



## ELITTE COLLEGE OF ENGINEERING

(TRACK ID: WBCOGN115803)

Applying for Accreditation of "Cycle-1"

**National Assessment and Accreditation Council  
(NAAC)**

### Supporting Documents

#### Criteria 2. Teaching-learning and Evaluation

##### 2.6: Student Performance and Learning Outcomes

##### 2.6.1: Programme Outcomes (POs) and Course Outcomes (COs) for all

Programmes offered by the institution are stated and displayed on website

Annexure-2.6/1	Upload Additional information
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## **Annexure-2.6/1**

**Upload Additional information**

**(Sample webpage screenshots, Sample geo tagged images  
of places where POs & COs are displayed.)**



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## Vision



Striving tirelessly towards excellence in technical education to bring forward technically competent innovative, entrepreneurial and ethical Engineers from the College, fit for globally competitive environment with motivation to the service of Nation.

### Notice Board

- Notice Regarding Navayuga Engineering Company - Recruitment Drive
- Notice Regarding Talentise Global | Integrated Physical Campus Drive - MY JOB GROW
- Notice for Holiday of May Day or International Worker's Day
- Notice Regarding MOOCs
- Talentise Global | Integrated Hybrid Campus Drive-APPSeCONNECT-B.E./B.Tech ( CSE/CS/IT/EE/ECE )
- JVR Land Surveys-Recruitment Drive-Engg/2024

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### Downloads

- DEEP 2022
- Notice Regarding Talentise Global | Integrated Physical Campus Drive - STP Limited

All Downloads →



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## Elite College of Engineering

Approved by AICTE and Affiliated to MAKAUT, West Bengal  
PO: Karnamadhhabpur, PS: Ghola, Sodepur, Kolkata - 700113

### Contact Info

📍 PO: Karnamadhhabpur, PS: Ghola, Sodepur, Kolkata - 700113

☎ Telephone

+91 91633 16560 / +91 98315 00840

✉ Email

info@ece.ac.in

admission@ece.ac.in

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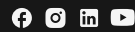
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## Mission



- Impart high quality technical education to develop innovative, entrepreneurial and ethical future engineering professionals fit for ever changing competitive environment.
- Providing the student with strong engineering foundation reinforced with analytical and problem solving abilities so as to confidently work in intra and interdisciplinary activities among appropriate culturally, socially and environmentally diversified situations and emerge as future technological leaders.
- Equipping the students with up-to-date knowledge of cutting-edge emerging technology, wisdom, creativity and passion for innovations and life-long learning skill.
- Developing an effective partnership between industry and institute of higher learning and research, through exchange programs, collaborations and sharing experiences for mutual benefits.

### Notice Board

- Notice Regarding Practical & Sessional Examination for Even Semester 2023-24
- Notice Regarding Gainwell Engineering-Recruitment Drive 2024
- Notice Regarding Proclivity Digitech - Recruitment Drive 2024
- Notice Regarding MyJobGrow - Recruitment Drive 2024
- Notice Regarding Holiday on Account of Rabindra Jayanti
- Notice Regarding Deposit of Due Semester Fees
- Notice Regarding Nicco Engineering Services Limited - Recruitment Drive

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## Downloads

- RONGE RONGE RONGILO AKASH | BASANTA UTSAB PART 2 | ELITTE MUSIC CLUB
- Routine: BSH
- Routine: MECHANICAL ENGINEERING
- Routine: COMPUTER SCIENCE AND ENGINEERING
- Even semester routine for CSE
- Even semester routine for ME
- Even semester routine for CE

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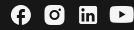
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## Quality Policy

We are committed to promoting climate of student success and to provide an environment conducive to learning and teaching by creating and expanding educational opportunities and support services so that highest quality is achieved.

