report of the work shall be submitted at the end of Semester III after approval by the Guide and endorsement of the Head of Department. It will be assessed for term work, by the evaluation committee appointed by the Head of the Department, for appropriateness, sufficiency of contents and offer suggestions if any.

The candidate shall prepare a report of about 50 pages. The report typed on A4 sized sheets and bound in the prescribed format shall be submitted after approval by the Guide and endorsement of the Head of Department. It will be assessed for term work by the evaluation committee appointed by the Head of the Department.

The report copies must be duly signed by the guide and Head of department (one copy for institute, one copy for guide and one copy for the candidate for certification). Attendance of all students for all seminars is compulsory

NORTH MAHARASHTRA UNIVERSITY, JALGAON
M.E. (MACHINE DESIGN)
W.E.F.: 2010-11
SECOND YEAR TERM II
PROGRESS SEMINAR

Exam Scheme :
Practical’s – 04 hours/week. Term-work – 50 marks

Progress Seminar shall be based on topic of the Dissertation Work. It may include literature review, required theoretical input, study and comparison of various approaches for the proposed dissertation work. The candidate shall prepare a report of about 25 pages. The report typed on A4 sized sheets and bound in the prescribed format shall be submitted after approval by the Guide and endorsement of the Head of Department. It will be assessed for term work by the evaluation committee appointed by the Head of the Department.

The report copies must be duly signed by the guide and Head of department (one copy for institute, one copy for guide and one copy for the candidate for certification). Attendance of all students for all seminars is compulsory

NORTH MAHARASHTRA UNIVERSITY, JALGAON
M.E. (MACHINE DESIGN)
W.E.F.: 2010-11
SECOND YEAR TERM II
PROJECT STAGE - II

Exam Scheme :
Practical's – 18 hours/week. Term-work – 100 marks

The candidate shall submit the detailed report as per the synopsis approved by the evaluation committee, of the dissertation work in the prescribed format after approval by the Guide and endorsement by the Head of the Department. It will be assessed for term work by the evaluation committee appointed by the Head of the Department, for completion of the proposed work.
Note: - The evaluation committee shall consist of the Guide, one senior expert faculty member and the Head of the Department or his/her representative.

Rules and Regulations for M.E. in ((Machine Design):-

1.The post graduate degree in engineering consisting of 2 years (4 terms) shall be designated as Master of Engineering in Mechanical Engineering.
2. A candidate may be permitted to register him/her self for the M.E. degree in (Machine Designing) 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 Appropriate/Allied branch, recognized by AICTE/UGC & 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 75%) or non-submission of term work is required to repeat the term.
7. Any approved guide will not be allowed to 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 the 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 dissertation 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 & two faculty members of the department appointed by Director/Principal of the college as per the recommendation of the Head of the Department.
3. Seminar-III presentation will be evaluated by examiners appointed by University, one of which should be 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:

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.

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 at least 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 & 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
c) 60% to less than 70%	: First Class
d) 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.

School of Management Studies,
North Maharashtra University, Jalgaon

Syllabus for
P.G. Department of Management

(Under Academic Flexibility)

First Year M. B. A. First Semester

(With Effect from June 2013)

Faculty of Commerce and Management

2013-14

North Maharashtra University, Jalgaon

(NACC Accredited 'B' Grade University)

School of Management Studies

MASTER IN BUSINESS ADMINISTRATION (M.B.A.)

(FACULTY OF COMMERCE & MANAGEMENT)

(Under Academic Flexibility)

COURSE STRUCTURE WITH CREDIT

Semester I					
Paper	**Paper Name**	**Credits**	**Maximum Marks**		
			Internal	**External**	**Total**
101	Management Science –I	4	25	75	100
102	Accounting For Management	4	25	75	100
103	Organizational Behavior	4	25	75	100
104	Basic Economics for Management	4	25	75	100
105	Quantitative Techniques	4	25	75	100
106	Computer applications in Business	4	25	75	100
107	Communication Skills	4	25	75	100
Semester II					
201	Management Science-II	4	25	75	100
201	Management Accounting & Financial Management	4	25	75	100
203	Marketing Management	4	25	75	100
204	Human Resource Management	4	25	75	100
205	Operations & Material Management	4	25	75	100
206	Advance Research Methods	4	25	75	100
207	Ethical Practices in Business	4	25	75	100
Semester III					
301	Strategic Management	4	25	75	100
302	Business Law-I	4	25	75	100
303	Current Business Scenario	4	25	75	100
304	Specialization I	4	25	75	100
305	Specialization II	4	25	75	100
306	Specialization III	4	25	75	100
307	Specialization IV	4	25	75	100
Semester IV					
401	International Business Management	4	25	75	100
402	Business Law-II	4	25	75	100
403	Management Information System and E-Commerce	4	25	75	100
404	Specialization I	4	25	75	100
405	Specialization II	4	25	75	100
406	Specialization III	4	25	75	100
407	Specialization IV (Project Viva-Voce)	4	25	75	100
	Total	**112**			**2800**

1. TITLE OF THE DEGREE

This degree shall be titled as Master in Business Administration (MBA) with the mention of Major Specialization in the bracket as "MBA (Specialization)". This new curricula shall be effective from July 2010.

2. DURATION

The regular Full Time Course shall be of 2 Years duration; comprising of 4 Semesters through Theory papers, Sessional, Practical, Project report, Viva-voce, and such other Continuous Evaluation Systems as may be prescribed, in this respect, from time to time.

3. ELIGIBILITY FOR ADMISSION

As per admission rule framed by Directorate of Technical Education (DTE) the Government of Maharashtra AICTE and North Maharashtra University

4. PATTERN & GRADING SYSTEM

A. Features of the CGPA System :

1. Master's degree courses namely, M.B.A. run in Department of Management Studies would be of **28 credits** for each **Semester** that is **112 credits** for whole **Degree Course**
2. One credit for the theory course shall be of the **15 clock hours** (Each course being taught in the semester will be of **4 credits**) that is each course will be of **60 hours**.
3. Out of this 4 credits for each course **3 credits (45 Hours)** allotted to **External Theory Exam** and **1 credit (15hours)** is for **Internal Assessment**.
4. **4 credits** shall be awarded to the Project course, which will commence after completion of II Semester (During vacation falling after the end of first year) and the final work and report will be submitted during IV Semester. The marks and the credits will be allotted in IV Semester.
5. Academic calendar showing dates of commencement and end of teaching, internal assessment tests and term end examination shall be duly notified before commencement of each semester every year by the Department.

B. Evaluation of the student :

(a) The evaluation of the student shall be divided into two parts viz. **Internal Assessment** and **Term End Examination (final semester examination)** with a weightage in the ratio of 25:75

(b) Standard of passing –

(i) There shall not be pass or fail for the internal assessment. However, the attendance for the internal assessment shall be compulsory.

(ii) Minimum marks for passing the Term End Examination in theory/project course shall be 40%.

(iii) Minimum marks for passing the theory/project course (i.e. sum of the marks obtained in internal and term end examination) shall be 40%.

(c) The distribution of marks for each theory paper of **4 credits** at term (Semester) end examination and for continuous internal assessment shall be as follows :

Theory Examination	Maximum marks
Internal assessment	25
Term end examination	75
Total marks	100

(d) The **Project course** will commence after completion of II Semester (During vacation falling after the end of first year) and the final work and report will be completed during IV Semester. The marks and the credits will be allotted in IV Semester. The distribution of marks for Project course of **4 credits** is as follows

Project Examination	Maximum marks
Internal assessment	50
Viva - voce	50
Total marks	100

(e) Internal Assessment:

For the internal assessment **1 credit (15 Hours)** shall be assign. The internal assessment includes:

Heads	Marks	Evaluating Authority
Internal test/Computer Practical	15	Concerned Faculty
Presentation, Seminar, Assignment, Case Study, Research Paper	10	
Total marks	25	

(i) Two internal tests conducted by the subject teacher. Each test shall be of **15 marks and the concerned teacher shall consider either best of two or average.** The duration of the each test will be of 60 minutes.

(ii) The marks for each test shall be displayed on notice board within seven days of conducting the test.

(iii) It is mandatory to show the answer sheets of all tests to the students.

(f) Term end examination :

(i) The term end examination for 75 marks per course would be held about a week after completion of teaching for the semester.

(ii) The term end examination of maximum marks 75 and its assessment work shall be conducted by the department under the academic flexibility granted to the department by the University authorities.

(iii) Each theory paper of 75 marks shall be of the three hours duration.

C. Grades:

(i) Marks for each course would be converted to grades as shown in Table 1.

Table 1: Conversion of marks to grades in credit system

Marks obtained	Grade	Grade Points
90-100	A+	10
80-89	A	9
70-79	B+	8
60-69	B	7
55-59	C+	6
45-54	C	5
40-44	D	4
39 and less	F	0

(ii) The grade point will be given on the total marks (sum of mark obtained in internal assessment and term end examination) obtained in the said subject.

(iii) A student who fails in a course (i.e. he scores less than 30 out of 75 marks in the Term End Examination or less than 40 out 100 marks) shall be given FC grade. Student with FC grade in course would be granted credit for that course but not the grade for that course and shall have to clear the concerned course within 3 (Three) year from appearing for first time in the concerned paper.

(iv) The **total grade points earned in each course** shall be calculated as –

Grade points obtained (vide Table-1) X Credits for the course
Maximum grade points that can be earned in a semester are 320.

(v) **Semester Grade Point Average (SGPA)** –

The performance of a student in a semester is indicated by a number called SGPA. SGPA is the weighted average of the grade points obtained in all courses registered by the student during the semester. It shall be calculated as follows-

$$\text{SGPA} = \frac{\sum_{j=1}^{m} c_i \, p_i}{\sum_{j=1}^{m} c_i}$$

where C_i = the number of credits earned in the i^{th} course of a semester for which SGPA is to be calculated

p_i = grade point earned in the i^{th} course

i = 1,2,3……n represent the number of courses in which a student is registered in the concerned semester.

That is,

$$\text{SGPA} = \frac{\text{Total earned grade points for the semester}}{\text{Total credits for the semester}}$$

The SGPA is rounded upto two decimal places.

(vi) **Final result** – Up to date assessment of the overall performance of a student from the time of his/her first registration is obtained by calculating a number called Cumulative Grade Point Average (CGPA), which is weighted average of the grade points obtained in all courses registered by the student since he/she entered the School/Department.

$$\text{CGPA} = \frac{\sum_{j=1}^{m} c_j \, p_j}{\sum_{j=1}^{m} c_j}$$

where C_j = the number of credits earned in the j^{th} course up to the semester

p_j = grade point earned in the j^{th} course. A letter grade lower than D (i.e. grade point < 4) in a course shall not be taken into consideration for the calculation of CGPA.

j = 1, 2,3……m represent the number of courses in which a student is registered up to the semester for which the CGPA is to be calculated

The CGPA is rounded upto two decimal places.

(vii) The final grade earned shall be as per Table 2 given below-

Table-2

CGPA	Grade
9.0-10	A+
8.0-8.9	A
7.0-7.9	B+
6.0-6.9	B
5.5-5.9	C+
4.5-5.4	C
4.0-4.4	D
0 -3.9	F

5. GUIDELINES FOR TEACHING

5.1. There shall be 60 (45 for Teaching Sessions & 15 for Continuous Assessment) lecture hours per semester per course. The duration of the lectures shall be 60 minutes each. There shall be at least 14-16 weeks of teaching before commencement of examination of respective semester.

5.2. There shall be 4 lectures / week / paper.

5.3. The semester workload is balanced with 7 full papers of 100 marks each / semester. Thus 315 lectures hours are considered for teaching sessions and 105 hours shall be used for continuous assessment.

5.4. Self study shall be natural requirement beside the time table. The Faculty will have to exert a little extra for cultivating reading habits amongst the students.

5.5. The teaching method shall comprise a mix of Lectures, Seminars, Group discussions, Brain storming, Game playing, Interactions with Executives etc. so as to prepare the students to face the global challenges as business executive for this Audio- visual aids and Practical field work should be a major source of acquiring knowledge.

5.6. Case study method preferably shall be used wherever possible for the better understanding of the students.

5.7. Department shall issue annual souvenir/ placement brochure separately and a copy of the same shall be submitted to the university before the end of the year.

6. PRACTICAL TRAINING AND SUMMER INTERNSHIP PROJECT

6.1. Each student shall have to undergo a practical training for a period of not less than 7 weeks during vacation falling after the end of first year.

6.2. In the Fourth semester examination student has to do "Project Work" individually on the basis of specialization. No group work is allowed in this. The topic should be decided in consultation with the guidance of internal teacher of the Institute at the end of the first year, so that the student can take up the training during the vacations. The Project should be necessarily Research oriented, Innovative and Problem solving. No teacher shall be entrusted with more than 15 students for guidance and supervision.

6.3. The Academic committee shall submit the detailed list of candidate with Project Titles, name of the organization, internal guide & functional elective to the Examination committee on or before 31st March of the second year.

6.4. The student has to write a report based on the actual training undergone during the vacations at the specific selected business enterprise, get it certified by the concerned teacher that the Project report has been satisfactorily completed and submit THREE typed copies of the same to the Head of the Department.

6.5. Two copies of the report submitted by the student shall be forwarded to the Examination committee by the Academic committee before 31st January.

6.6. The project work will carry maximum 100 marks, of which internal teacher shall award marks out of maximum 50 marks on the basis of project work done by the student as a continuous assessment. Remaining marks shall be awarded out of maximum 50 marks by examining the student during Viva-voce, by the panel of the external examiners to be appointed as per university norms.

6.7. No students will be permitted to appear for Viva- voce and Semester IV examinations, unless and until he/she submits the project report before the stipulated time.

7. ADDITIONAL SPECIALIZATION

7.1 The student who has passed MBA of this University with a specific specialization may be allowed to appear for MBA examination again, with other specialization by keeping term for the IIIrd and IVth semester for the so opted 8 papers of additional specialization. (S)He has to appear for 8 papers including Project report of the additional specialization so opted.

7.2 He shall be given exemption for all other papers.

7.3 The student has to pay only Tuition fees for one year as may be prescribed from time to time for this purpose.

7.4 The student is not entitled to receive separate Degree Certificate or Class for this additional specialization.

8. STRUCTURE OF THE QUESTION PAPER

8.1 Each question paper shall be of 75 marks and of 3 hours duration.

8.2 **For Theory papers** there will be 2 Sections. In section I candidate required to answer 3 questions out of 5 questions & in section II candidate required to answer 2 questions out of 3 questions. All questions shall carry equal marks i.e. 15 marks each.

8.3 **For Composite papers (theory and practical / problems)** there will be 2 sections. In section I (practical/problem) student required to answer 3 questions out of 5 questions & in section II (Theory) student required to answer 2 questions out of 3 questions. All questions shall carry equal marks i.e. 15 marks each.

8.4 **For papers including case studies** there shall be 2 Sections. In Section I (Theory) a student shall be required to answer 3 questions out of 5 questions & in Section II (Case studies) 2 case Studies out of 3 case studies to be attempted by the students. All questions shall carry equal marks i.e. 15 marks each.

Syllabus:

Keeping in view the professional nature of examinations, students are required to equip themselves as per the prescribed syllabus and questions can be asked according to the course structure. The department **also reserves the right to vary the syllabus / rules from time to time**, as the department is carrying out this course under Academic Flexibility as per the direction of the university. Any alterations made will be notified from time to

School of Management Studies,
P.G. Department of Management
North Maharashtra University, Jalgaon

(Grade ‘B’ (2.88) NAAC Re- Accredited)

FACULTY OF COMMERCE & MANAGEMENT

New Syllabus: First Year M.B.A. (W.E.F. June -2013)

Paper: 101 Management Science I

(75 + 25 Pattern: External Marks 75+Internal Marks 25 = Maximum Total Marks: 100)

Required Lectures: 45+15 hours

Unit 1: Introduction to Management **(05)**

1.1 What is Management?
1.2 The Management Process.
1.3 The functions of Management.
1.4 Who are managers & what they do?
1.5: Types of managers
- Corporate level Manager

- Business Level Manager
- Functional Manage
- Frontline Manager

1.6: Managerial Roles & skills

- Interpersonal Roles
- Informational Roles
- Decision Roles
- Managerial skills, values and motivation

1.7 Management Yesterday & Today
1.7.1. The evolution of Management Theories.
1.7.2. The Pre classical Contributors.
1.7.3. The Classical viewpoints.
1.7.4. Behavioural viewpoints.
1.7.5. Contemporary viewpoints.
1.7.6. Managing in the 21st Century.

