Course Outcome for B.E. Computer Engineering

Class	Semester	Program	Name of the Subject	CO	Course Outcome
FE	I	B.E. Computer	Physics	817101.1	To study Bragg's Law and introduced to the principles of lasers, types of lasers and applications
				817101.2	Various terms related to properties of materials such as, permeability, polarization, etc.
				817101.3	Some of the basic laws related to quantum mechanics as well as magnetic and dielectric
				817101.4	properties of materials
				817101.5	Simple quantum mechanics calculations
				817101.6	Nanotechnology and their industrial applications.
FE	I	B.E. Computer	Mathematics - I	817102.1	Apply differential and integral calculus. Apart from some other applications they will have a basic understanding of Beta and Gamma functions.
				817102.2	The fallouts of Rolle's Theorem that is fundamental to application of analysis to Engineering problems.
				817102.3	The tool of Fourier series for learning advanced Engineering Mathematics.
				817102.4	To deal with functions of several variables that are essential in most branches of Engineering.The essential tool of matrices and linear algebra in a comprehensive manner.
FE	I	B.E. Computer	Basic Electrical & Electronics Engineering	817103.1	Students will be able to demonstrate knowledge of circuit analysis using various basic laws and theorems of electrical circuits
				817103.2	Students will be able to demonstrate and understand definition and relationship of various AC circuits.
				817103.3	Understand working principle of PN junction diode, Zener diode and their applications.
				817103.4	Describe different configuration of Bipolar Junction Transistor.
				817103.5	Describe different configurations of FET
				817103.6	Understand operating principle Power Electronics Devices
				817103.7	Describe use of the Basic gate and Universal gate

Class	Semester	Program	Name of the Subject	CO	Course Outcome
FE	I	B.E. Computer	Programming for Problem Solving	817104.1	To formulate simple algorithms for arithmetic and logical problems
				817104.2	Understand the fundamentals of C programming.
				817104.3	To test and execute the programs and correct syntax and logical errors
				817104.4	Choose the loops and decision making statements to solve the problem.
				817104.5	To decompose a problem into functions and synthesize a complete program using divide and conquer approach
				817104.6	To use arrays, pointers and structures to formulate algorithms and programs
FE	I	B.E. Computer	Physics Lab	817105.1	To study Bragg's Law and introduced to the principles of lasers, types of lasers and applications
				817105.2	Various terms related to properties of materials such as, permeability, polarization, etc.
				817105.3	Some of the basic laws related to quantum mechanics as well as magnetic and dielectric
				817105.4	properties of materials
				817105.5	Simple quantum mechanics calculations
				817105.6	Nanotechnology and their industrial applications.
FE	I	B.E. Computer	Basic Electrical and Electronics Engineering Lab.	817106.1	Identify electrical and electronics components/equipments.
				817106.2	Simplify D.C. network using Superposition Theorem.
				817106.3	Simplify D.C. network using Thevenin's Theorem.
				817106.4	Learn diode V-I Characteristic
				817106.5	Understand BJJ as a switch
				817106.6	Understand LED, JFET, SCR V-I characteristics
FE	I	B.E. Computer	Programming for Problem Solving Lab	817107.1	Understand the fundamentals of C programming.

Class	Semester	Program	Name of the Subject	CO	Course Outcome
				817107.2	Choose the loops and decision making statements to solve the problem.
				817107.3	Use functions to solve the given problem.
				817107.4	Implement different Operations on arrays.
				817107.5	Understand strings and structures.
				817107.6	Understand the usage of pointers.
FE	II	B.E. Computer	Chemistry	817201.1	Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.
				817201.2	Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques
				817201.3	Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity.
				817201.4	Rationalise bulk properties & processes using thermodynamic considerations
				817201.5	List major chemical reactions that are used in the synthesis of molecules.
FE	II	B.E. Computer	Engineering Graphics	817203.1	Introduction to engineering design and its place in society
				817203.2	Exposure to the visual aspects of engineering design
				817203.3	Exposure to engineering graphics standards
				817203.4	Exposure to solid modeling.
FE	II	B.E. Computer	English	817204.1	To acquire basic proficiency in English including reading and listening
				817204.2	To demonstrate proficiency in the use of written English, including proper spelling, Grammar and punctuation.
				817204.3	To enhance their ability to use spoken words in interpersonal communication, small group interactions and public speaking Comprehension, writing and speaking skills.
				817204.4	Become accomplished technical communicators.
FE	II	B.E. Computer	Mathematics-II	817202.1	Use mathematical tools needed in evaluating multiple integrals and their usage.
				817202.2	Apply effective mathematical tools for the solutions of differential equations that model physical processes.