## Core Values

- Ethics
- Integrity
- Transparency
- Discipline
- Leadership
- Commitment
- Excellence
- Teamwork
- Social service

### Notice Board

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[All Notices →](#)

### Downloads

- Even semester routine for CE
- Even semester routine for EE
- DEEP 2022
- Notice Regarding Talentise Global | Integrated Physical Campus Drive - STP Limited

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## Computer Science and Engineering

[Overview](#)[Courses](#)[Infrastructure](#)[Faculty List](#)[Notice](#)[Events](#)[Downloads](#)

### Department Overview

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#### Vision

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The purpose of To strive tirelessly towards excellence in teaching environment to contribute to our society and country through the technical education with Computer Science & Computational Technology, Aiming towards creating Computer Engineers who can meet the industrial expectations and challenges at present and future.

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#### Mission

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**M1:** To impart high-quality technical education to produce computer engineers who are creative, entrepreneurial, and morally suitable for the constantly changing competitive settings found in diverse sectors of the software industry.

**M2:** To provide a platform for inductive learning, a well-equipped lab, and cutting-edge technologies to prepare students for various industrial projects focused on research-oriented topics and cutting-edge software tools for innovation.

**M3:** To equip the students with the latest and most updated knowledge in Computer Science and to foster a love of learning and advance creativity, research, and development through a competence in lifelong learning.

**M4:** To develop a successful collaboration between the business community and the department of computer engineering to exchange knowledge and skills in order to advance research initiatives and higher education.

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#### Programme Educational Objectives (PEO)

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**PEO1:** Have skills to solve the problems by analysis, design, develop and implementation of concept, knowledge and skill leading to optimal solutions

fulfilling the dynamic requirement of industry and society.

**PEO2:** Have good understanding of Engineering concepts, making them practicing engineers with sound knowledge of logic and design, in Industries.

**PEO3:** Undertake research in emerging fields in Engineering so as to face the challenges of global challenges in their higher studies and by lifelong learning.

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#### **Program Outcomes (PO)**

Engineering Graduates will be able to:

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**PO1:** Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

**PO2:** Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

**PO3:** Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

**PO4:** Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

**PO5:** Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

**PO6:** The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

**PO7:** Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**PO8:** Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

**PO9:** Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

**PO10:** Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

**PO11:** Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

**PO12:** Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

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#### **Program Specific Outcomes (PSO)**

At the end of the program, the student

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**PSO1:** Programming skills: Apply fundamental knowledge and programming aptitude to identify, design and solve real life problems.

**PSO2:** Professional skills: Students shall understand, analyze and develop software solutions to meet the requirements of industry and society.

**PSO3:** Competency: Students will be competent for competitive examinations for employment, higher studies and research.

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#### Course Outcomes (COs)

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## Course Outcomes (COs) of Computer Science & Engineering

### Course Outcomes (COs)

On completion of the course students will be able to

#### 1st Semester

**Subject Name : Mathematics –IA**

**Subject Code : BS-M 101**

**CO Code: BS-M 101.CO<NUMBER>**

1. Learn the basic mathematical tools to deal with problems of engineering sciences.
2. Understand properties and application of Calculus and Linear Algebra.
3. Analyze of physical or engineering problems
4. Acquire problem solving skills related to engineering science
5. Apply Calculus and Linear Algebra in real life problems.
6. Classify ensembles and differentiate between Calculus and Linear Algebra.

**Subject Name : Physics-I**

**Subject Code BS-PH 101**

**CO Code: BS-PH 101.CO<NUMBER>**

1. Apply basic concepts of mechanics
2. Discuss Physical optics and analyze principles of lasers with applications
3. Categorize di electric and magnetic properties of materials leading to Electromagnetic laws
4. Differentiate between Classical Physics and Quantum Physics by introducing Planck's law
5. Apply wave particle duality in real life problems followed by simple quantum mechanics calculations
6. Classify ensembles and differentiate between classical and Quantum statistical mechanics

**Subject Name : Basic Electrical Engineering**

**Subject Code: ES-EE 101**

**CO Code: ES-EE 101.CO<NUMBER>**

1. Understand and analyze basic electric and magnetic circuits.
2. Study the working principles of electrical machines and power converters.
3. Introduce the components of low voltage electrical installations.
4. Understand the general structure of electrical power system.
5. Understand the construction and operation of single-phase transformer.
6. Explain the working principle of power converters.