Unit 2: Planning **(05)**

2.1 Planning within the organisation & levels of Planning
2.1.1 Strategic Plans
2.1.2 Operating Plans
2.2 Types of plans.
2.3 The overall planning process.
2.4 The nature of organizational goals.
2.5 Linking goals & plans.
2.6 Objectives.
2.7 Evolving concepts in management by objectives.

Unit 3: Decision Making **(05)**

3.1 Rationality in decision making.
3.2 Steps in effective decision making.
3.3 Development of alternatives & the limiting factor.
3.4 Approaches to selecting an alternative.
3.5 Programmed & non programmed decisions.
3.6 Decision making under certainty, uncertainty & risk.
3.7 Decision making heuristics & cognitive biases.
3.8 Prospect theory.
3.9 Promoting innovation. The creativity factor in decision making

Unit 4: Planning & decision aids **(05)**

4.1 Forecasting
4.2 Project planning & control models.
4.3 Other planning techniques.
4.3.1. Linear programming.
4.3.2. Queuing or waiting lines
4.3.3. Models Routing.
4.3.4. Simulation models.
4.4 Quantitative aids for decision making.

Unit 5: Organisational Architecture **(08)**

5.1. Organizational structure defined.
5.2. The organizational Chart.
5.3. Job design.
5.4. Departmentalization.
5.5. Methods of Vertical Co-ordination.
5.5.1. Formalization.

5.5.2. Span of Management.
5.5.3. Downsizing.
5.5.4. Centralization Vs Decentralization.
5.5.5. Delegation.
5.5.6. Line & Staff Positions.
5.6. Methods of Horizontal Co-ordination.
5.6.1. Slack resources.
5.6.2. Information systems.
5.6.3. Lateral resources.
5.7. Designing organization structures.
5.8. Assessing structural alternatives
5.8.1. Functional Structure.
5.8.2. Divisional Structure.
5.8.3. Emerging structures.
5.8.3.1. Virtual organizations
5.8.3.2. Boundary less organization.
5.9. An organizational environment for Entrepreneuring & Intrepreneuring.
5.10. Reengineering the organization.

Unit 6: Motivation **(07)**
6.1. Nature of Motivation.
6.2. Need theories
6.2.1. Hierarchy of Needs Theory.
6.2.3. Two factor Theory.
6.2.3. ERG Theory.
6.2.4. Acquired Needs Theory.
6.3. Cognitive Theories.
6.3.1. Expectancy theory.
6.3.2. Equity theory.
6.3.3. Goal setting theory.
6.4. Reinforcement Theory.
6.5. Social Learning Theory.
6.6. Managing motivation through extrinsic & intrinsic rewards.
6.7. Self motivation.

Unit 7: Leadership **(05)**
7.1. Leadership defined.
7.2. Ingredients of Leadership
7.3. Leadership behavior& styles.
7.4. The Managerial Grid.
7.5. Leadership theories.
7.5.1. Fiedler's Contingency Model.
7.5.2. Normative Leadership Model.
7.5.3. Situational Leadership Model.
7.5.4. Path goal theory.

Unit 8: Controlling **(05)**
8.1. The basic control process.
8.2. Critical control points, standards & benchmarking.
8.3. Control as a feedback system.
8.4. Real time information & control.
8.5. Feed forward & preventive control
8.6. Managerial approaches to implementing controls.

8.6.1. Bureaucratic control
8.6.2. Clan control.
8.6.3. Market control.
8.7. Requirement for effective control.

Reference:

1. Management' - Kathryn Bartol & David Martin lrwin- McGraw Hill.
2. 'Management - A global & entrepreneurial Perspective'-Heinz Weihrich, Mark Cannice, Haroldkoontz- Tata Mc-Graw Hill
3. 'Principles of Management '- Charles WL Hill, Steven L Mcshane- Tata McGraw Hill.
4. 'Management'- Stephan Robbins, Mary Coulter-Prentice hall India.
5. Management' – Stoner, Freeman, Gilbert- Prentice hall India.

Additional Readings in Management- An Indian Perspective

1. Business Maharajas-Gita Piramal- Penguin Book.
2. The India Way – Peter CappelliHarbir Singh, Jitendra Singh, Michael Useem-Harvard business press.
3. Indian railways turnaround-R.N.Mishra-Jaico Publishing House

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FACULTY OF COMMERCE & MANAGEMENT

New Syllabus: First Year M.B.A. (W.E.F. June -2013)

Paper: 102 Accounting for Management

(75 + 25 Pattern: External Marks 75+Internal Marks 25 = Maximum Total Marks: 100)

Required Lectures: 45+15 hours

Unit 1: Accounting Principal and Concept (08)

Meaning and scope of Accounting – Definition of Accounting – Steps of accounting – Function of Accounting – Objectives of Accounting – Book Keeping – Limitations of Accounting; Branches of Accounting; Relationship between Management Accounting and Financial Accounting, Relationship between Cost Accounting and Management Accounting; Accounting Principles - Accounting Concepts – Entity concept- Dual Aspect concept – Accounting Period Concept – Going concern Concept – cost Concept – money Measurement Concept – Matching Concept – Realization – accrual Concept – Rupee Value Concept; Accounting Conventions –Conventions of Disclosure – Convention of Conservation – Convention of Consistency –Convention of Materiality; Tools and Techniques of Management Accounting

Unit 2: Financial statements: Analysis and Interpretation (08)

Introduction – Definition of Financial statements – Objectives of Financial statements – Nature of Financial statements – Requisites, attributes or Essential Requirements of financial Statements– Importance of Financial statements – Limitation of Financial statements – Recent trends in Presenting Financial statements – Basic Financial statements or Packages of Financial, Statements – Format of Profit and Loss Account – Position Statement or Balance Sheet – Form or Performa of a Balance sheet – Elements of Balance Sheet. Analysis and Interpretation- Meaning – Types of Analysis and Interpretations- Internal Analysis – External Analysis- Horizontal Analysis – Vertical analysis-Methods of Analysis and Interpretation – comparative Financial Statement – Common Size Statements – Trend Analysis.

Unit3: Fund Flow Statement (08)

Introduction – Meaning of Fund – Flow of Fund and No Flow of Fund – Statement of Change in Financial Position – Flow of Fund Chart – No Flow of Fund Chart – Examples Flow of fund –Components of Flow of Fund – Current Assets – Current Assets – Current Liabilities - Non-Current Assets – Non-Current Liabilities – Fund Flow Statement Vs Balance Sheet – Preparation of Fund Flow Statement; Fund from Operations- Statement of Change in Working Capital –Fund Flow Statement - Meaning – Specimen Format- Purposes-Calculation of fund From Operation- Practical Problem.

Unit 4: Cash Flow Statement (06)

Meaning – Purpose of Cash Flow statement – Difference between Cash Flow statement and Fund Flow statement- Limitation – Preparation of Cash Flow statement- Flow of Cash under Noncurrent Items- Flow of Cash due to operations – Non- cash Items – Specimens Form at calculation of Cash Received from Operation - Practical Problem

Unit 5: Ratio Analysis **(08)**

Meaning and Definition of Analysis and Interpretations of Ratio – Principles of Ratio Selection-Advantages- limitations of Ratio Analysis: Classification of Ratios- Liquidity ratios-Current ratio-Quick ratio- Absolute Liquid Ratio; Profitability ratios- Gross Profit Ratio- Net Profit Ratio-Return on Investment-Operating ratio- Operating Profit ratio-Return on capital Employed Ratio- Earning per share Ratio- Dividend Yield Ratio- Price earnings Ratio- Net profit to Net Worth ratio; Turnover ratios- stock turnover ratio – debtors turnover ratio- debt collection period ratio- creditor turnover ratio- Average payment period- working capital turnover ratio- fixed assets turnover ratio- capital turnover ratio; Solvency ratios- debt equity ratio- proprietary ratio – capital gearing ratio-debt service ratio; Practical Problems

Unit 6: Cost Accounting& Cost sheet Analysis **(07)**

Objective of Cost Accounting – Advantages and Limitation of Cost Accounting –Installation of Cost Accounting System- Practical difficulties in Installation of Costing system. Cost sheet – Meaning – Element of Cost – Direct Cost – Indirect cost - Overheads- Prime Cost-Works cost – Cost of Production- Cost of Sales – Importance of Cost sheet – Specimen Format of Cost Sheet- Preparation of Cost sheet- Practical Problem.

References:

1. “Management Accounting”,M. E. ThukaramRao, New Age International Publishers.

2. “Financial Cost and Management Accounting”, Dr P. Periasamy, Himalaya Publication House.

3. “Financial Management”, Ravi M Kishor, Taxman Publication

4. “Financial Management”, IM Pandey, Vikas Publishing House.

5. “Financial Management”, Khan & Jain”, MC Graw Hill Publishing House.

6. “Cost Accounting”, M.C Shukla, T.S. Grewal, M.P. Gupta, S.Chand Publishing house.

7. “Cost and Management Accounting”, Ravi. M. Kishore, Taxman Publication.

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FACULTY OF COMMERCE & MANAGEMENT

New Syllabus: First Year M.B.A. (W.E.F. June -2013)

Paper: 103 Organisational Behaviour

(75 + 25 Pattern: External Marks 75+Internal Marks 25 = Maximum Total Marks: 100)

Required Lectures: 45+15 hours

Unit 1: Introduction to the Field of Organizational Behaviour (06)

1.1 Field of organization behaviour.
1.2 Emergence of O.B as a discipline.
1.3 Importance of organizational behaviour.
1.4 Foundation of O.B.
1.5 Anchor of Organizational Behaviour.
1.6 Interdisciplinary Influences on O.B.

Unit 2: Individual Processes and Behaviour (10)

2.1 MARS Models of Individual Behaviour
2.2 Types of Individual Behaviour in Organization.
2.3 Individualism and Collectivism
2.4 Personality in Organization
2.5 Personality Theories
2.6 Big five personalities Dimension.
2.7 Perception and perceptual process.
2.8 Social Identity and Attribution theory of perception.
2.9 Perpetual Errors and Perception Improvement.
2.10 Learning in organization.

Unit 3: Values and Attitudes (06)

3.1 Nature and components of attitude
3.2 Attitudes and attitude formation.
3.3 Functions of attitude
3.4 How attitude can be change
3.5 Job satisfaction and work behaviour
3.6 Values: Personal and organizational values
3.7 Attitude, values and OB
3.8 Managing emotion in the workplace.

Unit 4: Motivation, Leadership and Trust at work (08)

4.1 Motivation and work behaviour
4.2 Different Theories of motivation
4.3 MBO Approaches to motivation.
4.4 Motivation Programme for employee.
4.5 Reward Practices and Empowerment Practices.
4.6 Contemporary issues in leadership.
4.7 Trust and leadership.

Unit 5: Organizational Change and Stress Management **(08)**

6.1 Forces for change.
6.2 Managing Planed Change.
6.3 What can change agents change?
6.4 Resistance to change.
6.5 Approaches' to managing organizational change.
6.6 Stress, Consequences of stress, Sources of stress.

Unit 6: Power & Conflict in the Workplace **(07)**

7.1 Model for Power in organization
7.2 Sources of Power in organization
7.3 Contingencies of Power
7.4 Influence Tactics and Organizational Politics
7.5 Conflict Process
7.6 Source and Conflict Management Style

References

1. Organization behaviour by Debra L. Nelson & James Campbell, Cengate Publication
2. Organization behaviour by Stephen Robins, Timothy A Judge, Seema Sanghi, Pearson Education
3. Organization behaviour by Suja R. Nair, Himalaya Publication House
4. Organization behaviour by M. N. Mishra, Vikas Publication House
5. Organization behaviour by Steven L. McShane, Mary Ann Von Gliow

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FACULTY OF COMMERCE & MANAGEMENT

New Syllabus: First Year M.B.A. (W.E.F. June -2013)

Paper: 104 Basic Economics for Management

(75 + 25 Pattern: External Marks 75+Internal Marks 25 = Maximum Total Marks: 100)

Required Lectures: 45+15 hours

Unit I- Fundamental concepts of Economics (10)

1.1 Definition, Basic economic problems of economics importance and scope of economics .
1.2 Early theories- Adam Smith, Alfred Marshall, Lionel Robins.
1.3 Subject Matter of-
  a) Micro Economics- Nature, scope, Importance and limitations.
  b) Macro Economics- Utility and Need
  c) Capitalism- Definition Features.
  d) Socialism- Definition, Features, Merits & Demerits
  e) Mixed economy and Indian economy-Bases of Indian economy, Nature, Scope, Problems. Determination of national income and GDP. Unemployment And Trade cycles and its impact on National policies.

Unit 2: Managerial Economics (05)

2.1 Nature & Scope of Managerial Economics
2.2 Managerial decisions under Factor markets- Perfect competition, monopolistic, Monopoly, Oligopoly
2.3 Decisions under Risk: Maximization of Expected Value, Mean-Variance Analysis, Co-Efficient of Variation Rule, Expected Utility
2.4 Criterion's of Decision Making under Uncertainty

Unit 3: Law of Demand and Supply (06)

3.1 Defination,Types of demand, Law of demand, exceptions to the law of Demand.
3.2 Determinants and Elasticity of demand,
3.3 Demand Curves, Demand estimation And Forecasting Methods
3.4 Demand- led Business Strategy
3.5 Consumers Equilibrium
3.6 Supply: Determinants and Its Elasticity

Unit 4: Costs, Revenue and pricing practices (06)

4.1 Costs Curves
4.2 Average and Marginal Revenue Curves
4.3 Pricing Practices: Price Discrimination, Full Cost Pricing, Product Life Cycle Pricing, Transfer Pricing, Modern Theory of Factor Pricing
4.4 Various Concepts of Profits: Determinants of Profits.

Unit 5 The factors of production **(05)**

5.1 Production function: content, importance

5.2 Peculiarities of Land, Labour.

5.3 Meaning of Rent: Quasi-rent- Theories of Rent: Ricardian Theory; Modern Theory of Rent Relationship between Rent and Price: Ricardian Analysis;

5.4 Concept of Wages: Difference between Real Wages and Nominal Wages, Theories of Wages: Bargaining Theory of Wages; Morden Theory of Wages

Unit 6: Economics of Regulation **(06)**

6.1 The Role and need of the Government, Problem with Regulation and Cost of the Regulation

6.2 Regulatory Response: Incentive Failures: Property, Rights & Regulation, Patents & Tort System, Subsidy & Tax Policy

6.3 Deregulation Movement & Regulatory Reforms: Government Failures, Deregulation and Privatization, Regulatory Reforms for Promoting Competition

Unit 7: Financial repressions and Financial reforms **(07)**

7.1 Monetary economy-

a) Concept, scope, Function and Importance of Money in Modern economy, Demand and Supply of money

b) Gold Standards, exchange rate regime since 1973 Currency,

c) Exchange rate determination- theory of equilibrium rate of exchange, Currency exchange standards, Factors influencing Exchange rates.

d) Public Debt, Supply of Loans and Demand for deposits.

e) Measures of Inflation and stagflation

7.2 Fiscal Policy measures:

a)Deficit financing and fiscal policy,

b)Role of government in economic planning

c) Balance of payments

7.3 Development planning:

a) Finance: Savings, Public Revenue, FI,FDI

b) Balanced and Unbalanced growth- types of strategies.