Class	Semester	Program	Name of the Subject	CO	Course Outcome
				817202.3	Use tools of differentiation and integration of functions of a complex variable that are used in various techniques dealing engineering problems.
FE	II	B.E. Computer	Chemistry Lab	817206.1	Upon successful completion of lab Course, student will be able to: The chemistry laboratory course will consist of experiments illustrating the principles of chemistry relevant to the study of science and engineering.
				817206.2	Estimate rate constants of reactions from concentration of reactants/products as a function of time
				817206.3	Measure molecular/system properties such as surface tension, viscosity, conductance of solutions, redox potentials, chloride content of water, etc
				817206.4	Synthesize a small drug molecule and analyse a salt sample .
FE	II	B.E. Computer	Engineering Graphics Lab	817207.1	Introduction to engineering design and its place in society
				817207.2	Exposure to the visual aspects of engineering design
				817207.3	Exposure to engineering graphics standards
				817207.4	Exposure to solid modeling.
FE	II	B.E. Computer	English Lab	817208.1	Students will be sensitized towards recognition of English sound pattern.
				817208.2	The fluency in speech will be enhanced.
FE	II	B.E. Computer	Workshop Practices	817205.1	Students will be able to fabricatecomponents with their own hands.
				817205.2	Get practical knowledge of the dimensional accuracies and dimensional tolerances possible
				817205.3	with different manufacturing processes.
				817205.4	Assemble different components, they will be able to produce small devices oftheir interest.
SE	III	B.E. Computer	Mathematics – III	817301.1	Solve field problems in engineering involving Ordinary differential equations using Laplace Transform.
				817301.2	Apply concept of Fourier and Z-transform to solve field problems in engineering

Class	Semester	Program	Name of the Subject	CO	Course Outcome
				817301.3	Formulate and solve problems involving random variables.
				817301.4	Apply statistical methods for analyzing experimental data.
				817301.5	Understand basic concept statistics, probability distribution and test of significance
SE	III	B.E. Computer	Signals and Systems	817302.1	Demonstrate the ability to represent signals mathematically in continuous time and discrete time, and in frequency domain.
				817302.2	Understand the use of numerical method to analyze digital signal processing.
				817302.3	Understand Discrete Fourier Transform (DFT) and properties.
				817302.4	Analyze discrete time systems using Laplace and Z – transform.
				817302.5	Basic Understanding of state space analysis of system.
SE	III	B.E. Computer	Analog Electronic Circuits	817303.1	To categorize and calculate the DC and AC parameters of BJT / FET.
				817303.2	To describe and solve the frequency analysis of BJT.
				817303.3	To decide and formulate the various classes of operation of power amplifier.
				817303.4	To predict and classify the different configurations of feedback amplifiers.
				817303.5	To identify and analyze the different open loop and close loop applications of OP-Amp.
SE	III	B.E. Computer	Discrete Mathematics	817304.1	Formulate the given logic sentence it in terms of predicates, quantifiers, and logical connectives
				817304.2	Formulate real life problems in terms of set theory concepts.
				817304.3	Analyze the solution using deductive logic and prove the solution based on logical inference for given problem
				817304.4	Describe given mathematical problem according to its algebraic structure
				817304.5	Analyze the given problem as graph networks and solve with techniques of graph theory.
SE	III	B.E. Computer	Organizational Behavior	817305.1	Explain organization behaviour
				817305.2	Define individual behavior