**Subject Name : Physics-I Lab.**

**Subject Code BS-PH 191**

**CO Code: BS-PH 191.CO<NUMBER>**

1. Observe and read data in slide calliper's, screw gauge. Calculate different modulus of elasticity to apply basic knowledge Physics of Elasticity and apply viscosity principle of streamline motion of water to calculate its viscosity coefficient required in fluid mechanics.
2. Arrange sequential connection in electrical experiment to verify principles of Kirchhoff's law to verify passive elements of electrical circuit.
3. Operate optical instruments to illustrate physical properties of light and to observe spectral lines of light to verify medium specific characteristics. Calculate Rydberg constant by studying Hydrogen spectrum to visualize visible spectra and to assess this empirical fitting parameter as a fundamental physical constant.
4. Determine Band Gap and Hall coefficient of a given intrinsic semiconductor and distinguish between different intrinsic semiconductors. Determine the dielectric constant of different capacitors to correlate their usage like insulator and limitation of their usage as a dielectric material.
5. Apply concepts of quantum mechanics to verify Bohr's atomic orbital theory.
6. Determine Planck's constant and Stefan's constant applying modern Physics.

**Subject Name : Basic Electrical Engineering Lab.**

**Subject Code: ES-EE 191**

**CO Code: ES-EE 191.CO<NUMBER>**

1. Calibrate Ammeter and Wattmeter.
2. Demonstrate the measuring instrument and electrical machines.
3. Conduct open circuit and short circuit test of single-phase transformer.
4. Measure 3 phase power using two wattmeters.
5. Identify the components of LT switchgear.
6. Understand the characteristic of RLC series and parallel circuit.

**Subject Name : Workshop.**

**Subject Code: ES-ME 192**

**CO Code: ES-ME192.CO<NUMBER>**

1. Understanding the application of hand tools and machinetools.
2. Comprehend the safety measure required to be taken while using the tools.
3. Select the appropriate tools required to manufacture an object of predetermined shape and size considering least wastage and cost.
4. Fabricate components with their own hands.
5. Practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.
6. Produce small device of their interest, by assembling different components.

## 2nd Semester

**Subject Name : Chemistry-I.**

**Subject Code: BS-CH 201**

**CO Code: BS-CH 201.CO<NUMBER>**

1. Apply first and second law of thermodynamics to different chemical and physical processes under specified condition to determine the equilibrium condition, spontaneity and thermo-chemical behavior of a reaction.
2. using the concept of conductance of ions analyze the design and working principle of different electrochemical cells.
3. Derive rate of a reaction at a specified temperature under different medium.
4. Explain the mechanism considering the structure of the molecules and type of electronic effect present in them.
5. Analyze different types of fuels for industrial application.
6. Distinguish different types of polymer for diverse application.

**Subject Name : Mathematics –IIA**

**Subject Code: BS-M201**

**CO Code: BS-M201.CO<NUMBER>**

1. Learn the basic mathematical tools to deal with problems of Engineering sciences.
2. Understand properties and application of Linear Algebra, Ordinary Differential Equations (ODE) and numerical analysis.
3. Analyze of physical or engineering problems.
4. Acquire problem solving skills related to engineering science.
5. Apply Linear Algebra, Ordinary Differential Equations (ODE) and Numerical analysis in real life problems.
6. Classify ensembles and differentiate among Linear Algebra, Ordinary Differential Equations (ODE) and numerical analysis.

**Subject Name : Mathematics –IIB****Subject Code: BS-M202****CO Code: BS-M202.CO<NUMBER>**

1. Learn the methods for evaluating multiple integrals and their applications to different physical problems.
2. Understand different techniques to solve first and second order ordinary differential equations with its formulation to address the modeling of systems and problems of engineering sciences.
3. Learn different tools of differentiation and integration of functions of a complex variable that are used with various other techniques for solving engineering problems.
4. Apply different types of transformations between two 2- dimensional planes for analysis of physical or engineering problems.

**Subject Name : Programming for ProblemSolving****Subject Code: ES-CS201****CO Code: ES-CS201.CO<NUMBER>**

1. Analyze the problem and formulate algorithms for them.
2. Translate the algorithms to programs (in C language).
3. Understand the correct syntax of logical expression, branch instruction, iteration,
4. Apply array and pointer to solve problem.
5. Understand the use of , function, recursion.
6. Build analytical skill.