References:

1. Modern Economic Theory: K.K.Dewett, S.Chand publications. New Delhi.
2. Indian Economy: Mishra- puri, Himalaya publication ltd.
3. Managerial Economics: H.Craig Peterson,W.Cris Lewis,Prentice- Hall Of India,3rd Ed.
4. Macro Economics: Erol D' Souza, Pearson Education. New Delhi.
5. Micro Economics:Robert S. Pindyick, Daniel L. Rubinfed, Prem L. Mehta, 7th edition,Pearson Education. New Delhi.
6. Managerial Economics: Mishra, Puri, Himalaya Publications.Ltd
7. Managerial Economics (theory and applications):Dr. D.M. Mithani, Himalaya Publications.Ltd.
8. International Financial Management, V.S. Sharan, Printice hall of India Pvt. Ltd. New Delhi, Third edition.

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FACULTY OF COMMERCE & MANAGEMENT

New Syllabus: First Year M.B.A. (W.E.F. June -2013)

Paper: 105 Quantitative Techniques

(75 + 25 Pattern: External Marks 75+Internal Marks 25 = Maximum Total Marks: 100)

Required Lectures: 45+15 hours

Unit: 1 Basic Statistical Concept **(04)**

1.1 statistics:- meaning, function and limitation of statistics and its characteristics
1.2 Measures of Central Tendency, Mean, Mode, Median
1.3 standard Deviation and Application of standard deviation
1.4 Frequency Distribution and cumulative frequency distribution

Unit: 2 Correlation and Regression analysis **(06)**

3.1 Meaning- Properties and types of correlation
3.2 Scatter Diagram
3.3 Karl Pearson's coefficient of correlation
3.4 Probable error
3.5 Meaning and properties of Regression analysis
3.6 Line of Regression
3.7 Coefficient of Regression
3.8 Relation between correlation and regression.
3.9 Simple numerical problems on above concept.

Unit: 3 Probability **(06)**

2.1 Introduction, Basic Probability concept, Types of Probability
2.2 permutation and combination
2.3 Concept of Probability Distribution
2.4 Conditional Probability, computation of conditional probability.
2.5 statistical or empirical probabilities
2.6 Axiomatic probability
2.5 Statement of addition and multiplication, Theory of Probability.
2.6 Numerical Problems on the above concept.

Unit: 4 Determinants and Matrices **(06)**

4.1 Meaning and tabular presentation of matrices
4.2 Types of Matrices
4.3 Matrix Operations
4.4 Determinant – Basic concept of Determinants
4.5 Properties of determinant
4.6 Cramer's rule & Matrix Inversion Method to solve matrices
4.7 Numerical problem on above concepts.

Unit: 5 Linear Programming Problems **(07)**

5.1 Introduction
5.2 Formulation of linear programming problems

5.3 Assumption underlying linear programming
5.4 Methods of LLP-Graphical Method and simplex method
5.5 Solution of only maximization problems
5.6 Concept of Duality
5.7 Some real life problems.

Unit: 6 Assignment Problems **(06)**
6.1 Introduction
6.2 Mathematical statement of the problem
6.3 Solution of assignment problem by Hungarian method
6.4 variations of the assignment problem: Multiple option solution, maximization case in assignment, unbalanced assignment problem
6.4 Some special cases.

Unit: 7 CPM and PERT **(05)**
7.1 Introduction
7.2 PERT/CPM Network
7.3 Network analysis
7.4 Resource analysis and allocations
7.5 Programme evaluation and review techniques.
7.6 Difference between CPM and PERT.

Unit: 8 Decision theory and decision Trees **(05)**
8.1 Introduction: steps in decision theory
8.2 Decision Making under uncertainty
8.3 Maximax criteria, Maximin criteria, Minimax criteria, Laplace criteria.
8.4 Decision Making under certainty: Expected monetary value criteria, EVPI
8.5 Decision tree analysis.

References
1. Quantitative techniques in management –N.D.Vohra- Tata McGraw Hill
2. Quantitative Techniques- L.C.Jhamb-Everest Publishing House.
3. Quantitative techniques for decision making-Anand Sharma-Himalaya Publishing House
4. Business Statistics-S.P.Gupta-Sultan Chand & Sons.
5.Quantitative techniques for Managerial decisions by J.K. Sharma

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FACULTY OF COMMERCE & MANAGEMENT

New Syllabus: First Year M.B.A. (W.E.F. June -2013)

Paper: 106 Computer Applications in Business

(75 + 25 Pattern: External Marks 75+Internal Marks 25 = Maximum Total Marks: 100)

Required Lectures: 45+15 hours

Unit: 1 Computer Fundamentals (08)

Computer-meaning, definition, characteristics, types of computer, classification of computer, basic components, basic computer operations, memory system, and practical data processing applications in business, computer Applications in various areas of business, Components of computer-Computer memories, primary storage, secondary storage, Introduction to input /output Device

Unit: 2 Introduction to software (06)

Software types, system software, classification of Operating system, Application software, Introduction to programming language, types of programming language, Algorithm, flowcharts, Types of flowcharts ,Program development

Unit: 3 Introduction to Database Management system (08)

Data processing-Introduction, cycle, operations, types, objective, methods, role of data Processing applications in business, Data base- Introduction, characteristics, objectives Database Management system-Introduction, objective, components functions, advantages

Unit: 4 Computer Communications (08)

Introduction, data communication, Computer network, Advantages of networking, Types of network, Telecommunication –Introduction, Media, Channel, Software, types of data transmission, modems and multiplexers

Unit: 5 Introductions to Internet (08)

Internet-Introduction, history, features, Internet software, Applications of internet and WWW, Extranet and E-mail, Introduction to web Browsers, Intranet, internet, extranet

Cyber Crime: meaning, measures for prevention, cyber laws, cyber warfare

Information Security: concept, meaning, goals for security, security threats, computer viruses, security procedures, computer and cyber forensic

Unit: 6 Microsoft Office-2007 (07)

MS-Word-Creating and editing document, Formatting characters and paragraphs, formatting and enhancing a document, formatting with special features

MS- Excel-Analyzing data using Excel, Editing and formatting worksheets, using functions, word and excel

MS-Power Point-Preparing a presentation, editing and enhancing slides, customizing a presentation, word, excel and PowerPoint

MS-Access-Maintaining a data in Access tables, creating tables and relationships, creating queries, forms and reports, word excel and Access

Reference

1. Computer Application in business-S. Sudalaimuthu, S. Anthony Raj-Himalaya
2. Publishing House
3. Fundamentals of Computers-C.S.V. Murthy- Himalaya Publishing House
4. Ms-Word 2007-A visual approach to learning computer skills-BPB publication
5. Ms-EXCEL 2007-A visual approach to learning computer skills-BPB publication
6. Ms-Power Point 2007-A visual approach to learning computer skills-BPB publication
7. Ms-ACCESS 2007-A visual approach to learning computer skills-BPB publication
8. Computer Applications for management-Vishal Soni- Himalaya Publishing House
9. Fundamentals of Computers, V. Rajaraman,Prentice-Hall.
10. Cyber Security in the 21st Century, Nina Verma, Global Vision Publishing House
11. Inside Cyber warfare, Carr, Kitab Mahal, New Delhi
12. Information Security: Principles and Practices, Pearson publisher
13. Cybre Security: Understanding cyber crimes, computer forensic and legal practices, Wiley India Pvt. Ltd.

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FACULTY OF COMMERCE & MANAGEMENT

New Syllabus: First Year M.B.A. (W.E.F. June -2013)

Paper: 107 Communication Skills

(75 + 25 Pattern: External Marks 75+Internal Marks 25 = Maximum Total Marks: 100)

Required Lectures: 45+15 hours

Unit 1 Understanding Business Communication **(08)**

1.1 Model of Communication Process
1.2 Effective Business communication
1.2 Verbal and Non-Verbal Communication
1.3 Formal and Informal Communication
1.4 Communication barriers & breakdowns
1.5 Mastering Listening
1.6 Communicating in teams
1.7 Negotiation Skill
1.8 Planning, Conducting and Recording meetings
1.9 Communicating Cross-culturally

Unit 2 Effective Writing **(08)**

2.1 Format and Layout of Business Documents.
2.2 Planning Business Messages
2.3 Writing Business Messages
2.4 Completing Business Messages

Unit 3 Writing Brief Message **(07)**

3.1 Formats for Letters and Memos
3.2 Writing Messages for Electronic Media
3.3 Writing Routine and Positive Messages
3.4 Writing Negative Message
3.5 Writing Persuasive Messages

Unit 4 Report Writing **(06)**

4.1 Report Structure
4.2 Short Reports
4.3 Long – Formal Reports
4.4 Writing a Summer Project Report

Unit 5 Oral and Online Presentation **(06)**

5.1 Creating and developing oral and online Presentation
5.2 Public Speaking and Oral Reporting

Unit 6 Building Careers **(04)**

6.1 Writing Resumes
6.2 Attending GDs
6.3 Interviewing for Employment

Unit 7 Written Analysis of Cases **(03)**

7.1 What is a Case?
7.2 How to do a Case analysis?
7.3 Process of Analysis a Case

7.4 Requirement for a Case Analysis

Unit: 8 Technology enabled Communication **(03)**
Application of Technology in Communication

Reference Books:

1. “Basic Business Communication Skill For Empowering The Internet Generation” Lesikar F Lately, Tata McGraw Hill Edition.
2. “Business Communication Today”, Cortland Bovee, John V Thill, MukeshChaturvedi,Pearson Edition.
3. “Business Communication – Building Critical Skills”, Kity O Locker, Stephen Kyo Kaczmarek, Tata McGraw Hill Edition.
4. “Business Communication – Concept, Cases and Applications”, P .D Chaturvedi and MukeshChaturvedi, Pearson Edition.
5. “Contemporary Business Communication”, Scot Ober AIPD (All India Publishers and Distributors Regd)
6. “Strategic Communication in Business and the Profession” Dan O’Hair, Gustar Friedrich, Lynda Dixon, Pearson Edition.

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FACULTY OF COMMERCE & MANAGEMENT

New Syllabus: First Year M.B.A. (W.E.F. June -2013)

Paper: 201 Management Science II

(75 + 25 Pattern: External Marks 75+Internal Marks 25 = Maximum Total Marks: 100)

Required Lectures: 45+15 hours

Unit -1: Globalization & the Managers (10)

1.1 Managing in a Global Environment.
1.2 The Process of Globalization.
1.3 Constraints on Globalization.
1.4 The Benefits of Going Global.
1.5 Management Challenges in a Global Enterprise.
1.6 Understanding Global Environment.
1.7 Legal- Political Environment.
1.8 Economic Environment.
1.9 Cultural Environment.
1.10 Technological Environment.
1.11 Ecological Environment.
i. Regional Trading Alliances
ii. Different Types of Global Organisation.

Unit- 2: Productivity, Operations Management & Total Quality Management (10)

2.1 Productivity Problems and Measurement
2.2 Production & Operations Management: Manufacturing & Service
2.3 Quality Measurement in the Information Age
2.4 The Operations Management System
2.5 Tools and Techniques for Improving Productivity
2.6 Overview of the Related Concepts
i. Total Quality Management,
ii. Value Engineering
iii. Value Chain Management
iv. Supply Chain Management
v. Six Sigma
vi. Benchmarking
vii. Just In Time
viii. Kanban
ix. Knowledge Management

Unit- 3: Entrepreneurial Development & Management (07)

3.1 Entrepreneur & Entrepreneurship: Definition, Concept, Traits, Characteristics, Skills, Nature & Importance, Concept & Theories of Entrepreneurship
3.2 Entrepreneurship Development: Training, Institutions In Aid of Entrepreneurship Development
3.3 Project Management: Search & Identification of Business Idea, Project Formulation& Preparation of Project Report.

Unit -4: Types of Entrepreneurship (08)

4.1 Rural Entrepreneurship: Meaning, Need, Concept of Rural Industrialization, Problems of Rural Entrepreneurship, NGO's & Rural Entrepreneurship

4.2 Women Entrepreneurship: Concept of Women Entrepreneurship, Functions of Women Entrepreneur, Challenges & Problems of Women Entrepreneurs in India, Factors Responsible for growth of Women Entrepreneurs

4.3 Social Entrepreneurship: Need, Characteristics of Social Entrepreneur, Importance & Scope of Social Entrepreneurship in India

4.4 E- Entrepreneur: Meaning & Concept

Unit- 5: Essentials of Entrepreneurship (05)

5.1 Factors affecting Entrepreneurship in India: Economic Factors, Non-Economic Factors, Government Actions

5.2 Entrepreneurship Cycle

5.3 Entrepreneurship Development Programmes: Phases, Issues, Content & Methods

Unit- 6: Case Studies Based On 101,201 * (05)

References:

1. Principles Of Management Tata- Mcgraw Hill Charles W.L.Hill, Steven L. Mcshane
2. Management- Prentice Hall India Stephen Robbins –Mary Coulter
3. Management-A Global & Entrepreneurial Perspective-Welhrich, Cannice, Koontz
4. Global Management Solutions Demystified- Thomson Publication. Dinesh Seth, Subhash Rastogi
5. Management- Prentice Hall, Stonner, Freeman, Gilbert
6. Management- Irwin Macgraw Hill Kathryan Bartol, David Martin
7. The Dynamics Of Entrepreneurial Development & Management- Himalaya Publishing House 5th Edition , Vasant Desai
8. Business Law- Himalaya Publishing House Dr. S.N. Maheshwari & Dr.S.K.Maheshwari.
9. Financial Management- Ravi Kishor.
10. Entrepreneurship- Robert D. Hisrich, Michael P. Peters,Tata Mc Graw Hill Pub.
11. Entrepreneurship Development in India-Gupta, Srivivasan- Sultan Chand & Sons
12. Entrepreneurship Development -Cynthia L. Greene, Cenage Lear ning
13. Entrepreneurship Development – S.S. Khanka,S.Chand

Additional Reading

1) The Six Sigma Way-Tata Mcgraw Hill , Peter S. Pande, Robert P. Neuman, Roland R. Cavanagh
2) A Passion for Excellence - Viva Books Pvt. Ltd. Tom Peters, Nancy Austin
3) Built To Last- Collins Jim Collins, Jerry Porras.

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FACULTY OF COMMERCE & MANAGEMENT

New Syllabus: First Year M.B.A. (W.E.F. June -2013)

Paper: 202 Financial Management & Management Accounting

(75 + 25 Pattern: External Marks 75+Internal Marks 25 = Maximum Total Marks: 100)

Required Lectures: 45+15 hours

Unit-1: Scope and Objectives of Financial Management (08)

1.1 Approaches to Financial Management: Traditional View-Modern View-Investment Decisions-Dividend Decisions-Liquidity and Profitability

1.2 Comparison with Accounting and Economics: Financial Management and accounting - Financial Management and Economics-Financial Management-Science or Art

1.3 Financial Management's Importance in Business: Significance of Financial Controller-Finance Manager as a Facilitator- Organization Chart of Finance Function- Reason for Centralizing Finance Function

1.4 Financial Objectives of Business Firm: Profit Maximization, Wealth Maximization, Value Maximization, Other Maximization Objectives.