Class	Semester	Program	Name of the Subject	CO	Course Outcome
				817305.3	Determine group issues
				817305.4	Apply leadership styles
				817305.5	Analyze factors causing work stress
SE	III	B.E. Computer	Analog Electronic Circuits Lab	817306.1	To design and formulate the operating point parameters of BJT / FET.
				817306.2	To measure the effect of bypass capacitor in frequency response.
				817306.3	To assess the effect of positive feedback in oscillator.
				817306.4	To test OP-Amp as an integrator and differentiator.
				817306.5	To measure the performance of OP-Amp low pass/ high pass filter
SE	III	B.E. Computer	Discrete Mathematics Lab	817307.1	Solve the problem based on set theory and logical connectives.
				817307.2	Identify various number conversion techniques.
				817307.3	Apply shortest path techniques in real life.
				817307.4	Analyze minimum spanning tree using Prims and Kruskal algorithm
SE	III	B.E. Computer	Object Oriented Programming Lab	817308.1	Create class and object for various application.
				817308.2	Use the concept pointers, constructors, destructors etc. for dynamic memorymanagement techniques.
				817308.3	Apply the concept of inheritance to avoid data duplication.
				817308.4	Create and demonstrate operator overloading.
				817308.5	Implement class and function template.
SE	IV	B.E. Computer	Biology	817401.1	Describe the concepts of modern cell theories and identify the differences in eukaryotic and prokaryotic cells.
				817401.2	Explain the major groups of animal and plant kingdom.
				817401.3	Demonstrate the advanced techniques in plant and animal tissue culturing, and able to calculate the growth rate of cells through culturing.

Class	Semester	Program	Name of the Subject	CO	Course Outcome
				817401.4	Classify the microorganisms through different isolation techniques and illustrate microbial culture techniques.
				817401.5	Illustrate mechanism involved rDNA technology and apply the different aspects of Biotechnology.
SE	IV	B.E. Computer	Digital Electronics	817402.1	Develop a digital logic and apply it to solve real life problems.
				817402.2	Understand and use of K-Map and Tabular method for simplification of logical expression.
				817402.3	Analyze, design and implement combinational logic circuits
				817402.4	Analyze and implement the sequential logic circuits using flip-flops.
				817402.5	Classify registers and design of the counters.
SE	IV	B.E. Computer	Data Structure & Algorithms	817403.1	Enumerate the concepts of data and data structure
				817403.2	Analyze linear data structures
				817403.3	Analyze nonlinear data structure
				817403.4	Enumerate sorting and searching algorithms
				817403.5	Analyze space and time complexity
SE	IV	B.E. Computer	Computer Organization & Architecture	817404.1	To draw and explain internal architecture of 8086 with its register organization.
				817404.2	Explain various arithmetic and logical 8086 instructions and assembler directives.
				817404.3	Explain single bus architecture within the processor with complete execution cycle.
				817404.4	Explain various types of memories and solve numerical on cache memory design.
				817404.5	Explain and solve arithmetic operations like multiplication using booths algorithm and bit pairing method.
SE	IV	B.E. Computer	Finance & Accounting	817405.1	Understand the meaning, scope, significance, legal aspects and applications of accounting in Engineering field .

Class	Semester	Program	Name of the Subject	CO	Course Outcome
				817405.2	Understanding and use of book-keeping and the distinction of accounting with bookkeeping
				817405.3	Understand and apply Concept Double Entry System, Journal, Ledger for accounting purpose.
				817405.4	Understand both the theoretical and practical role of financial management in business corporations.
				817405.5	Exposure to primary and secondary markets.
SE	IV	B.E. Computer	Digital Electronics Lab	817406.1	Generate a logic circuit for Boolean expression using basic gates.
				817406.2	Design a simplified logic circuit using K-Map/ QM method
				817406.3	Create a higher order combinational circuit from lower order combinational circuit
				817406.4	Modify any logic circuit of any type register.
				817406.5	Deploy a counter of any modulus using flip-flops.
SE	IV	B.E. Computer	Data Structure & Algorithms Lab	817407.1	Evaluate linear data structure
				817407.2	Evaluate inter conversions of mathematical notations
				817407.3	Evaluate Tree traversals
				817407.4	Evaluate nonlinear data structure
				817407.5	Evaluate searching and sorting techniques.
SE	IV	B.E. Computer	Computer Organization & Architecture Lab	817408.1	Apply DOS/BIOS interrupts and its functions for input and output operations.
				817408.2	Identify and apply 8086 assembly language macro.
				817408.3	Understand and apply 8086 assembly language NEAR and FAR procedure
				817408.4	Apply various string matching operations.
				817408.5	Write program for BCD to HEX conversion and BCD addition
SE	IV	B.E. Computer	IT Workshop	817409.1	Discuss basics of MATLAB/Scilab open source simulation software
				817409.2	Demonstrate Mathematical operations in MATLAB /Scilab