**Subject Name : English****Subject Code: HM-HU201****CO Code: HM-HU201.CO<NUMBER>**

1. Understand and apply English Speech Sounds for enhancing English Communication
2. Apply English Language Presentation Skill in Academic and in Professional Communication
3. Apply Receptive Skills of English in Academics and in Engineering Profession
4. Apply Writing Skill of English in Academics and in Profession
5. Apply Grammar Skill of English in Academic and in Professional Communication
6. Apply Critical Thinking Skill of English in Academic and in professional Communication

**Subject Name : Chemistry-I****Subject Code: BS-CH291****CO Code: BS-CH291.CO<NUMBER>**

1. Determine some physical parameter like viscosity of a solution and rate constant of a reaction
2. Determine the strength of an acid using conductometric method.
3. Determine the strength of an acid using pH metric method.
4. Determine partition coefficient of a compound
5. Estimate the amount of an ion present in a given solution using permanganometric and argentometric methods.
6. Evaluate alkalinity (in terms of CaCO<sub>3</sub> equivalent), hardness (in ppm) and amount of dissolved oxygen (in mg/l) present in a given water sample using volumetric method.

**Subject Name : Programming for Problem Solving****Subject Code: ES-CS291****CO Code: ES-CS291.CO<NUMBER>**

1. Analyze the problem and formulate algorithms for them.
2. Translate the algorithms to programs (in C language).
3. Understand the correct syntax of logical expression, branch instruction, iteration,
4. Apply array and pointer to solve problem.
5. Understand the use of , function, recursion.
6. Build analytical skill.

**Subject Name : Engineering Graphics & Design****Subject Code: ES-ME291****CO Code: ES-ME291.CO<NUMBER>**

1. Understand the applications of hand tools and machine tools.
2. Comprehend the safety measures required to be taken while using the tools.
3. Select the appropriate tools required to manufacture an object of predetermined shape and size considering least wastage and cost.
4. Fabricate components with their own hands.
5. Confident on practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.
6. Produce small devices of their interest by assembling different components.

**Subject Name : Language Laboratory****Subject Code: HM-HU291****CO Code: HM-HU291.CO<NUMBER>**

1. Understand and apply English Speech Sounds for enhancing English Communication
2. Apply English Language Presentation Skill in Academic and in Professional Communication
3. Apply Receptive Skills of English in Academics and in Engineering Profession
4. Apply Writing Skill of English in Academics and in Profession
5. Apply Grammar Skill of English in Academic and in Professional Communication
6. Apply Critical Thinking Skill of English in Academic and in professional Communication

**3rd Semester****Subject Name : Mathematics-III****Subject Code : BSC-301****CO Code: BSC-301.CO<Number>**

1. Express a logic sentence in terms of predicates, quantifiers, and logical connectives.
2. Apply the rules of inference and methods of proof including direct and indirect proof forms, proof by contradiction, and mathematical induction.
3. Use tree and graph algorithms to solve problems
4. Evaluate Boolean functions and simplify expressions using the properties of Boolean algebra.

**Subject Name : Economics for Engineers****Subject Code : HSMC-301****CO Code: HSMC-301.CO<Number>**

1. Make different economic decisions and estimate engineering costs by applying different cost estimation models.
2. Create cash flow diagrams for different situations and use different interest formulae to solve associated problems.
3. Take decisions regarding different engineering projects by using various criteria like rate of return analysis, present worth analysis, cost-benefit analysis etc.
4. Incorporate the effect of uncertainty in economic analysis by using various concepts like expected value, estimates and simulation.

5. Understand the concepts of depreciation and replacement analysis and solve associated problems.
6. Understand the process of inflation and use different price indices to adjust for its effect.

**Subject Name : Data Structure & Algorithm****Subject Code : PCC-CS301****CO Code: PCC-CS301.CO<Number>**

1. Differentiate how the choices of data structure & algorithm methods impact the performance of program.
2. Solve problems based upon different data structure & also write programs.
3. Identify appropriate data structure & algorithmic methods in solving problem.
4. Discuss the computational efficiency of the principal algorithms for sorting, searching, and hashing.
5. Compare and contrast the benefits of dynamic and static data structures implementations.