1.5 Agency theory of Firm

Unit-2: Project Planning and Control (08)

2.1 Capital Investment Process and Kinds of Project: Meaning of Capital Budgeting- Capital Investment Process- Kinds of Projects, Classification of Projects, Forward and Backward Integration, Rationale for Diversification, New Concepts in Financing and Execution of Projects

2.2 Project Organization Structure and Management Systems: Project Organization Structure, Benefits of Project Management, Project Management Information System,

2.3 Stages in Setting up of a Project: Initial Selection of Project Ideas, Selection of Project Location, Selection of Project Site, SWOT Analysis, Reasons of Project Failure, Techniques for Project Control

2.4 Cost Benefits Analysis: CBA and Investment Decisions, CBA Procedure Techniques of CBA, Benefits and Limitations of CBA, Social Cost and Benefit Analysis, Indicators of Social Desirability of a Project

Unit-3: Sources of Finance (07)

3.1 Need for long term finance

3.2 Sources of long term financing and short term financing

3.3 Financial Implications of long term financing

3.4 Long term financing and debt equity ratio

3.5 Short term V/s long term financing

3.6 Venture capital

Unit-4: Marginal Costing & Cost Volume Profit Analysis (08)

4.1 Absorption Costing & Marginal Costing

4.2 Similarities and Dissimilarities between Absorption and Marginal Costing

4.3 Cost Behaviour and Its Impact over Marginal Costing, Marginal Cost Equation, Marginal Costing and Valuation of Finished Stock

4.4 Utility-Advantages and Limitations of Marginal Costing, Precautions to Be Taken While Adopting Marginal Costing, Applications of Marginal Costing
4.5 Objectives of CVP Analysis, Assumptions of CVP Analysis, Limitations of CVP Analysis
4.6Algebraic Method of Presenting CVP Analysis, Profit Volume Ratio or Contribution, Sales Percentage, Graphic Method of Presenting CVP Analysis

Unit-5: Standard Costing **(07)**
5.1 Historical Costing, Standard Cost and Standard Costing
5.2 Standard Costing and Standardized Costing, Advantages and Limitations Of Standard Costing, Preliminaries in Establishing A System of Standard Costing, Standard Hour, Standard Cost Card, Procedure for Introducing Standard Costing, Variance Analysis-Material -Labour-Overhead

Unit-6: Budget and Budgetary Control **(07)**
6.1 Budget and Budgetary Control, Objectives of Budgetary Control
6.2 Essential Requirements of Budgetary Control, Advantages and Limitations of Budgetary Control
6.3 Organization for Budgetary Control, Rolling Budget, Types Of Budget, Zero Base Budgeting, Budget Report

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1. Cost and Management Accounting –M. E. Thukaram Rao, New Age International publisher
2. Cost Accounting-M. N. Arrora, Himalaya Publishing House
3. Practical Costing-B. S. Khanna, I. M. Pandey, G.K.Ahuja, S. C. L.Batra, S. Chand
4. Cost Accounting-M. C.Shukla,T.S.Grewal,M.P.Gupta, S. Chand
5. Cost Accounting- Jawahar Lal, Srivastava, Tata McGraw Hill
6. A Textbook of Financial, Cost and Management Accounting-Dr.P.Periasamy, Himalaya Pub. House.
7. Management Accounting-I.M.Pandey

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FACULTY OF COMMERCE & MANAGEMENT

New Syllabus: First Year M.B.A. (W.E.F. June -2013)

Paper: 203 Marketing Management

(75 + 25 Pattern: External Marks 75+Internal Marks 25 = Maximum Total Marks: 100)

Required Lectures: 45+15 hours

Unit- 1: Foundation to Marketing **(05)**

1.1 What Is Marketing?
1.2 Nature, Scope & Importance of Marketing
1.3 Evolution of Marketing
1.4 Understanding the Market Place & Customer Needs
1.5 The Marketing Concept
1.6 The Changing Marketing Landscape

Unit- 2: Environmental Variables & Marketing Mix **(05)**

2.1 Environmental Monitoring
2.2 External Macro Environment
2.3 External Micro Environment
2.4 Organization Internal Environment
2.5 Responding to the Marketing Environment
2.6 Marketing Mix

Unit- 3: Segmenting & Targeting the Market **(05)**

3.1 Market Segmentation:
i. Segmenting Consumer Market
ii. Segmenting Business Market
iii. Requirement for Effective Segmentation
3.2 Market Targeting: Target Market Strategies
3.3 Differentiation & Positioning
i. Position Maps
ii. Choosing a Differentiation & Positioning Strategy

Unit- 4: Product & Product Related Strategies **(05)**

4.1 Product: Meaning & Classification
4.2 New Product Development
i. New Product Development Process
ii. New Product Adoption & Diffusion
4.3 Product Life Cycle: Product Life Cycle Strategies
4.4 New Product Mix Strategies
i. Product Mix & Product Line
ii. Product Mix Strategies

Unit- 5: Price **(05)**

5.1 Price Determination
i. Meaning & Importance of Price

ii. Pricing Objectives
Iii. Factors Influencing Price Determination
5.2 Pricing Strategies
i. Price vs. Non Price Competition
ii. Market Entry Strategies
iii. Discounts & Allowances
Iv. Geographic Pricing Strategies & Situations

Unit- 6: Channels of Distribution & Physical Distribution (05)
6.1Channels of Distribution
i. Middlemen & Distribution Channels
ii. Designing Distribution Channels
iii. Selecting the Type of Channels
iv. Determining the Intensity of Distribution
v. Conflict & Control in Channels
vi. Legal Considerations In Managing Channels
6.2 Physical Distribution
i. Nature & Importance Of Physical Distribution
ii. Tasks In Physical Distribution Management

Unit- 7: Integrated Marketing Promotion (05)
7.1 The Role of Promotion in Marketing
7.2 Promotion Methods
7.3 Integrated Marketing Communication
7.4 The Communication Process & Promotion
7.5 Determining the Promotion Mix
7.6 The Promotion Budget

Unit- 8: Social Responsibility & Ethics in Marketing (05)
8.1 Social Criticism of Marketing
8.2 Ethics & Marketing
8.3 Consumer Action to Promote Sustainable Marketing
8.4 Business Action toward Sustainable Marketing
8.5 Ecological Marketing

Unit- 9: Strategic Marketing Planning & Implementation (05)
9.1Strategic Marketing Planning Process
i. Implementation
ii. Organizing for Implementation
iii. Post Sale Follow Trough
9.2 Evaluating Marketing Performance

Reference
1. Principles of Marketing-A South Asian Perspective Pearson, 13th Edition, Philip Kotler, Gary Armstrong, Prafulla Agnihotri, Ehsan UlHaque
2. Marketing-(Special Indian Edition) Mac Graw Hill 14th 2 Edition Michael Etzel, Bruce Walker, William Stanton,
3. Marketing Management -Ajay Pandit the Mac Graw Hill Cos. RajanSaxena
4. Marketing Management-Planning, Implementation& Control Global Perspective, Indian Context, Macmilln Business Books, V.S Ramaswamy, S. Namakumari

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FACULTY OF COMMERCE & MANAGEMENT

New Syllabus: First Year M.B.A. (W.E.F. June -2013)

Paper: 204 Human Resource Management

(75 + 25 Pattern: External Marks 75+Internal Marks 25 = Maximum Total Marks: 100)

Required Lectures: 45+15 hours

Unit-1: Human resource management -an overview (8)

1.1 Meaning, Definition, Nature, Scope & Objectives of HRM
1.2 Characteristic & Significance of Human Resource
1. 3 Functions of HRM
1.4. HRM vs. Personnel Management, HRM vs. HRD
1.5. Challenges before HRM
1.6 Human resource Environment
1.6. Human Relations- Human Relations Movement, Group Dynamics, Approaches, Challenges

Unit-2: Human resource planning and Process (14)

2.1 Human Resource Planning
i. Concept & Need of HRP
ii. Process of Human Resource Planning
iii. Manpower Demand and supply,
iv. Prerequisites of HRP
2.2 Process of Procurement: Recruitment, Concept, Purpose & Factors Affecting Recruitment, Sources of Recruitment, Process of Recruitment
2.3 Selection: Concept Selection process, barriers of selection
2.4 Placement: Concept & Problems
2.5 Induction: Concept, Objective & Steps in Induction, Problems in Induction

Unit-3: Human Resource Development (10)

3.1 Performance appraisal: Definitions, Objective & Process of Performance Appraisal,
3.2 Methods of Performance Appraisal: a) Traditional Methods: Ranking, Paired Comparison, Grading, Critical Incident, Force Choice, Checklist, Graphic Rating, Essay Evaluation, Confidential Reports, b) Modern Methods: MBO, BARS, 360 Degree Appraisal System, Problems with Performance Appraisal
3.3 Post Appraisal Analysis
3.4 Employee Training
- i. Meaning, Need and Objective of Training
- ii. Methods of Training: On the Job & Off the Job
- iii. Evaluation of Training
- iv. Executive Development

Unit-4: Wages & Salary Administration & Employee Motivation & Morale (8)

4.1 Nature, Purpose and Objectives of W & S Administration
4.2 Factors Influencing Wages Policy

4.3Time & Piece Rate System of Wages
4.4 Wage Differentials: reasons and types.
4.5 Incentives: Meaning, types and importance
4.6 Meaning &Importance of Motivations & Theories of Motivation
4.7Meaning & Causes of Morale, Indications of High & Low Morale

Unit-5: Recent Trends in HRM (10)

5.1 HR as distinctive competitive advantage
5.2 Human Resource Accounting and Audit
5.3 Human Resource Information System
5.4 Employer branding
5.5 Human Resource Research
5.6 Moonlighting by employees
5.7 Competency Mapping
5.8 Flexi time & Flexi work
5.9 e-HRM, e-recruitment, e-training & e-learning

References:

1. Human Resource Management, Text & Cases by Dr. V.S.P Rao - Excel Books
2. Essentials of Human Resource Management by P. Subba Rao – Himalaya Publishing House
3. Human Resource Management by S.S.Khanka – S Chand & Sons
4. Human Resource Management by Dr K. Ashwathappa – Tata McGraw Hill
5. Comprehensive Human Resource Management by P.L.Rao - Excel Books
6. Human Resource Management by A M Sharma – Himalaya Publishing
7. Managing Human Resources by Fisher- Cengage Learning
8. Human Resource Management by Dr. C.B. Gupta – Sultan Chand & Sons
9. Human Resource Management by Gary Dessler.- Pearson/ Prentice Hall
10. Personnel Management: - C. B. Mamoria Himalaya Publishing

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FACULTY OF COMMERCE & MANAGEMENT

New Syllabus: First Year M.B.A. (W.E.F. June -2013)

Paper: 205 Operations and Materials Management

(75 + 25 Pattern: External Marks 75+Internal Marks 25 = Maximum Total Marks: 100)

Required Lectures: 45+15 hours

Unit-1: Production and operation Management **(07)**

1.1 Meaning, scope, functions of production management,
1.2 life cycle concept extended to Production system,
1.3 Historical evolution of production management, recent trend in production,
1.4 Automation.
1.5 Decision making in Production and Operation Management
1.6 Difference between operation and production
1.7 The role and challenges facing operations managers.

Unit-2: Production System and Demand Forecasting **(07)**

2.1 A production system model: production system Diversity
2.2 elements and types of production systems
2.3 Productivity-measures and its uses, Factors affecting productivity.
2.4 Meaning, need, objective for demand forecasting
2.5Types of forecast
2.6 Steps in forecasting process

Unit-3: Capacity Planning **(07)**

3.1 Concept- Meaning,
3.2 Types of capacity,
3.3 Measurement of capacity,
3.4 long term capacity planning,
3.5Capacity planning
3.5 Capacity requirement planning strategies
3.6 Balancing capacity, economic run length.

Unit-4: Facility planning and plant layout **(07)**

4.1 Introduction –factor affecting plant location,
4.2 Localization-needs for location decision selection of site,
4.3 Method of evaluating location alternatives,
4.4 Recent trends in location of industries.
4.5 Government Control on Location of Industries
4.6 Importance of facility layout

Unit-5 Plant layout and plant Maintenance **(06)**

5.1 Meaning-need-importance-objectives, Plant layout factors,
5.2 Types of plant layout,
5.3 Layout tools and techniques,
5.4 Layout and computers.
5.5 Plant Maintenance and Materials Handling

i. Meaning – Necessity –objectives
ii. Types of maintenance, Preventive, predictive and overhaul

iii .Selection of Good Materials Handling equipment
Iv. Trends in maintenance,

Unit-6: Work study **(06)**

6.1 Meaning, importance, objectives of work study.
6.2 Work study procedure, organizing for work study
6.3 Duties and responsibilities of industrial engineering department, standard time,
6.5 Method Study – Need, Objectives, Advantages and Method Study Procedures
6.6 Work Measurement – Definition, Objectives, Steps in Work Measurement, Techniques of Work Measurement – Time Study, Synthesis Method, Analytical Estimation, Pre-determined Motion Time Study System (PMTS), work sampling.

Unit 7 Quality Control and Quality Assurance **(05)**

7.1 Definition of Quality, inspection and quality control.
7.2 Quality control, benefits and objects of quality control
7.3 Total quality Management: Principles and elements of TQM
7.4 Types of acceptance sampling plans-single sampling, double sampling sequential sampling, quality Circle.
7.5 Six sigma theme, quality certification, ISO 9000 certification and benefits.

Books

1. K. Sridhara Bhat-Production & Operations Management, 2009 (4th Edition), Himalaya Publishing House
2. S. A. Chunawalla, D. R. Patel-Production & Operation Management, 2006, Himalaya Publishing House
3. K. Ashwathappa & K. Sridhara Bhat-Production & Operations Management, 2008,(2nd Edition),Himalaya Publishing House
4. Kanishka Bedi – Production and Operations Management , 2007,(2nd edition); Oxford University Press
5. Buffa, E. S. and Sarin, R. K. – Modern Production /Operations Management; John Wiley
6. Chary, S.N. – Production and Operations Management (3rd edition); TMH
7. Chase, Jacobs, Aquilano and Agarwal – Operations Management for Competitive Advantage (11th edition); TMH
8. Production/operation Management by Dr. B.S. GOEL
9. Evans and Lindsay – The Management and Control of Quality (6th edition); Cenage Learning
10. Gaither and Frazier – Operations Management (9th edition); Thomson Learning
11. Gopalakrishnan and Sundaresan – Materials Management: An Integrated Approach; TMH

School of Management Studies,
P.G. Department of Management
North Maharashtra University, Jalgaon

(Grade 'B' (2.88) NAAC Re- Accredited)

FACULTY OF COMMERCE & MANAGEMENT

New Syllabus: First Year M.B.A. (W.E.F. June -2013)

Paper: 206 Advance Research Methods

(75 + 25 Pattern: External Marks 75+Internal Marks 25 = Maximum Total Marks: 100)

Required Lectures: 45+15 hours

Unit-1: Introduction (06)

Meaning, Types, Criteria of good research, Marketing research, scientific approach to research in physical and management science, Limitations of applying scientific methods in business research problems, Ethical issues in business research

Unit-2: Business Research-An Overview (06)

Research process, problem formulation, management problem v/s. research problem, Steps involved in preparing business research plan/proposal Business Research Design: Exploratory, Descriptive, & Causal research exploratory research: Meaning, suitability, collection, and hypothesis formulation

Unit 3 Research Design (05)

Meaning and need for research design, Features of good research design, Choice of research design, Scientific method and research design, Types of research design Validity and reliability in research

Unit-4: Data collection (06)

Primary and Secondary data – Sources – advantages/disadvantages, Data collection Methods –Observations, Survey, Interview and Questionnaire design, Qualitative Techniques of data collection. Measurement & Scaling Techniques: Nominal Scale, Ordinal Scale, Interval Scale, Rating Scale, Criteria for good measurement, attitude measurement – Likert's Scale, Semantic Differential Scale, Thurston-equal appearing interval scale, MDS – Multi Dimensional Scaling.

Unit-5: Hypothesis (06)

Meaning, Types, characteristics, sources, Formulation of Hypothesis, Errors in hypothesis testing, parametric and nonparametric test: T-test, Z-test, F-test, U-test, Rank-Sum test, K-W test. (Theory only)

Unit-6: Sampling (05)

Meaning, Steps in Sampling process, Types of Sampling - Probability and non probability Sampling Techniques, Errors in sampling. Sampling process

Unit-7: Introduction to statistical tools of Business Research (05)

Bivariate Analysis (Chi-square only), Multivariate Analysis - Factor Analysis, Discriminant Analysis, Cluster Analysis, Conjoint Analysis, **ANOVA** – One-way & Two-way classification (Theory only).