Class	Semester	Program	Name of the Subject	CO	Course Outcome
				817409.3	Illustrate plotting operations on linear expression
				817409.4	Demonstrate relational and logical operations on matrix
				817409.5	Use of matrix manipulation operations
SE	IV	B.E. Computer	Environmental Studies	55555.1	Illustrate Natural Resources and associated problems
				55555.2	Outline Ecosystem
				55555.3	Describe Biodiversity
				55555.4	Illustrate Environmental pollution
				55555.5	Illustrate social issues that effect Environment
TE	V	B.E. Computer	Database Management Systems	517501.1	Explain the basics of Database Management System and develop the entity relationship diagram for any database application.
				517501.2	Construct the queries using Formal Relational Query Languages.
				517501.3	Construct the queries using Structured Query Language and explain the working of Function, Procedure and Triggers.
				517501.4	Identify and apply normalization methods on database, along with understanding of indexing basic concept
				517501.5	Discuss the concept of transaction, concurrency, recovery and various database system architectures.
TE	V	B.E. Computer	Software Engineering	517502.1	Define basic concepts of software engineering
				517502.2	Describe software requirements
				517502.3	Illustrate the design of software
				517502.4	Test developed software for requirements validation
				517502.5	Outline software project planning activities and schedule them for project execution
TE	V	B.E. Computer	Formal Language and Automata Theory	517503.1	Understand the basic of formal languages and automata theory.
				517503.2	Describe and transform regular expression for computation.
				517503.3	Construct/convert grammars for formal languages.

Class	Semester	Program	Name of the Subject	CO	Course Outcome
				517503.4	Interpret PDA for Context free language and regular language.
				517503.5	Design and analyze the Turing machine for formal languages.
TE	V	B.E. Computer	Artificial Intelligence (PEC-I)	517541.1	Use appropriate search algorithms for any AI problem
				517541.2	Represent a problem using first order and predicate logic
				517541.3	Provide the apt agent strategy to solve a given problem
				517541.4	Design software agents to solve a problem
				517541.5	Design applications for NLP that use Artificial Intelligence.
TE	V	B.E. Computer	Cyber Law and Ethics (OEC - I)	517553.1	To able to understand the objective and scope of IT act 2000
				517553.2	To get acquainted with the Intellectual Property issues for obtaining the copyright, patents, trademark
				517553.3	To able to get familiar with the procedure of handling the process of Physical security breach
				517553.4	To able to understand the characteristics of Cybercrime and its classification
				517553.5	To be able to classify and understand information security system with respect to threats and attacks.
TE	V	B.E. Computer	Database Management Systems Lab	817506.1	Develop a database with various constraints using SQL Data Definition Language.
				817506.2	Use DML queries to retrieve, insert, delete and update the database.
				817506.3	Apply various SQL features such as Aggregate functions, Set Operations and Views to resolve the queries.
				817506.4	Demonstrate Stored Procedure, Stored function and Trigger on a Sample Databases.
				817506.5	Develop database application using ODBC/JDBC interface to store and retrieve data from the database.
TE	V	B.E. Computer	Software Engineering Lab	817507.1	Analyze the type of UML diagrams required for proposed software system

Class	Semester	Program	Name of the Subject	CO	Course Outcome
				817507.2	Decide contents of the UML diagrams
				817507.3	Design basic and advanced structural UML modeling diagrams
				817507.4	Design basic and advanced behavioral UML modeling diagrams
				817507.5	Develop various UML models for proposed software
TE	V	B.E. Computer	Web Programming Language Lab	817508.1	Able to learn new web languages (PHP, JavaScript)
				817508.2	Make use of appropriate web scripting language for different applications
				817508.3	Install and configure web server
				817508.4	Design interactive website
				817508.5	Design and develop database web application
TE	V	B.E. Computer	Minor Project (Stage – I)	817509.1	Demonstrate a sound technical knowledge of their selected project topic.
				817509.2	Undertake problem identification, formulation and solution.
				817509.3	Design engineering solutions to complex problems utilizing a systems approach.
				817509.4	Conduct an engineering project
				817509.5	Demonstrate the knowledge, skills and attitudes of a professional engineer.
TE	VI	B.E. Computer	Operating Systems	617601.1	Discuss fundamental of OS
				617601.2	Solve process scheduling, critical section, concurrency problems.
				617601.3	Explain deadlock & memory management concept.
				617601.4	Describe file management system.
				617601.5	Identify efficient disk scheduling algorithm.
TE	VI	B.E. Computer	Computer Networks	617602.1	Explain the basics concepts of data communication and networking.
				617602.2	Solve numerical of IP addressing and describe internet protocol along with address mapping.
				617602.3	Describe error reporting and forwarding along with routing protocols.