**Subject Name : Computer Organization****Subject Code : PCC-CS302****CO Code: PCC-CS302.CO<Number>**

1. Understand basic structure of digital computer, stored program concept and different arithmetic and control unit operations.
2. Understand basic structure of different combinational circuits multiplexer, decoder, encoder etc.
3. Perform different operations with sequential circuits.
4. Understand memory and I/O operations.

**Subject Name : Analog & Digital Electronics****Subject Code : ESC-301****CO Code: ESC-301.CO<Number>**

1. Realize the basic operations of different analog components.
2. Realize basic gate operations and laws Boolean algebra.
3. Understand basic structure of digital computer, stored program concept and different arithmetic and control unit operations.

**Subject Name : Analog and Digital Electronics Lab****Subject Code : ESC-391****CO Code: ESC-391.CO<Number>**

1. Understand of the fundamental concepts and techniques used in digital electronics.
2. Understand and examine the structure of various number systems and its application in digital design
3. Apply the basic requirements for a design application and propose a cost effective solution of various combinational circuits
4. Analyze basic requirements for a design application and propose a cost effective solution of various sequential circuits.
5. Identify and prevent various hazards and timing problems in a digital design for developing skill to build, and troubleshoot in digital circuits.
6. Design and examine the structure of analog circuits and verify its operations.

**Subject Name : Data Structure & Algorithm Lab****Subject Code : PCC-CS391****CO Code: PCC-CS391.CO<Number>**

1. Construct algorithms from problems.
2. Understand the basics of Stack, Queue
3. Categorize the necessity of linked list and array implementation
4. Learn the real life use of Tree and graph.
5. Compare different sorting and searching methods.
6. Understand the implementation mechanism of sorting and searching.

**Subject Name : Computer Organization Lab****Subject Code : PCC-CS392****CO Code PCC-CS392.CO<Number>**

1. Understand the behaviour of logic gates.

2. Design combinational circuits for basic components of computer system and Applications
3. Analyze the operational behaviour and applications of various flip-flop.
4. Implement Arithmetic logic units and different types of memory blocks.
5. Design to cascade multiple RAM chips for vertical and horizontal expansion.
6. Implement Carry-Look-Ahead Adder and BCD adder circuit .

**Subject Name : IT Workshop (Sci Lab/MATLAB/Python/R)**

**Subject Code : PCC-CS393**

**CO Code PCC-CS393.CO<Number>**

1. Interpret the basic syntax of python variables,data types and operator in python .
2. Make use of conditional and control flow statement in python fluently.
3. Define the use of string and list datatype in proficiency level.
4. Discover the method to create and manipulation of python data structure like tuple and dictionary
5. Explain the use of python function and uses of different modules in python.
6. Discuss the concepts of object oriented programming like exception handling.

#### **4th Semester**

**Subject Name : Discrete Mathematics**

**Subject Code : PCC-CS401**

**CO Code: PCC-CS401.CO<Number>**

1. Express a logic sentence in terms of predicates, quantifiers, and logical connectives
2. Derive the solution for a given problem using deductive logic and prove the solution based on logical inference
3. Classify its algebraic structure for a given a mathematical problem,
4. Evaluate Boolean functions and simplify expressions using the properties of Boolean algebra
5. Develop the given problem as graph networks and solve with techniques of graph theory.

**Subject Name : Computer Architecture**

**Subject Code : PCC-CS402**

**CO Code: PCC-CS402.CO<Number>**

1. learn pipelining concepts with a prior knowledge of stored program methods
2. learn about memory hierarchy and mapping techniques.
3. study of parallel architecture and interconnection network

**Subject Name : Formal Language & Automata Theory**

**Subject Code : PCC-CS403**

**CO Code: PCC-CS403.CO<Number>**

1. write a formal notation for strings, languages and machines.
2. Design finite automata to accept a set of strings of a language.
3. Determine whether the given language is regular or not.
4. Design context free grammars to generate strings of context free language.
5. Determine equivalence of languages accepted by Push Down Automata and languages generated by context free grammars.
6. Write the hierarchy of formal languages, grammars and machines.
7. Distinguish between computability and non-computability & decidability and undecidability.