Unit 8: Report Preparation and Presentation (05)

Objective, Importance of the Report and presentation, Report preparation, Report format, Report writing, Guidelines for tables and graphs. Reading the research report

References books

1. Research Methodology (Methods & Techniques) – C.R.Kothari - Wiley Eastern Ltd
2. Business Research Methodology – Shrivastav- Tata McGraw Hill
3. Business Research Methodology – J.K. Sachdeva- Himalaya Publishing House
4. Marketing research-An applied orientation,5th edition-Naresh K. Malohtra,Satyabhushan Dash-pearson Publication
5. Research Methodology – A.B. Rao- Excel Books
6. Management Research Methodology – Krishnaswamy, Sivakumar, Mathirajan– PearsonEducation
7. Methodology and Techniques of Social Research- Wilkinson &Bhandarkar- Himalaya Publishing House
8. Business Research Methods- Murthy, Bhojanna- Excel Books

School of Management Studies,
P.G. Department of Management
North Maharashtra University, Jalgaon

(Grade 'B' (2.88) NAAC Re- Accredited)

FACULTY OF COMMERCE & MANAGEMENT

New Syllabus: First Year M.B.A. (W.E.F. June -2013)

Paper: 207 Ethical Managerial Practices

(75 + 25 Pattern: External Marks 75+Internal Marks 25 = Maximum Total Marks: 100)

Required Lectures: 45+15 hours

Unit-1: Role of Indian Ethical values in Management **(07)**

1.1 Dharma as a strategic intervention tool
1.2 Doctrine of Karma as a management technique
1.3 Purushottama - A Model of leadership
1.4 Kautilya's Economic view
1.5 Vivekananda's socio-economic ethics
1.6 Moral Laws of Gandhi

Unit-2: Understanding Ethics **(07)**

2.1 Moral
2.2 Personal Ethics
2.3 Stages of moral development
2.4 Kohlberg's six stages system
2.5 Office ethics vs. Business ethics
2.6 Myths about business ethics
2.7 Myths busting about office ethics

Unit-3: Business Ethics: Conceptual Framework **(08)**

3.1 Determinants of Individual Ethics
3.2 Business ethics- Meaning, Need, Importance of ethics in business
3.3 Why business Ethics is vital for Managers?
3.4 Factors influencing Business ethics
3.5 Principle of Business Ethics
3.6 Attitude of Indian manager towards Business Ethics
3.7 Implication of ethical leadership
3.8 Ethical decision making in the organization
3.9 Ethical dilemmas- Features and approaches to resolving it
3.10 Ten Commandments of Managerial Conduct

Unit-3: Ethics in Business Disciplines **(06)**

3.1 Ethics in marketing
3.2 Ethical and social issues in Advertisements.
3.3 Ethics & HRM
3.4 Ethics in Accounting & Finance
3.5 Ethics in Information Technology

Unit-4: Social Responsibility and Organizations **(06)**

4.1 Definition, Arguments for and against Social Responsibility
4.2 Gandhian Philosophy of Wealth management

4.3 Responsibilities of organization towards-Shareholders-Employees-Consumers-Suppliers-Government-Society
4.4 Organizational approaches to social responsibility
4.5 Major social responsibilities of Business organization
4.6 Social Responsible Practices of different Corporate

Unit-5: Concept of Corporate Governance (06)
5.1 History and development, Objectives, Need
5.2 Importance of Corporate Governance
5.3 Principles of Corporate Governance
5.4 Corporate Governance in world-practices and perspectives

Unit-7: Ethical Paradoxes & Cases (05)

References book:

1. Business ethics & Professional Values by A.B.Rao, Excel Books
2. Business Ethics-Concept & Cases by Manuel G. Velasquez
3. Business Organization and Management by Neeru Vasisth, Namita Rajput, Kitab Mahal Publishing
4. Management by Ricky W.Griffin, AITBS Publishers
5. Corporate Governance by P. P. Arya, B.B. Tondon, A. K. Vashisht, Himalaya Publishing House
6. Ethical Management by Satish Modh, McMillan India Ltd.
7. Business Ethics by Dr. A.K. Gavai, Himalaya Publishing House
8. Corporate Governance & Business Ethics: Text & Cases by U.C. Mathur, McMillan India Ltd.
9. Business Ethics and Indian Value System: text and cases by Anand Singh, Himalaya Publishing House
10. Business ethics and managerial values by S. K. Bhatia, Deep & Deep Publications

SSBT's College of Engineering & Technology, Bambhori

Department of Applied Science

Teaching Work Sheet SEM: – I (July-November 2016)

Name of Faculty	FE/SE	Subject	Th	Pr/Tut	LOAD
1.Dr M Panigrahi	FE	EM-I	04	1	**11**
	SE	EM-III	04	2	
2.S S Patil	FE	EM-I	08	03	**183**
	SE	EM-III	04	03	
3.M V Deshpande	FE	EM-I	08	03	**18**
	SE	EM-III	04	03	
4.Parag V Patil	FE	EM-I	08	04	**18**
	SE	EM-III	04	02	
5.A.V.Khambayat	FE	EM-I	08	04	**18**
	SE	EM-III	04	02	
6.R.A.Kukkar	FE	EM-I	00	03	**13**
	SE	EM-III	08	02	
7.Dr K S Patil	FE	EP-I	09	09	**18**
8.C U Nikam	FE	EP-I	09	09	**18**
9.M B Patil	FE	EP-I	09	09	**18**
10.A R Mali	FE	EC-I	09	09	**18**
11.U T Patil	FE	EC-I	09	09	**18**
12.H A Wani	FE	EC-I	09	09	**18**
13.N B Bhoi	FE	SS-I	05	13	**18**
14.R A Adakmol	FE	SS-I	04	14	**18**
	TOTAL LOAD		127	112	**240**

HOD

Applied Science

SSBT's College of Engineering & Technology, Bambhori

Department of Applied Science

Teaching Work Sheet SEM: – II (Jan-April 2016)

Name of Faculty	FE/SE	Subject	Th	Pr/Tut	LOAD
1. Dr M Panigrahi	FE	EM-II (2-Sec)	08	04	**12**
2. S S Patil	FE	EM-II(2-Sec)	08	05	**18**
	SE	Biostatics (**Bio-Tech)**	04	01	
3. M V Deshpande	FE	EM-II (1-Sec)	04	03	**18**
	SE	EM-III (**E&Tc-A,B)**	08	03	
4.Parag V Patil	FE	EM-I (2-Sec)	08	03	**18**
	SE	EM-III (**Mech-A)**	04	03	
5.A.V.Khambayat	FE	EM-II (2-Sec)	08	03	**18**
	SE	EM-III (**Mech-B)**	04	03	
6.Dr K S Patil	FE	EP-II (3-Sec)	09	07	**16**
7.C U Nikam	FE	EP-II (3-Sec)	09	10	**19**
8.M B Patil	FE	EP-II (3-Sec)	09	10	**19**
9.D I Desai	FE	EC-II (2-Sec)	06	08	**14**
10.A R Mali	FE	EC-II (2-Sec)	06	06	**12**
12.U T Patil	FE	EC-II (3-Sec)	09	05	**14**
13.H A Wani	FE	EC-II (2-Sec)	06	08	**14**
14.N B Bhoi	FE	Soft Skill II	05	13	**18**
15.R A Adakmol	FE	Soft Skill II	04	14	**18**
	TOTAL LOAD		119	109	**228**

HOD

Applied Science

DEPARTMENT OF BIOTECHNOLOGY, SSBT's, COET, BAMBHORI, JALGAON

TEACHING LOAD DISTRIBUTION

ACADEMIC YEAR: 2015-2016 (SEMESTER I)

Date: 30-04-2015

SR.NO.	NAME	DESIGNATION	YEAR	SUBJECT	TH (Hrs)	PR BATCH X (Hrs)	TOTAL
1.	**Dr.I.D.Patil**	Prof. & HOD	SE	BPCAL	04	01(T)	09
			BE	Project & Seminar	--	04	
2.	**Mr. Jayant P.P.**	Assistant Prof.	TE	ENZ	03	--	18
			TE	Mol Bio	04	04	
			BE	DSP	03	02	
			BE	Int.D. Elective	03	--	
			BE	Project -I	--	02	
3.	**Mrs. S.S.Pawar**	Assistant Prof.	SE	UO I	04	02	16
			TE	CRE	04	02	
			TE	BIA		02	
			BE	PROJECT-I	--	02	
4.	**Mr. Gaurav Khodape**	Assistant Prof.	TE	Tissue Culture	01	02	17
			TE	BIEM	04	--	
			TE	Bioinfo	03	02	
			BE	BED	03	--	
5.	**Mr. Vikas Dongardive**	Assistant Prof.	SE	MB	04		17
			TE	ENZY	04		
			BE	Elective-I	03	02	
			BE	Project-I & Seminar		04	
6.	**Ms. Aaisha Sayyad**	Assistant Prof.	SE	CB	04	02	17
			SE	SOFT SKILLS	01	02	
			TE	BIA	04		
			TE	MB		04	
					TOTAL	**:**	**94**

Dr.I.D.Patil
HOD Biotech

DEPARTMENT OF BIOTECHNOLOGY
SSBT'S COLLEGE OF ENGINEERING & TECHNOLOGY, BAMBHORI.
TEACHING LOAD DISTRIBUTION
ACADEMIC YEAR: 2015-2016 (SEMESTER II)

Date: 15-01-2016

SR.NO.	NAME	DESIGNATION	CLASS	SUBJECT	TH (Hrs)	PR BATCH X (Hrs)	TOTAL
1	Dr.I.D.Patil	Prof. & HOD	TE	IPR &E	04	--	12
			TE	Seminar-I	--	02	
			TE	Mini project	--	02	
			BE	PROJECT-II	--	04	
2	Mr. Jayant P. Parpalliwar	Assistant Prof.	BE	BPI	03	02	20
			TE	GENE	04	02	
			BE	Ele-II	03	02	
			BE	Project-II		04	
3	Mrs. S. S. Pawar	Assistant Prof.	SE	UO II	04	02	21
			SE	PHT	04	02	
			TE	MT	03	02	
			BE	PROJECT-II	--	04	
4	Mr. Gaurav Khodape	Assistant Prof.	TE	BPE	04		20
			BE	BPMS	03	02	
			TE	BP&FT	--	04	
			SE	CA	01	02	
			BE	PROJECT-II	--	04	
5	MS. Aaisha Sayyad	Assistant Prof.	SE	BCH	04	02	16
			SE	IMMU	--	02	
			TE	Minor Project	--	02	
			TE	Seminar-I	--	02	
			TE	FT	04		
6	Ms. Shraddha Ujjainwal	Contributory Lecturer	SE	IMMU	04	01	08
			BE	Ele-III	03	--	
TOTAL							**97**

Dr.I.D.Patil

(HOD, BIOTECH DEPT)

SSBT'S COLLEGE OF ENGINEERING & TECHNOLOGY, BAMBHORI.

DEPARTMENT OF CHEMICAL ENGINEERING

TEACHING LOAD DISTRIBUTION FOR TERM II,

SEM : IV, VI, & VIII

YEAR 2015-2016

<table>
<tr><th>SR. NO.</th><th>NAME</th><th>YEAR</th><th>SUBJECT</th><th>TH(Hrs)</th><th>(Hrs) x PR BATCH</th><th>TOTAL</th></tr>
<tr><td>1</td><td>Dr. K.S.WANI</td><td>T.E.</td><td>CRE-I</td><td>4</td><td>--</td><td>4</td></tr>
<tr><td rowspan="3">2</td><td rowspan="3">Dr. V.R.DIWARE</td><td>B.E.</td><td>CPDPE</td><td>3</td><td>2X2=4</td><td rowspan="3">19</td></tr>
<tr><td>T.E.</td><td>PED-II</td><td>4</td><td>--</td></tr>
<tr><td></td><td>PROJECT(BE) , Minor Project, Seminar-I (TE)</td><td>--</td><td>8</td></tr>
<tr><td rowspan="4">3</td><td rowspan="4">Dr.A.R.LOKHANDE</td><td>B.E.</td><td>CAPEDMS</td><td>3</td><td>2X2=4</td><td rowspan="4">20</td></tr>
<tr><td rowspan="2">S.E.</td><td>MO</td><td>3</td><td>--</td></tr>
<tr><td>LAB CA</td><td>--</td><td>2X1=2</td></tr>
<tr><td></td><td>PROJECT(BE) , Minor Project, Seminar-I (TE)</td><td>--</td><td>8</td></tr>
<tr><td rowspan="3">4</td><td rowspan="3">Dr. S.A.THAKUR</td><td>B.E.</td><td>Elective II</td><td>3</td><td>--</td><td rowspan="3">15</td></tr>
<tr><td>T.E.</td><td>PEEC</td><td>4</td><td>--</td></tr>
<tr><td></td><td>PROJECT(BE) , Minor Project, Seminar-I (TE)</td><td>--</td><td>8</td></tr>
<tr><td rowspan="5">5</td><td rowspan="5">V.P.SANGORE</td><td>T.E.</td><td>Entrepreneurship</td><td>--</td><td>1X2=2</td><td rowspan="5">22</td></tr>
<tr><td rowspan="3">S.E.</td><td>APC</td><td>4</td><td>2X2=4</td></tr>
<tr><td>CEP I</td><td>4</td><td>--</td></tr>
<tr><td>LAB CP</td><td>--</td><td>2X2=4</td></tr>
<tr><td></td><td>Minor Project, Seminar-I (TE)</td><td>--</td><td>4</td></tr>
</table>

6	N.Y.GHARE	T.E.	MT-II	4	4X1=4	21
		S.E.	PCAL	3	--	
			MO(TU)	--	1X2=2	
			PROJECT(BE) , Minor Project, Seminar-I (TE)	--	8	
7	Y.D.THAKARE	B.E.	IPC Elective II	3	2X2=4	21
		T.E.	CET	4	--	
			Entrepreneurship	--	1X2=2	
		S.E.	LAB MO	--	1X4=4	
			LAB CA	1	--	
			PCAL(TU)	--	1X1=1	
			Seminar-I (TE)	--	2	
8	Miss.P.N.BHAUTIK	T.E.	CRE - I	--	2X2=4	21
			MT-II	--	4X1=4	
		S.E.	CEP - II	4	--	
			PCAL(TU)	--	1X1=1	
			LAB MO	--	1X4=4	
			LAB CA	--	1X2=2	
			Seminar-I (TE)	--	2	
					TOTAL LOAD	143

HOD (CHEMICAL ENGG)

SSBT'S COLLEGE OF ENGINEERING & TECHNOLOGY, BAMBHORI.