Class	Semester	Program	Name of the Subject	CO	Course Outcome
				617602.4	Demonstrate process to process communication at transport layer using TCP and UDP.
				617602.5	Discuss network security and wireless networking concepts.
TE	VI	B.E. Computer	Design and Analysis of Algorithms	617603.1	Understand and design of basic algorithms and computer time complexity.
				617603.2	Design and analyze algorithm by Divide and conquer approach.
				617603.3	Apply backtracking and Branch-bound approach to real word problem.
				617603.4	Simulate Greedy and Dynamic programming approach.
				617603.5	Recognize basic computational types of problem
TE	VI	B.E. Computer	Neural Networks	617641.1	Analyze the differences between computer and human brain.
				617641.2	Apply learning rules to artificial neural networks.
				617641.3	Analyze various architectures of artificial neural networks.
				617641.4	Enumerate perceptron
				617641.5	Enumerate the Associative Memory
TE	VI	B.E. Computer	Project Management	617651.1	Use and explain different stages of project management
				617651.2	Make use of project planning and scheduling tools
				617651.3	Know the methods of cost estimation of project
				617651.4	Apply project risk management for controlling risk
				617651.5	Understand the procurement management for the project
TE	VI	B.E. Computer	Operating Systems Lab	817606.1	Apply process scheduling concept.
				817606.2	Explain file management & memory management concept.
				817606.3	Discuss concurrency problems.
				817606.4	Analyse the disk scheduling algorithm.
				817606.5	Describe Inter Process Communication mechanism

Class	Semester	Program	Name of the Subject	CO	Course Outcome
TE	VI	B.E. Computer	Computer Networks Lab	817607.1	Apply the concept of bit stuffing in framing.
				817607.2	Use Run Length Encoding for data compression.
				817607.3	Demonstrate client server communication using TCP and UDP Socket.
				817607.4	Develop Cryptographic algorithms.
				817607.5	Build the network scenario in network simulation tool.
TE	VI	B.E. Computer	Design and Analysis of Algorithms Lab	817608.1	Analyze and Implement divide and conquer approach.
				817608.2	Implement dynamic programming approach
				817608.3	Implement Branch and bounding approach
				817608.4	Implement backtracking approach.
				817608.5	Implement greedy algorithm approach
TE	VI	B.E. Computer	Minor Project	817609.1	Demonstrate a sound technical knowledge of their selected project topic.
				817609.2	Undertake problem identification, formulation and solution.
				817609.3	Design engineering solutions to complex problems utilizing a systems approach.
				817609.4	Conduct an engineering project
				817609.5	Demonstrate the knowledge, skills and attitudes of a professional engineer.
BE	VII	B.E. Computer	Compiler Design	717701.1	Design Lexical Analyzer
				717701.2	Design Syntax Analyzer
				717701.3	Generate Intermediate Code
				717701.4	Illustrate different storage management schemes
				717701.5	Design Code Generator
BE	VII	B.E. Computer	Machine Learning	717721.1	Recognize the characteristics of machine learning that make it useful to real-world problems.
				717721.2	Able to use regularized regression and Classification algorithms.
				717721.3	Evalute machine learning algorithms and model selection.
				717721.4	Understand scalable machine learning and machine learning for IoT.