**Subject Name : Design and Analysis of Algorithms**

**Subject Code : PCC-CS404**

**CO Code: PCC-CS404.CO<Number>**

1. For a given algorithms analyze worst-case running times of algorithms based on asymptotic analysis and justify the correctness of algorithms.

2. Describe the greedy paradigm and explain when an algorithmic design situation calls for it. For a given problem develop the greedy algorithms.
3. Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Synthesize divide-and-conquer algorithms. Derive and solve recurrence relation.
4. Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it. For a given problems of dynamic-programming.
5. Develop the dynamic programming algorithms, and analyze it to determine its computational complexity.
6. For a given model engineering problem model it using graph and write the corresponding algorithm to solve the problems.
7. Explain the ways to analyze randomized algorithms (expected running time, probability of error).
8. Explain what an approximation algorithm is. Compute the approximation factor of an approximation algorithm (PTAS and FPTAS).

**Subject Name : Biology**

**Subject Code : BSC 401**

**CO Code: BSC 401.CO<Number>**

1. Describe how biological observations of 18th Century that lead to major discoveries.
2. Convey that classification per se is not what biology is all about but highlight the underlying criteria, such as morphological, biochemical and ecological.
3. Highlight the concepts of recessiveness and dominance during the passage of genetic material from parent to offspring.
4. Convey that all forms of life have the same building blocks and yet the manifestations are as diverse as one can imagine.
5. Classify enzymes and distinguish between different mechanisms of enzyme action.
6. Identify DNA as a genetic material in the molecular basis of information transfer.
7. Analyse biological processes at the reductionistic level.
8. Apply thermodynamic principles to biological systems.
9. Identify and classify microorganisms.

**Subject Name : Environmental Sciences**

**Subject Code: MC-401**

**CO Code: MC-401.CO<Number>**

1. Understand the natural environment and its relationships with human activities.
2. Apply the fundamental knowledge of science and engineering to assess environmental and health risk.
3. Develop guidelines and procedures for health and safety issues obeying the environmental laws and regulations.
4. Acquire skills for scientific problem-solving related to air, water, noise and pollution.
5. Identify and classify microorganisms.

**Subject Name : Computer Architecture Lab**

**Subject Code: PCC-CS492**

**CO Code: PCC-CS492.CO<Number>**

1. Discuss the various logic gates using the VHDL programming language.
2. Understanding the arithmetic operations of n- bit numbers using VHDL.
3. Analyzing the synthesis of different combinational circuits using VHDL.
4. Illustrate the synthesis of the different sequential circuits using VHDL.
5. Explain the construction of different memory elements using VHDL.
6. Develop different processing elements using VHDL.

**Subject Name : Design and Analysis of Algorithms Lab**

**Subject Code: PCC-CS494**

**CO Code: PCC-CS494.CO<Number>**

1. Analyse different types of applications of Divide & Conquer techniques.
2. Understanding to implement Dynamic Programming techniques.

3. Examine to implement knapsack, Job sequencing with deadlines, Prim's and Kruskal's algorithms by using greedy method.
4. Discuss the implementation of the N-Queen and Graph Coloring Problem by using Backtracking.
5. Develop 15 Puzzle problems by using Branch & Bound.
6. Explain the way of implementation of BFS and DFS by using Graph Traversal Algorithms.

### 5th Semester

#### Subject Name Software Engineering

Subject Code: ESC501

CO Code: ESC501.CO<Number>

1. Given project and the appropriate process model depending on the user requirements in order to develop a cost effective software product.
2. Distinguish between a structure chart and a flow chart and identify the activities carried out during transform.
3. Choose between the coding style (structured or oo) and perform code review, code analysis, build process.
4. Judge appropriate software testing techniques to the quality of a software product at modules, integration, and system granularity levels.
5. Apply the principles, processes and main knowledge areas for software project management.
6. Design different types of uml diagram with knowledge when and why use a particular type of dig based on the software product requirements.