DEPARTMENT OF CHEMICAL ENGINEERING

TEACHING LOAD DISTRIBUTION FOR TERM I
SEM: III, V & VII
YEAR 2015-2016

SR. NO.	NAME	YEAR	SUBJECT	TH (Hrs)	PR BATCH x (Hrs)	TOTAL
1	DR.K.S.WANI	B.E.	BCE(ELE-I)	3	0	03
2	DR. V.R.DIWARE	B.E.	CRE-II	3	2X2=4	
			Lab (Ele-I)	0	2x2-4	
			PROJECT	0	2	
			SEMINAR	0	2	
		T.E.	PEDD-I	4	0	19
3	DR.S.A.THAKUR	B.E.	PDC	3	0	
			PROJECT	0	2	
			SEMINAR	0	2	
		T.E.	MT-I	4	0	
			IEM	2	0	13
4	V.P.SANGORE	T.E.	IIA	0	2X2=4	
		S.E.	AIOC	4	2X2=4	
			AOC	4	2X2=4	20
5	N.Y.GHARE	B.E.	TP	3	0	
			PROJECT	0	2	
			SEMINAR	0	2	
			PDC	0	1X2=2	
		T.E.	DA&I	1	1X2=2	
			MT-I	0	1X4=4	
		S.E.	CEM	4	0	20

6	DR. A.R.LOKHANDE	B.E.	EE(Int. Disci)	3	0	
			PROJECT	0	2	
			SEMINAR	0	2	
		T.E.	PHT	4	2X2=4	
			IEM	2	0	
			MT-I	0	1x4=4	21
7	Y.D.THAKARE	B.E.	PDC	0	1X2=2	
		T.E.	IIA	4	0	
		S.E.	FFO	4	2X2=4	
			SS-III	1	2X2=4	21
			DA&I	1	1X2=2	
					TOTAL	117

HOD (CHEMICAL ENGG)

COMPUTER DEPARTMENT
TEACHING LOAD DISTRIBUTION **TERM-I 2015-16**

Sr No.	Name of Staff	Year	Subject	TH	PR	Total
1	G. K. Patnaik	BE(A)	ACN	3	--	10
		BE(B)	ACN	3	--	
		BE	PROJECT	--	4	
2	K.P. Adhiya	SE(A)	MPMC	4		19
		SE(A)	MPMC LAB	-	4*2	
		BE	PROJECT	-	4	
		ME	DS	3		
3	M. E. Patil	TE(B)	CN	4	-	19
		TE(B)	CN LAB	-	4*2	
		ME	SPM	3	2*2	
4	Sandip S. Patil	TE(A)	CN	4	-	19
		TE(A)	CN LAB	-	4*2	
		ME	ASE	3	2*2	
5	Ashish T. Bhole	TE(B)	SE	4	-	21
		TE(B)	SE LAB	-	3*2	
		ME	NCC	3	2*2	
		BE(B)	A C N LAB	-	2*2	
6	S.S. Gharde	TE(A)	SP	4	-	21
		TE(A)	SP	-	6*2	
		ME	AA	3		
		BE	PROJECT	-	2	
7	Nilima Patil	SE(A)	OOT	4	-	20
		SE	OOT LAB	-	7*2	
		BE	PROJECT	-	2	

8	D. D. Puri	SE(B)	DSGT	4	2	20
		SE(B)	DSGT LAB	-	2*2	
		FE(A)	CP	4	-	
		FE(A)	CP LAB		2*2	
		BE	PROJECT	-	2	
9	Shital A. Patil	FE(I)	CP	4	-	20
		FE(I)	CP LAB	-	3*2	
		TE(B)	SP	4	-	
		TE(B)	SP	-	2*2	
		BE	PROJECT	-	2	
10	Akash Waghmare	SE(A)	DSGT	4	2	20
		SE(A)	DSGT LAB	-	6*2	
		BE	PROJECT	-	2	
11	N. Y. Suryavanshi	SE(B)	SS-II	1	-	21
		SE(B)	SS-II LAB	-	2*2	
		TE(A)	FLAT	4	--	
		BE(A)	ACN LAB	-	4*2	
		BE	PROJECT	-	4	
12	Priti R. Sharma	FE(D)	CP	4		21
		FE(D)	CP LAB	-	3*2	
		BE(A)	ES	3	-	
		BE(A)	ES LAB	-	3*2	
		BE	PROJECT	-	2	

13	Dipak D. Bage	FE(B)	CP	4		21
		FE(B)	CP LAB	-	1*2	
		BE(B)	ES	3	-	
		BE	ES	-	5*2	
		BE	PROJECT	-	2	
14	Y. Borse	FE(C,F)	CP	8	-	20
		FE(C,F2)	CP LAB	-	5*2	
		BE	PROJECT	-	2	
15	Atul V. Dusane	SE (B)	MPMC	4	-	16
		SE (B)	MPMC LAB	-	4*2	
		BE	PROJECT	-	4	
16	Satpal Rajput	TE(A)	SE	4	-	21
		TE	SE LAB	-	5*2	
		BE(A)	INTER-DICIPLINARY	3	-	
		BE	PROJECT	--	4	
17	Manojkumar Mahajan	TE(B)	POM	4	-	21
		TE	JAVA LAB	1	6*2	
		BE	PROJECT	-	4	
18	Vijay Ingle	TE(A)	POM	4	-	21
		TE(A)	JAVA LAB	1	2*2	
		BE(A)	ACNLAB		4*2	
		BE	PROJECT	-	4	
19	Jitendra Patil	SE(A)	OOT	4	-	14
		SE(A)	OOT LAB	-	4*2	
		BE	PROJECT	-	2	

20	Sushant Bahekar	FE(E)	CP	4	-	17
		FE(E,A1)	CP LAB	-	4*2	
		BE(A)	AIES	3	-	
		BE	PROJECT	-	2	
21	Vinaya Sawdekar	SE(A)	SS-II	1	-	19
		SE(A)	SS-IILAB	-	6*2	
		TE(B)	FLAT	4	-	
		BE	PROJECT	-	2	
22	Prachi Chaudhari	FE(H)	CP	4	-	19
		FE(H,F1)	CP LAB	-	4*2	
		BE(B)	AIES	3	-	
		BE	PROJECT	-	4	
23	Dhanashree Tayade	BE(B)	AUP	3	-	21
		BE(B)	AUP LAB	-	4*2	
		TE(B)	LINUXLAB		4*2	
		BE	PROJECT	-	2	
25	Chetana T. Baviskar	BE(A)	AUP	3	-	21
		BE(A)	AUP LAB	-	4*2	
		TE(A)	LINUXLAB		4*2	
		BE	PROJECT	-	2	
26	Shweta Pandey	FE(G)	CP	4	-	17
		FE (G,B2)	CP LAB	-	5*2	
		BE(B)	INTER-DICIPLINARY	3	-	

COMPUTER DEPARTMENT

TEACHING LOAD DISTRIBUTION TERM-II 2015-16

Sr No.	Name of Staff	Year	Subject	TH	PR	Total
1	G. K. Patnaik	BE(A)	CD	4	--	14
		BE(B)	CD	4	--	
		BE	PROJECT	--	6	
2	K.P. Adhiya	SE(A)	CO	4		15
		SE(B)	CO	4		
		BE	PROJECT	-	4	
		ME	PC	3		
3	M. E. Patil	BE(B)	SMQA	4	-	18
		BE(B)	SMQA LAB	-	2*2	
		BE(A)	MC	3		
		ME	STQA	3	2*2	
4	Sandip S. Patil	SE(A)	DS	4+2	-	19
		SE(A)	DSLAB	-	2*2	
		ME	SC	3	2*2	
		BE	PROJECT	-	2	
5	Ashish T. Bhole	TE(B)	OOMD	3	-	17
		TE(B)	OOMD LAB	-	2*2	
		BE(B)	MC	3		
		ME	WE	3		
		TE(A)	OOMD LAB	-	1*2	
		BE	PROJECT	-	2	

6	S.S. Gharde	TE(A)	OOMD	4	-	20
		TE(A)	OOMD LAB	-	6*2	
		BE	PROJECT	-	4	
7	Nilima Patil	SE(A)	CG	4	-	20
		SE(A)	CG LAB	-	4*2	
		SE(B)	CG LAB	-	3*2	
		BE	PROJECT	-	2	
8	D. D. Puri	SE(B)	CG	4	-	20
		SE(B)	CG LAB	-	4*2	
		SE(A)	CG LAB	-	3*2	
		BE	PROJECT	-	2	
9	Shital A. Patil	TE(B)	DBMS	4	-	20
		TE(B)	DBMS LAB	-	4*2	
		TE(A)	DBMS LAB	-	3*2	
		BE	PROJECT	-	2	
10	Akash Waghmare	TE(A)	DBMS	4	-	21
		TE(A)	DBMS LAB	-	2*2	
		ME	ADBMS	3	2*2	
		TE(B)	DBMS LAB	-	1*2	
		SE(B)	DS LAB	-	1*2	
		BE	PROJECT	-	2	
11	N. Y. Suryavanshi	TE(A)	ADA	3	-	21
		BE(A)	CD LAB	-	4*2	
		BE(B)	CD LAB	-	3*2	
		BE	PROJECT	-	4	

12	Priti R. Sharma	BE(B)	DWM	4	-	21
		BE(B)	DWM LAB	-	2*2	
		BE(A)	SMQA LAB	-	3*2	
		SE(A)	MPMCI	3+2	--	
		BE	PROJECT	-	2	
13	Dipak D. Bage	TE(A)	OS	4		21
		TE(A)	OS LAB	-	4*2	
		TE(B)	OS LAB	-	3*2	
		SE(A)	MPMCI	3+2	--	
		BE	PROJECT	-	2	
14	Y. Borse	BE(A)	SMQA	4	-	20
		BE(A)	SMQA LAB	-	4*2	
		BE(B)	SMQA LAB	-	3*2	
		BE	PROJECT	-	2	
		SE (B)	MPMCI LAB	-	2*2	
		SE (A,B)	MPMCI LAB	-	2*2	
		BE	PROJECT	-	2	
15	Satpal Rajput	SE(A)	DC	4	-	20
		SE(A)	DC LAB	-	4*2	
		TE(A)	DBMS LAB		2*2-	
		SE(B)	DC LAB	-	1*2	
		BE	PROJECT		2	
16	Manojkumar Mahajan	SE(A)	ADL	1	-	22
		SE(B)	ADL	1	-	
		SE(A)	ADL LAB		4*2	
		SE(B)	ADL LAB		4*2	
		SE(B)	DS LAB	-	1*2	

		BE	PROJECT		2	
17	Vijay Ingle	TE(A)	MIS	3	-	19
		TE(A)	WPL LAB		4*2	
		TE(B)	DBMS LAB	-	2*2	
		BE	PROJECT	-	4	
18	Jitendra Patil	SE(B)	DC	4	-	20
		SE(B)	DC LAB	-	4*2	
		SE(A)	DC LAB	-	3*2	
		BE	PROJECT	-	2	
19	Sushant Bahekar	TE(B)	OS	3		17
		TE(B)	OS LAB	-	4*2	
		TE(A)	OS LAB	-	2*2	
		BE	PROJECT	-	2	
20	Vinaya Sawdekar	TE(B)	ADA	4	-	20
		BE(B)	CD LAB	-	4*2	
		BE(A)	CD LAB	-	3*2	
		BE	PROJECT	-	2	
21	Prachi Chaudhari	TE(A)	WPL LAB		4*2	18
		SE (A,B)	MPMCI LAB	-	4*2	
		BE	PROJECT	-	2	
22	Dhanashree Tayade	BE(A)	DWM	4	-	20
		BE(A)	DWM LAB	-	4*2	
		BE(B)	DWM LAB	-	2*2	
		SE(B)	DS LAB	-	1*2	
		BE	PROJECT	-	2	

23	Chetana T. Baviskar	TE(A)	MIS	3	-	19
		SE (A)	MPMCI LAB	-	4*2	
		SE(B)	MPMCI LAB	-	3*2	
		BE	PROJECT	-	2	
24	Shweta Pandey	SE(B)	DS	4+2	-	20
		SE(B)	DSLAB	-	4*2	
		SE(A)	DSLAB	-	3*2	

Electrical Engineering Department
Load Distribution 2015-16 Semester-I
Teaching load (UG)

S.N.	Name of the Staff	Year	Subject	Th.	Pr.	Tu.	Total Load (Hrs)
1	Dr. P. J. Shah	TE	PE	04	02		10
		BE	Seminar		02		
		BE	Project-I		02		
2	Dr. P. V. Thakre	BE	IDC	03	06		16
		BE	RES*	03			
		BE	Seminar		02		
		BE	Project-I		02		
3	Mr. V. S. Pawar	TE	EME	04			15
		BE	IEE (Elect.-I)	03	04		
		BE	Project-I		02		
		BE	Seminar-II		02		
4	Mr. M. M. Ansari	TE	EM/C-II	04	06		17
		BE	EAC*	03			
		BE	Project-I		02		
		BE	Seminar-II		02		
5	Mr. S. M. Shembekar	TE	PS-II	04	08		19
		BE	PSOC	03			
		BE	Project-I		02		
		BE	Seminar-II		02		
6	Mr. D. S. Patil	SE	EEM	04	08		21
		BE	HVE	03	02		
		BE	Project-I		02		
		BE	Seminar-II		02		
7	Mr. N.S. Mahajan	SE	PS-I	04			20
		SE E&TC	ECM	04	08		
		BE	Project-I		02		
		BE	Seminar-II		02		
8	Mr. S. S. Bhuskute	SE E&TC	ECM		08		18
		TE	EEW		08		
		BE	IDC		02		
9	Ms. S.S. Chhabra	SE	EM-I	04	08	02	20
		TE	PE		06		
10	Ms. N. D. Sapkar	TE	IOM	04			20
		BE	HVE		06		
		SE	EW		08		
		TE	EM/C-II		02		
11	Mr. A.R. Khan	SE	SS - III	01	08		22
		TE	SA-I	01	08		
		BE	IEE		04		
Total Load							**198**

* Interdisciplinary subject

Electrical Engineering Department
Teaching Load Distribution 2015-16 Semester-II (UG)

S.N.	Name of the Staff	Year	Subject	Th.	Pr.	Tu.	Total Load (Hrs)
1	Dr. P. J. Shah	SE	ADE	04	06	-	16
		BE	Project-II		04		
		TE	Seminar-I		02		
2	Dr. P. V. Thakre	SE	NA	03	04	02	19
		FE	EEEE	04			
		BE	Project-II		04		
		TE	Seminar-I		02		
3	Mr. V. S. Pawar	TE	CS-I	03	08		21
		BE	FACTS & PQ	04			
		BE	Project-II		04		
		TE	Seminar-I		02		
4	Mr. M. M. Ansari	SE	EM/C-I	04	08	02	24
		BE	PSS	04			
		BE	Project-II		04		
		TE	Seminar-I		02		
5	Mr. S. M. Shembekar	SE	EIED	04	08		25
		BE	SGP	03	04		
		BE	Project-II		04		
		TE	Seminar-I		02		
6	Mr. D. S. Patil	SE	NT	04			23
		TE	EM-II	03	08		
		SE	CP/MATLAB		02		
		BE	Project-II		04		
		TE	Seminar-I		02		
7	Mr. N.S. Mahajan	BE	CAPSA	04	04		25
		BE	SGP		04		
		SE	CP/MATLAB	01	06		
		BE	Project-II		04		
		TE	Seminar-I		02		
8	Mr. S. S. Bhuskute	TE	EMD	04			23
		SE Mech.(A)	BEDC	03	06		
		SE	NA		04		
		TE	Minor Project		02		
		TE	Seminar-I		02		
		FE	WP-II		02		
9	Ms. N. D. Sapkar	SE Mech.(B)	BEDC	03	06		23
		TE	SA-II		08		
		SE	ADE		02		
		TE	Minor Project		02		
		TE	Seminar-I		02		
10	Mr. A. R. Khan	TE	MPMC	04	08		24
		BE	PSDP	04	04		
		TE	Minor Project		02		
		TE	Seminar-I		02		
11	Miss N.R. Bhole	TE	ED	03			23
		BE	PSS		08		
		FE	WP-II		08		
		TE	Minor Project		02		
		TE	Seminar-I		02		
Load				**66**	**176**	**04**	**246**
Industrial Lecture/week by Industrial person							01
Total Load							**247**

Academic year 2015-16 (Semester –I)
Teaching load (PG)

S. N.	Name of the Staff	Year/ Sem.	Subject						No. of Batches	Total Load (Hrs)
				Th.	**Pr.**	**Tu./ D**	**Project**	**Seminar**		
1	Dr. P.J.Shah	ME-(FY)/I	MPMC	3	-	-	-	-	-	09
		ME-(FY)/I	Seminar-I	-	-	-	-	2		
		ME-(SY)/I	Project Stage-I	-	-	-	4	-		
2	Dr. P.V. Thakre	ME-(FY)/I	Lab. Pract.	-	2	-	-	-	1	02
3	V. S. Pawar	ME-(FY)/I	PSOT	3	-	-	-	-	-	11
		ME-(FY)/I	Seminar-I	-		-		2	-	
		ME-(SY)/I	Project Stage-I	-	-	-	4	-	-	
4	M.M.Ansari	ME-(FY)/I	PSD	3	-	-		-	-	07
		ME-(SY)/I	Project Stage-I	-	-	-	4	-	-	
5	S. M. Shembekar	ME-(FY)/I	FACTS & PQ	3	-	-	-	-	-	09
		ME-(SY)/I	Project Stage-I	-	-	-	4	-	-	
		ME-(SY)/I	Seminar-III	-	-	-	-	2	-	
6	N.S. Mahajan	ME-(FY)/I	PSPR	3	-	-	-	-	-	09
		ME-(FY)/I	Lab. Pract.	-	4	-	-	-	2	
		ME-(SY)/I	Project Stage-I	-	-	-	2	-	-	
		ME-(SY)/I	Seminar-III	-	-	-	-	2	-	
	Total Load			15	06		18	08		**47**

Academic year 2015-16 (Semester –II)
Teaching load (PG)

S.N.	Staff Name	Year/ Sem.	Subject	Th	Pr.	Tu./D	Project and Sem.	Total Load (Hrs)
1	Dr. P.J.Shah	ME/II (FY)	DSP	03				11
		ME/II (FY)	Lab. Practice		02			
		ME/IV (SY)	Project Stage-II				06	
		ME/II (FY)	Seminar-II					
2	V.S. Pawar	ME/II (FY)	Elective-II	03				11
		ME/II (FY)	Lab. Practice		02			
		ME/IV (SY)	Project Stage-II				06	
		ME/II (FY)	Seminar-II					
3	M.M. Ansari	ME/II (FY)	HVPT	03				09
		ME/IV (SY)	Project Stage-II				06	
		ME/II (FY)	Seminar-II					
4	S.M. Shembekar	ME/II (FY)	PSMC	03				09
		ME/IV (SY)	Project Stage-II				06	
		ME/II (FY)	Seminar-II					
5	N. S. Mahajan	ME/II (FY)	CMPSA	03				11
		ME/II (FY)	Lab. Practice		02			
		ME/IV (SY)	Project Stage-II				06	
		ME/II (FY)	Seminar-II					
	Total load			15	06		30	51

COLLEGE OF ENGINEERING & TECHNOLOGY, BAMBHORI.