Class	Semester	Program	Name of the Subject	CO	Course Outcome
				717721.5	Understand Deep leaning and Expert system.
BE	VII	B.E. Computer	Data Mining	717731.1	To introduce students to the basic concepts and techniques of Data Mining.
				717731.2	To develop skills of using recent data mining software for solving practical problems.
				717731.3	To gain experience of doing independent study and research.
				717731.4	To study the methodology of engineering legacy databases for data warehousing and data mining to derive business rules for decision support systems.
				717731.5	Develop and apply critical thinking, problem-solving, and decision-making skills.
BE	VII	B.E. Computer	Quantitative Reasoning and Problem Solving	717743.1	Perform arithmetic calculations on number system, HCF and LCM and age
				717743.2	Solve application problems involving Time, Distance, Speed.
				717743.3	Calculate Time Taken at varies case.
				717743.4	Calculate percentage, average and simple interest.
				717743.5	Classify data as categorical or quantitative.
BE	VII	B.E. Computer	Compiler Design Lab	717705.1	Demonstrate LEX and YACC tools.
				717705.2	Design Lexical Analyzer.
				717705.3	Design Syntax Analyzer.
				717705.4	Design Code Optimization.
				717705.5	Design Code Generator
BE	VII	B.E. Computer	Advanced Technology Lab-I	717706.1	Break down real world problems / application.
				717706.2	Demonstrate Full Stack development.
				717706.3	Design Full Stack based applications.
				717706.4	Decide tools for Full Stack development.
				717706.5	Develop Full Stack based applications.
BE	VII	B.E. Computer	Project (Stage–I)	717707.1	Demonstrate a sound technical knowledge of their selected project topic.

Class	Semester	Program	Name of the Subject	CO	Course Outcome
				717707.2	Undertake problem identification, formulation and solution.
				717707.3	Design engineering solutions to complex problems utilizing a systems approach.
				717707.4	Conduct an engineering project
				717707.5	Demonstrate the knowledge, skills and attitudes of a professional engineer.
BE	VIII	B.E. Computer	Cyber Security	817801.1	Determine the act of Cyberoffenses.
				817801.2	Determine the Cybercrime through portable devices.
				817801.3	Determine the methods used in Cybercrime
				817801.4	Determine Phishing and Identity theft
				817801.5	Describe Computer Forensics.
BE	VIII	B.E. Computer	Soft Computing (Professional Elective Course–V)	817821.1	Apply soft computing methodologies includes neural network.
				817821.2	Apply soft computing methodologies includes fuzzy logic
				817821.3	Apply soft computing methodologies includes genetic algorithm
				817821.4	Apply soft computing methodologies includes hybrid system
				817821.5	Design of certain scientific and commercial application using soft computing approach
BE	VIII	B.E. Computer	Data Analytics (Professional Elective Course – VI)	817831.1	Understand the concepts of big data
				817831.2	Understand the concepts of Data science
				817831.3	Do the data analysis
				817831.4	Apply the concepts of data visualization
				817831.5	Apply data analytics tools

Class	Semester	Program	Name of the Subject	CO	Course Outcome
BE	VIII	B.E. Computer	Logical Reasoning and Problem Solving (Open Elective Course – IV)	817843.1	Tell Analogy, Classification, perform coding and decoding on data
				817843.2	Recognize logical and philosophical reasoning.
				817843.3	Recognize logical reasoning applicable to real-life situations, solve real-life problems
				817843.4	Experience with diversity to demonstrate knowledge and sensitivity.
				817843.5	Solve application problems involving Clock, Calendar and Ratio and Proportion.
BE	VIII	B.E. Computer	Cyber Security Lab	817805.1	To describe Information Technology Act of India.
				817805.2	Describe Cyber Security
				817805.3	Demonstrate Offensive Cyber Security Tools
				817805.4	Demonstrate Defensive Cyber Security Tools
				817805.5	Demonstrate Security Testing Tools for Web Applications.
BE	VIII	B.E. Computer	Advanced Technology Lab - II	817806.1	Break down real world problems / application.
				817806.2	Demonstrate Full Stack development
				817806.3	Design Full Stack based applications
				817806.4	Decide tools for Full Stack development
				817806.5	Develop Full Stack based applications.
BE	VIII	B.E. Computer	Project	817807.1	Demonstrate a sound technical knowledge of their selected project topic.
				817807.2	Undertake problem identification, formulation and solution.
				817807.3	Design engineering solutions to complex problems utilizing a systems approach.
				817807.4	Conduct an engineering project
				817807.5	Demonstrate the knowledge, skills and attitudes of a professional engineer.