#### Subject Name : Operating Systems

Subject Code: PCC-CS502

CO Code: PCC-CS502.CO<Number>

1. Create processes and threads.
2. Develop algorithms for process scheduling for a given specification of CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time.
3. Develop the techniques for optimally allocating memory to processes by increasing memory utilization and for improving the access time. Design and implement file management system.
4. Develop the I/O management functions in OS as part of a uniform device abstraction by performing operations for synchronization between CPU and I/O controllers.

#### Subject Name : Object Oriented Programming

Subject Code: PCC-CS503

CO Code: PCC-CS503.CO<Number>

1. Specify simple abstract data types and design implementations, using abstraction functions to document them.
2. Recognize features of object-oriented design such as encapsulation, polymorphism, inheritance, and composition of systems based on object identity.
3. Apply some common object-oriented design patterns and give examples of their use.
4. Design applications with an event-driven graphical user interface.

#### Subject Name : Compiler Design

Subject Code: PCC-CS501

CO Code :PCC-CS501.CO<Number>

1. Understand given grammar specification develop the lexical analyser.
2. Design a given parser specification design top-down and bottom-up parsers.
3. Develop syntax directed translation schemes.
4. Develop algorithms to generate code for a target machine.

#### Subject Name: Artificial Intelligence

Subject Code: PEC-IT501B

CO Code: PEC-IT501B.CO<Number>

1. Understand the various search techniques, constraint satisfaction problems along with problem solving techniques in strategic games.

2. Apply such techniques in real world problems which involve perception, reasoning and learning.
3. Understand the role of agents and identify ways to evaluate their performance in achieving goals.
4. Understand and apply predicate logic to process natural language texts.
5. Analyze and apply machine learning techniques to solve real world problems.
6. Design and employ expert systems for the societal needs.

**Subject Name : Introduction to Industrial Management**

**Subject Code: HSMC-501**

**CO Code: HSMC-501.CO<Number>**

1. Interpret given organization structure, culture, climate and major provisions of factory acts and laws.
2. Explain material requirement planning and store keeping procedure.
3. Plot and analyze inventory control models and techniques.
4. Prepare and analyze cpm and pert for given activities..
5. List and explain ppc functions.

**Subject Name: Constitution of India**

**Subject Code: MC-CS501A**

**CO Code: MC-CS501A.CO<Number>**

1. Understand Basic Structure of the Constitution of India.
2. Apply the understanding in Engineering Profession.
3. Apply Constitutional Values in Engineering Education.
4. Apply Constitutional Provisions in Policy matters of CSE.
5. Apply Team Spirit and Constitutional Legislative Provisions for Industrial Design.
6. Analyze Constitutional Values of Legislation, Executive & Judiciary in the light of the Professional requirements of Computer Science Engineering.

**Subject Name: Software Engineering Lab**

**Subject Code: ESC591**

**CO Code: ESC591.CO<Number>**

1. Understand the software engineering methodologies involved in the phases for project development.
2. Explain open source tools used for implementing software engineering methods.
3. Develop product-startups implementing software engineering methods.
4. Apply simple optimization techniques.

**Subject Name: Operating System Lab**

**Subject Code: PCC-CS592**

**CO Code: PCC-CS592.CO<Number>**

1. Understanding of different Unix/Linux commands and shell programming.
2. Demonstrate the creation of processes and POSIX threads.
3. Develop the problems of process scheduling and process synchronization (Signal and Semaphore).
4. Determine the deadlock avoidance and detection algorithms.
5. Analyze different Memory allocation and File accessing techniques.
6. Illustrate Inter-Process Communication through system calls.

**Subject Name: Object Oriented Programming Lab**

**Subject Code: PCC-CS593**

**CO Code: PCC-CS593.CO<Number>**

1. Define an object oriented programming language, and associated class libraries and learn how to develop object oriented programs.
2. Understand the concepts of class, constructor, data encapsulation, inheritance, overriding and polymorphism to describe large scale software.
3. Develop and debug programs using object oriented principles with wrapper class, arrays.
4. Apply the concept of interfaces- multiple inheritance, extending interfaces.

5. Analyze and use an integrated environment development by creating and accessing packages and multithreaded programming.
6. Develop programs with graphical user interfaces capabilities and solve related problems.