ELECTRONICS & TELECOMMUNICATION DEPARTMENT

TENTATIVE TEACHING LOAD SHEET
M.E. (DIGITAL ELECTRONICS) for Term- I
Year 2015-2016

Sr. No.	Name	Year and Term	Subject	Theory	Practical	Total load for each staff
01	Dr. S. R. Suralkar	ME FY Term I	AIS Seminar-I	03 --	-- 02*01=02	05
02	Prof. D. U. Adokar	ME FY Term I	DSD DSD Lab-I	03	-- 02*01=02	05
03	Dr. P. H. Zope	ME FY Term I	VLSI-D Seminar-I	03 --	-- 02*01=02	05
04	Prof.A.H.Karode	ME FY Term I	PC AIS Lab-I	02 --	-- 02*01= 02	04
05	Prof.N. M. KAZI	ME FY Term I	PC	01	--	01
06	Prof.S. U. NYATI	ME FY Term I	ADSP ADSP LAB-I	03 --	-- 02*01= 02	05
			Subtotal	15	10	
					Total	**25**

COLLEGE OF ENGINEERING & TECHNOLOGY, BAMBHORI.

ELECTRONICS & TELECOMMUNICATION DEPARTMENT

TEACHING LOAD SHEET

Second Year Term- III & IV

Year 2015-2016

Sr. No.	Name	Year and Term	Subject	Theory	Practical	Total
1	Dr S. R. Suralkar	ME SY Term I	Project Stage-I	--	18*01=18	18
2	Dr. P. H. Zope	ME SY Term I	Project Stage-I	--	18*01=18	18
3	Dr. M. P. Deshmukh	ME SY Term I	Project Stage-I	--	18*01=18	18
4	Prof. D U. Adokar	ME SY Term I	Project Stage-I	--	18*01=18	18
5	Prof. N. M. Kazi	ME SY Term I	Project Stage-I	--	18*01=18	18
6	Prof. A. C. Wani	ME SY Term I	Project Stage-I	--	18*01=18	18
7	Prof. A. H. Karode	ME SY Term I	Project Stage-I	--	18*01=18	18
8	Prof. S. U. NYATI	ME SY Term I	Project Stage-I	--	18*01=18	18
9	Prof S. P Ramteke	ME SY Term I	Project Stage-I	--	18*01=18	18
10	Prof V. M. Deshmukh	ME SY Term I	Project Stage-I	--	18*01=18	18
					TOTAL	180

Total Teaching Load = 180 Hrs.

COLLEGE OF ENGINEERING & TECHNOLOGY, BAMBHORI.

ELECTRONICS & TELECOMMUNICATION DEPARTMENT

TEACHING LOAD SHEET
M.E. (DIGITAL ELECTRONICS) for Term- II
Year 2015-2016

Sr. No.	Name	Year and Term	Subject	Theory	Practical	Total
1	Dr. S. R. Suralkar	ME FY Term II	IP&PR Seminar-II	03 --	-- 02*01=02	05
2	Dr. P. H. Zope	ME FY Term II	ESD Seminar-II	03	02*01=02 02*01=02	07
3	Prof. N. M. Kazi	ME FY Term II	ACN Seminar-II	03	---	03
4	Prof.A.H.Karode	ME FY Term II	ADC IP&PR	03	-- 02*01= 02	05
5	Prof. A. C Wani	ME FY Term II	MCD	03	--	03
6	Prof. S P Ramteke	ME FY Term II	ADC	--	02*01= 02	02
7						
8			Subtotal	15	10	
9					**Total**	**25**

COLLEGE OF ENGINEERING & TECHNOLOGY, BAMBHORI.

ELECTRONICS & TELECOMMUNICATION DEPARTMENT

TEACHING LOAD SHEET
M.E. (DIGITAL ELECTRONICS)
Year 2014-2015

Second Year Term- IV

Sr. No.	Name	Year and Term	Subject	Theory	Practical	Total
01	Dr U. S. Bhadade	ME SY Term I	Project Stage-II	--	18*01=18	18
02	Prof. S. R. Suralkar	ME SY Term I	Project Stage-II	--	18*01=18	18
03	Dr. P. H. Zope	ME SY Term I	Project Stage-II	--	18*01=18	18
04	Prof. A. H. Karode	ME SY Term I	Project Stage-II	--	18*01=18	18
05	Dr. M. P. Deshmukh	ME SY Term I	Project Stage-II	--	18*01=18	18
06	Prof. N. M. Kazi	ME SY Term I	Project Stage-II	--	18*01=18	18
07	Prof. A. C. Wani	ME SY Term I	Project Stage-II	--	18*01=18	18
08	Prof. S. U. NYATI	ME SY Term I	Project Stage-II	--	18*01=18	18
09	Prof S. P Ramteke	ME SY Term I	Project Stage-II	--	18*01=18	18
10	Prof D. U. Adokar	ME SY Term I	Project Stage-II	--	18*01=18	18
11	Prof V. M. Deshmukh	ME SY Term I	Project Stage-II	--	18*01=18	18
12	Prof. P. V. Thakre	ME SY Term I	Project Stage-II	--	18*01=18	18
					TOTAL	216

Total Teaching Load = 216 Hrs.

S.S.B.T'S College of Engineering & Technology, Bambhori, Jalgaon

Department of Information Technology

Load Distribution (SEM-I) 2015-16

Sr. No.	Staff Name	Designation	Class	Subject	Theory	Practical	Total Load
1	Dr. U. S. Bhadade	Professor	SEIT	OOT	4	2*1=2	10
			BE.IT	Project	--	2	
			BE IT	Seminar	--	2	
2	Mrs. A. K. Bhavsar	Asso. Prof	TE IT	SE	4	2*4=8	20
			BE.IT	IT	4	--	
			BE.IT	Project	--	2	
			BE IT	Seminar	--	2	
3	Mr. S. J. Patil	Asst. Prof	TE IT	CN	4	2*4=8	19
			TE IT	JPL	1	2*2=2	
			BE.IT	Project	--	2	
			BE IT	Seminar	--	2	
4	Mr. N. P. Jagtap	Asst. Prof	BE IT	ES	3	2*4=8	20
			SE IT	DSGT	4+1(T)	--	
			BE IT	Project	--	2	
			BE IT	Seminar	--	2	
5	Mr. S. H. Rajput	Asst. Prof	BE IT	AI	3	2*4=8	21
			TE IT	FLAT	4	--	
			TE IT	JPL	--	2*1=2	
			BE IT	Project	--	2	
			BE IT	Seminar	--	2	

6	Mr. R. B. Sangore	Asst. Prof	BE IT	ERP & SAP	3		20
			BE IT	ERP	3	--	
			SE IT	IT		2*4=8	
			TE IT	JPL	--	2*1=2	
			BE IT	Project	--	2	
			BE IT	Seminar	--	2	
7	Mr. P. C. Harne	Asst. Prof	TE IT	SP	4	2*4=8	20
			SE IT	DSGT	--	2*2=4	
			BE IT	Project	--	2	
			BE IT	Seminar	--	2	
8	Mr. H. R. Kotwal	Asst. Prof	SE IT	OOT	--	2*3=6	14
			TE IT	POM	4	--	
			BE IT	Project	--	2	
			BE IT	Seminar	--	2	
9	Mr. S. K. Singh	Asst. Prof	BE IT	AUP	4	2*4=8	22
			TE IT	JPL	--	2*1=2	
			SE IT	DSGT	--	2*2=4	
			BE IT	Project	--	2	
			BE IT	Seminar	--	2	
10	Mr. P. K. Patil	Asst. Prof	SE IT	DSMP	4	2*4=8	20
			TE IT	LL	--	2*4=8	
11	Mr. M. S. Patil	Asst. Prof	SE IT	SS-III	1	2*4=8	14
			SE IT	DSGT	1(T)	--	
			BE IT	Project	--	2	
			BE IT	Seminar	--	2	
						Total	**200**

Department of Information Technology
Load Distribution (SEM-II) 2015-16

Sr. No.	Staff Name	Designation	Class	Subject	Theory	Practical	Project/ Seminar/ Mini Project	Total Load
1	Dr. U. S. Bhadade	Professor	SE IT	DS	4+1(T)	--	4	9
2	Mrs. A. K. Bhavsar	Asso. Prof	TE IT	OOMD	4	4*2=8	4	20
			SE IT	DC	4	--		
3	Mr. S. J. Patil	Asst. Prof	BE IT	C & NS	3	--	4	18
			BE IT	IS	3	4*2=8		
4	Mr. N. P. Jagtap	Asst. Prof	BE IT	CC	3	--	4	19
			TE IT	DBMS	4	4*2=8		
5	Mr. S. H. Rajput	Asst. Prof	SE IT	MPMCI	4+1(T)	3*2=6	4	18
			BE IT	SMQA	3	--		
6	Mr. R. B. Sangore	Asst. Prof	TE IT	OS	4	4*2=8	4	19
			BE IT	MC	3	--		
7	Mr. H. R. Kotwal	Asst. Prof	SE IT	CGM	4	3*2=6	4	22
			TE IT	WPL	--	4*2=8		
8	Mr. P. C. Harne	Lecturer	TE IT	MIS	4	--	4	15
			SE IT	DS	1(T)	3*2=6		
9	Mr. S. K. Singh	Lecturer	BE IT	DWM	3	2*4=8	4	16
			SE IT	MPMCI	1(T)	--		
10	Mr. P. K. Patil	Lecturer	SE IT	CO	4	--	4	21
			SE IT	ADL	1	3*2=6		
			BE IT	C & NS	--	3*2=6		
11	Mr. M. S. Patil	Lecturer	TE IT	E COM	4	--	4	16
			BE IT	SMQA	--	1*2=2		
			SE IT	DC	--	3*2=6		
Total								**193**

Item No.17(A)

DEPARTMENT-Civil Engineering

Teaching work load of all classes in current year 2014-15(Term wise)

Year Course Semester	Subject	Load pattern per week				No.of batches	Total equivalent load per week			Total work load
		Th	Pr	Drg.	Tut.		Th	Pr	Drg.	
SemI FE(Civil)	ECE&EM	3	2	-	1	Pr 3x10=30	40	60	-	100
	SOM	3x2	2	-	2	6	8	12	-	
SemI	BCTM	3x2	-	2		6	6	-	12	
SE	CT	3x2	2	-		6	3	12	-	
(Civil)	SUR-I	3x2	2	-		6	3	12	-	82
	Soft Skill -III	2	2	-		6	2	12	-	
	FM-I	3	2			6	4	12		
					1					
	TOS-I	3	-	-		6	4	12	-	
SemII					1					
	BDD	3	-	-		6	3		-	
SE										
	EG	3	2	2		6	3	12	12	91
(Civil)										
	SUR-II	3	2	-		6	3	12	-	
	CG	2	2			6	2	12		
			-							
	SD-I					3		-		
		3	2				4			
	IE-I			2		3		6	6	
		3	2				4			
SemI	FM-II			-		3		6	-	
		3	2				4			
TE	EE-I			-		3		6	-	50
		3					4			
(Civil)	CM-I			-		3			-	
		3	2				4			
	TOM-I			-		3		6	-	
		1								

SemII TE (Civil)	SD-II TOS-II GTE-I IE-II CM-II TOM II Seminar-I Minor Project	3 3 3 3 3 -	- 2 2 2 2 2	2 - - - - -		3 3 3 3 3 13 13	3 3 3 3 3 -	- - 6 6 - 6 2 2	6 - - -	43
SemI BE (Civil)	QSV WRE-I CM-I EE-II ELEctive-I Project-I Seminar	4 4 4 4 4 - -	2 - 2 2 2 2 2	- - - - - -		4 4 4 4 4 13	4 4 4 4 4 - -	8 - 8 8 8 26 2	- - - - - - -	80
SemII BE (Civil)	WRE-II SDD-III CM-II ELECTIVE-II PROJECT-II	4 4 4 4 -	2 - 2 2 4	- 4 - - -		4 4 4 4 12	4 4 4 4 -	8 - 8 8 48	- 16 - - -	108
Sem I ME (civil)	EEM EEC DOM AP Elective I Lab Practice I Seminar I	3 3 3 3 3	- - - - - 6 4	- - - - - - -		- - - - - 1 -	3 3 3 3 3 - -	- - - - - 6 4	- - - - - - -	25

	AWTT		-	-		-	3	-	-	
	AWWTT	3	-	-		-	3	-	-	
	IWWM	3	-	-		-	3	-	-	
Sem II M E (Civil)	WSM	3	-	-		-	3	-	-	
	Elective II	3	-	-		-	3	6	-	29
	Lab Practice II	3	6	-		1	-	4	-	
	Seminar II		4	-		-	-	4	-	

LOAD DESTRIBUTION FOR MECHANICAL ENGG. DEPARTMENT 2015-2016 SEM-I

Sr. No.	NAME	CLASS	SUBJECT	Theory (Hr)	Tutorial (Batch X Hr)	Practical (Batch X Hr)	Total Load
1	Dr. D.S. Deshmukh	BE (B)	RAC	03	-----	01*02=02	09
		BE	PROJ.SEM	-----	-----	04	
2	Dr. S. P. Shekhawat	SE(A+B)	ET	04+04=08	-----	--	12
		BE	PROJ.SEM	--	-----	04	
3	Mr. N. K. Patil	FE (H)	ECME	03	01*01=01	------	15
		BE (A)	OR	03	-----	-----	
		TE	MD-I	------	------	02*02=04	
		BE	PROJ.SEM	-----	-----	04	
4	Mr. K. Shrivastava	FE (I)	ECME	03	01*01=01	-----	16
		TE (A)	HT	04	------	02*02=04	
		BE	PROJ.SEM	-----	-----	04	
5	Mr. M.V. Rawlani	BE (B)	OR	03	-----	-----	16
		BE (I.Elec-1)	ORT	03	-----	-----	
		SE	MSM	-----	-----	02*02=04	
		SE	SS	-----	-----	01*02=02	
		BE	PROJ.SEM	-----	-----	04	
6	Mr. P. G. Damle	TE(A+B)	MD-I	04+04=08	-----	02*02=04	16
		BE	PROJ.SEM	-----	-----	04	
7	Mr. D. B. Sadaphale	SE (A)	MSM	04	-----	02*02=04	20
		SE (B)	FM	04	02X01=02	01*02=02	
		BE	PROJ.SEM	-----	-----	04	
8	Mr. P. N. Ulhe	SE(A+B)	SOM	04+04=08	02x01=02	-----	20
		BE	CAD/CAM	-----	-----	03*02=06	
		BE	PROJ.SEM	-----	-----	04	
9	Mr. P. M. Solanki	BE (A)	MTX	03	-----	-----	19
		TE (A+B)	CG	01+01=02	-----	-----	
		BE	CAD/CAM	-----	-----	05*02=10	
		BE	PROJ.SEM	-----	-----	04	
10	Mr. P. D. Patil	SE (A+B)	SS	01+01=02	-----	06*02=12	21
		BE (A)	CAD/CAM	03	-----	-----	
		BE	PROJ.SEM	-----	-----	04	
11	Mr. M. V. Kulkarni	TE (B)	HT	04	-----	03*02=06	21
		BE (A)	RAC	03	-----	01*02=02	
		SE	ET	-----	-----	01*02=02	
		BE	PROJ.SEM	-----	-----	04	
12	Mr. A. R. Bhardwaj	SE (B)	ME-I	04	-----	-----	16
		TE	MD-I	-----	-----	04*02=08	
		BE	PROJ.SEM	-----	-----	04	

13	Mr. D. C. Talele	TE(B)	TOM-II	04	-----	05*02=10	21
		BE (I.Elec-1)	ERT	03			
		BE	PROJ.SEM	-----	-----	04	
14	Dr. P.P. Bornare	BE (A)	ELE-I (AUTO.)	03	-----	01*02=02	21
		TE(B)	ICE	04	-----	04*02=08	
		BE	PROJ.SEM	-----	-----	04	
15.	Mrs. J. R. Surange	SE (A)	ME-I	04	-----	-----	21
		SE (B)	MSM	04	-----	04*02=08	
		SE(B)	SOM	-----	01x01=01	-----	
		BE	PROJ.SEM	-----	-----	04	
16.	Mr. C. K. Mukherjee	TE (A & B)	IE&S	04+04=08	-----	-----	22
		SE	ET	-----	-----	07*02=14	
17.	Mr. A. V. Rajput	BE (A)	ELE-I (AUTO.)	03	-----	01*02=02	22
		TE	CG	-----	-----	08*02=16	
		FE	ECME	-----	01x01=01	-----	
18.	Mr. S.A. Rajput	SE (ELEX.)	PPE	04	-----	04*02=08	21
		BE	RAC	-----	-----	04*02=08	
		FE	ECME	-----	01x01=01	-----	
19	Mr. N. B. Dhanore	TE (A)	TOM-II	04	-----	03*02=06	22
		TE	HT	-----	------	01*02=02	
		SE	SS	-----	-----	01*02=02	
		BE	RAC	-----	-----	02*02=04	
		BE	ELE-I (AUTO.)	-----	------	02*02=04	
20	Mr. P. T. Patil	TE (A)	ICE	04	-----	04*02=08	23
		BE	ELE-I (AUTO.)	-----	------	04*02=08	
		TE	HT	-----	------	01*02=02	
		FE	ECME	-----	01x01=01	-----	
21	Miss. T.A. Chaudhari	SE (A)	FM	04	02X01=02	07*02=14	24
		SE	SOM	-----	01X01=01	-----	
		TE	HT	-----	-----	01*02=02	
		FE	ECME	-----	01X01=01	-----	

TIME TABLE I/C
Mr. P. N. Ulhe

HOD
Dr. D. S. Deshmukh

LOAD DESTRIBUTION
MECHANICAL ENGINEERING DEPARTMENT
Academic Year: - 2015-2016 Semester-IInd

Sr. No.	Name of Faculty Member	Subject	Class	Theory		Practical (Batch X Hr)		B.E. Project (Hrs)	T.E. Minor Project (Hrs)	T.E. Seminar-I	Total
				Section	Hours	No. of Batches	Hours				
1	Dr. D.S. Dehmukh	EDEME	F.E.	A	04*01=04	------	------	04	02	02	16
		EME	F.E.	------	------	02	02*02=04				
2.	Dr. S. P. Shekhawat	TOM-I	S.E.	A	04*01=04	------	------	04	------	02	14
		TOM-I	S.E.	B	04*01=04	------	------				
3.	Mr. N. K. Patil	EDEME	F.E.	B	04*01=04	------	------	04	------	02	23
		MQC	T.E.	A	03*01=03	------	------				
		ED	F.E.	------	------	03	03*02=06				
		FEA	B.E.	------	------	02	02*02=04				
4.	Mr. K. Shrivastava	EDEME	F.E.	C	04*01=04	------	------	04	------	02	22
		Turbo M/C	T.E.	A	04*01=04	------	------				
		ED	F.E.	------	------	02	02*02=04				
		Turbo M/C	T.E.	------	------	02	02*02=04				
5	Mr. M.V. Rawlani	NACM	T.E.	A	03*01=03	------	------	04	------	02	22
		NACM	T.E.	B	03*01=03	------	------				
		ED	F.E.	------	------	02	02*02=04				
		EME	F.E.	------	------	03	03*02=06				
6.	Mr. P. G. Damle	MD-II	T.E.	A	04*01=04	------	------	04	------	02	22
		MD-II	T.E.	B	04*01=04	------	------				
		MD-II	T.E.	------	------	03	03*02=06				
		ED	F.E.	------	------	01	01*02=02				

7.	Mr. D. B. Sadaphale	AT	S.E.	A	04*01=04	------	------	04	------	02	24
		AT	S.E.	B	04*01=04	------	------				
		AT	S.E.	A & B	Tut 2*1=02	------	------				
		AT	S.E.	------	------	04	04*02=08				
8.	Mr. P. N. Ulhe	MV	B.E.	A	04*01=04	------	------	04	------	02	24
		MV	B.E.	B	04*01=04	------	------				
		MV	B.E.	------	------	05	05*02=10				
9.	Mr. P. M. Solanki	EDEME	F.E.	E	04*01=04	------	------	04	------	02	23
		FEA	B.E.	A	03*01=03	------	------				
		ED	F.E.	------	------	03	03*02=06				
		FEA	B.E.	------	------	02	02*02=04				
10.	Mr. P. D. Patil	EDEME	F.E.	F	04*01=04	------	------	04	------	02	24
		ED	F.E.	------	------	07	07*02=14				
11.	Mr. M. V. Kulkarni	EDEME	F.E.	I	04*01=04	------	------	04	------	02	24
		Turbo M/C	T.E.	B	04*01=04	------	------				
		Turbo M/C	T.E.	------	------	03	03*02=06				
		EME	F.E.	------	------	02	02*02=04				
12.	Mr. A. R. Bhardwaj	ME-II	S.E.	A	03*01=03	------	------	04	------	02	18
		ME-II	S.E.	B	03*01=03	------	------				
		MD-II	T.E.	------	------	02	03*02=06				
13	Mr. D. C. Talele	FEA	B.E.	A	03*01=03	------	------	04	------	02	24
		Tribology	B.E.	B	03*01=03	------	------				
		FEA	B.E	------	------	04	04*02=08				
		Tribology	B.E	------	------	02	02*02=04				

14.	Dr. P.P. Bornare	PBM	T.E.	A	03*01=03	------	------	04	------	02	24
		PBM	T.E.	B	03*01=03	------	------				
		EME	F.E.	------	------	03	03*02=06				
		Tribology	B.E	------	------	03	03*02=06				
15.	Miss. J. R. Surange	EDEME	F.E.	G	04*01=04	------	------	04	------	02	25
		MQC	T.E.	B	03*01=03	------	------				
		ED	F.E.	------	------	03	03*02=06				
		MQC	T.E.	------	------	03	03*02=06				
16.	Mr. C. K. Mukherjee	MD Lab	S.E.	A	01*01=01	------	------	------	02	02	26
		MD Lab	S.E.	B	01*01=01	------	------				
		MD Lab	S.E.	------	------	06	06*02=12				
		MQC	T.E.	------	------	03	03*02=06				
		EME	F.E.	------	------	01	01*02=02				
17.	Mr. A. V. Rajput	EDEME	F.E.	H	04*01=04	------	------	------	02	02	25
		Auto-II	B.E.	A	03*01=03	------	------				
		ED	F.E.	------	------	03	03*02=06				
		EME	F.E.	------	------	04	04*02=08				
18.	Mr. S.A. Rajput	Tribology	B.E.	A	03*01=03	------	------	------	02	02	25
		Tribology	B.E	------	------	03	03*02=06				
		AT	S.E.	----	------	02	02*02=04				
		AT	S.E.	----	Tut 2*1=02	------	------				
		EME	F.E.	------	------	03	03*02=06				
19.	Mr. N.B. Dhanore	Auto-II	B.E.	B	03*01=03	------	------	------	02	02	25
		ED	F.E.	------	------	02	02*02=04				
		EME	F.E.	------	------	03	03*02=06				
		MD-II	T.E.	------	------	02	02*02=04				
		MV	B.E.	------	------	02	02*02=04				

20.	Mr. P.T. Patil	EME	F.E.	------	------	03	03*02=06	------	02	02	26
		TOM-I	S.E.	------	------	03	03*02=06				
		Turbo M/c	T.E.	------	------	03	03*02=06				
		MQC	T.E.	------	------	02	02*02=04				
21.	Miss. T.A. Chaudhari	EDEME	F.E.	D	04*01=04	------	------	------	02	02	26
		ED	F.E.	------	------	03	03*02=06				
		EME	F.E.	------	------	03	03*02=06				
		TOM-I	S.E.	------	------	03	03*02=06				

TIME TABLE I/C
Mr. P. D. Patil

HOD
Dr. D. S. Deshmukh

DEPARTMENT OF MEANICAL ENGINEERING (POSTGRADUATE)

ME (Machine Design) Load distribution SEM – I (2015 – 16)

Sr. No.	Name	Class	Subject	Theory (Hr)	Practical (Batch X Hr)	Total
1	Dr. D.S Deshmukh	FE	Seminar- I	--	04	04
2	Dr. S. P. Shekhawat	FE	IACS	03	--	07
		FE	Seminar -I	--	04	
3	Er. N. K. Patil	FE	CMMD	01	02 x 02 = 04	09
		FE	Seminar- I	--	04	
4	Mr. P. G. Damle	FE	VE	03	02 x 02 = 04	11
		FE	Seminar -I	--	04	
5	Mr. D. B. Sadaphale	FE	AMED	03	--	07
		FE	Seminar -I	--	04	
6	Mr. P. N. Ulhe	FE	TRIBO	03	02 x 02 = 04	11
		FE	Seminar-I	--	04	
7	Mr. P. M. Solanki	FE	CMMD	02	--	06
		FE	Seminar -I	--	04	

Mr. P.N. Ulhe
PG Time Table In-charge
Dept. Mechanical Engg

H.O.D
Dept. Mechanical Engg

DEPARTMENT OF MEANICAL ENGINEERING (POSTGRADUATE)

ME (Machine Design) Load distribution SEM – II (2015 – 16)

Sr. No.	Name	Class	Subject	Theory (Hr)	Practical (Batch X Hr)	Total
1.	Dr. D.S Deshmukh	FE	Seminar- II	--	04	04
2.	Dr. S. P. Shekhawat	FE	MPD	03	--	07
		FE	Seminar -II	--	04	
3.	Er. N. K. Patil	FE	MTD	01	--	05
		FE	Seminar- II	--	04	
4	Mr. P. G. Damle	FE	DSM	03	02 x 02 = 04	11
		FE	Seminar -II	--	04	
5	Mr. D. B. Sadaphale	FE	MTD	02	--	10
		FE	Seminar -II	--	04	
		FE	MPD	--	02 x 02 = 04	
6	Mr. P. N. Ulhe	FE	OTD	03	02 x 02 = 04	11
		FE	Seminar-II	--	04	
7	Mr. P. M. Solanki	FE	PBT	03	--	07
		FE	Seminar -II	--	04	

Mr. P.N. Ulhe
PG Time Table In-charge
Dept. Mechanical Engg

H.O.D
Dept. Mechanical Engg

SSBT's College of Engineering & Technology, Bambhori, Jalgaon.
Department of Business Administration
Teaching Load Distribution
Semester II & IV (Academic Year: 2015 - 16)

SR. No.	NAME	SUB CODE	SUBJECT	MBA-I Theory	MBA-II Theory	TOTAL
1	Dr. Vishal S. Rana	206	Organizational Behavior – II	4		**8**
		407 B	Retail Mgt & Consumer Behavior		4	
3	Dr. Saroj Shekhawat	202	IT For Managers	4		**8**
		402	E-Comm. & Excellence Mgt		4	
4	Er. P.A.Anawade	208	Operations Management	4		**8**
		403	Indian Commercial Laws		4	
5	H.A.Salunkhe	207	Financial Management	4		**12**
		405 A	Family Business Mgt		4	
		406 A	International Financial Mgt		4	
6	R.A.Modiyani	205	Management Accounting	4		**16**
		401	International HRM		4	
		406 B	Retail Management & Digital Mktg		4	
		407 A	Case Studies in Financial Mgt		4	
7	Mukesh Ahirrao	203	Global Economics Scenario	4		**16**
		204	Marketing Management	4		
		404	Investment & Portfolio Mgt		4	
		405 B	Investment & Portfolio Mgt		4	
8	Faroza Kazi	201	Business Research Methods	4		**16**
		405 C	Performance & Compensation Mgt		4	
		406 C	Performance & Compensation Mgt		4	
		407 C	Case Studies in HR Mgt		4	
				32	**52**	**84**

Time Table I/C **HOD (MBA)**

SSBT's College of Engineering & Technology, Bambhori, Jalgaon.
Department of Business Administration
Teaching Load Distribution
Semester I & III (Academic Year: 2015 - 16)

SR. NO	NAME	SUB CODE	SUBJECT	MBA-I Theory	MBA-II Theory	TOTAL
1	Dr.V.S.Rana.	106	Organizational Behavior-I	4		8
		307-B	Global Marketing Management		4	
2	Mr.P.A.Anawade	108	Quantitative Techniques	4		8
		303	Legal Aspect of Business		4	
3	Dr. Saroj Shekhawat	102	Corporate Communication Skills	4		12
		104	Human Resource Management		4	
		306-C	Strategic Human Resource Management		4	
4	Mr.H.A.Salunkhe	107	Corporate Social Responsibility	4		16
		304-A	Banking & Investment Management		4	
		305-A	Tax Management		4	
		306-B	Sales & Distribution		4	
5	Ms.R.A.Modiyani	105	Business Accounting	4		16
		301	Strategic Management		4	
		305-B	Consumer Behavior and Service Marketing		4	
		306-A	Strategic Financial Management		4	
6	Mr. Mukesh Ahirrao	103	Managerial Economics		4	16
		304-B	Product and Brand Management		4	
		305-C	Human Capital Management and Development	4		
		307-A	Tally & Advance Excel	4		
7	Ms. Faroza Kazi	101	Management Science	4		16
		302	Management Information System & ERP		4	
		304-C	Industrial Relations & Labour Welfare		4	
		307-C	Labour Laws		4	
			Total =	**32**	**60**	**92**

Time Table I/C **HOD (MBA)**

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 whom term work marks are to be sent to the University.

The attendance record of the students is maintained in ERP software and 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 5^{th} 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 is given by Coordinator of Academics and Research and Development and the Principal.