### 6th Semester

#### Subject Name: Database Management Systems

Subject Code: PCC-CS601

CO Code: PCC-CS601.CO<Number>

1. Write relational algebra expressions for that query and optimize the developed expressions
2. Design the databases using er method and normalization.
3. Construct the sql queries for open source and commercial dbms
4. Optimize execution of query
5. Determine the transaction atomicity, consistency, isolation, and durability.
6. Implement the isolation property, including locking, time stamping based on concurrency control and serializability of scheduling.

#### Subject Name: Computer Networks

Subject Code: PCC-CS602

CO Code: PCC-CS602.CO<Number>

1. Describe the fundamental concepts of computer networking, Data Communications System and learn its components.
2. Explain the concept of function(s) of each layer of the OSI model and learn about TCP/IP.
3. Identify the different types of network topologies, protocols, networking devices and make concepts about their functions within a network.
4. Simplify building the skills of subnetting and routing mechanisms.
5. Justify the different system component parts of the network.
6. Develop an expertise in some specific areas of networking such as the design and learn about maintenance of individual networks.

#### Subject Name: Distributed Database Management System

Subject Code: PEC-IT601B

CO Code: PEC-IT601B.CO<Number>

1. Design trends in distributed systems.
2. Apply network virtualization.
3. Apply remote method invocation and objects.

#### Subject Name: Data Warehousing and Data Mining

Subject Code: PEC-IT602B

CO Code: PEC-IT602B.CO<Number>

1. Explain different sequential pattern algorithms
2. Describe technique to extract patterns from time series data.
3. Demonstrate the graph of mining algorithms to web mining
4. Identify the computing framework for big data

#### Subject Name: Human Resource Development and Organizational Behavior

Subject Code: OEC-IT601B

CO Code: OEC-IT601B.CO<Number>

1. Apply different aspects of Organizational Behaviour in real life situations.
2. Create motivational content for person or organization.
3. Explain the importance of team work to solve any problem.
4. Understand environment or work culture in an organization.

#### Subject Name: Research Methodology

Subject Code: PROJ-CS601

CO Code: PROJ-CS601.CO<Number>

1. Define and understand the motivation and objectives of research work.
2. Explain how to define and formulate a research problem.
3. Identify the importance of literature review in a research work.

4. Examine the appropriate statistical methods required for a particular research design and develop the appropriate research hypothesis for a research project.
5. Explain the ethical issues involved while undertaking research.
6. Develop the skill set to correctly present a research work by following the protocols of writing a standard research report.

**Subject Name: Database Management System Lab****Subject Code: PCC-CS691****CO Code: PCC-CS691.CO<Number>**

1. Analyze and transform an Entity Relationship Model into a relational database schema and to use a data definition language to implement the schema using a DBMS.
2. Declare and enforce integrity constraints on a database using a DBMS.
3. Populate and query a database using SQL DML/DDDL commands.
4. Retrieve of data from a database.
5. Describe and implement relational algebra expression using aggregate functions, joins and sub-queries.
6. Compile programs in PL/SQL including stored procedures, stored functions, cursors, packages.

**Subject Name: Computer Networks Lab****Subject Code: PCC-CS692****CO Code: PCC-CS692.CO<Number>**

1. describe the Networking cables (CAT5, UTP), Connectors (RJ45, T-connector) and installation of Network Interface Card.
2. explain the working and difference of various networking devices like Hub, Bridge, Network Switch, Router and Modem.
3. developed a client server socket programming using TCP and UDP approach in C and Java.
4. generate techniques Data link Layer Flow control mechanisms like Stop &Wait and Sliding Window using C.
5. explain how to implement Data Link Layer Error Detection Mechanism (Cyclic Redundancy Check) and error control mechanism like Selective Repeat and GoBack-N algorithm using C.
6. create the server setup configuration using different process like FTP, DNS, TelNet,NFS and concept of Firewall.

**7th Semester****Subject Name: Cloud Computing****Subject Code: PEC-CS701B****CO Code :PEC-CS701B.CO<Number>**

1. Describe Cloud Computing and its Basics.
2. Demonstrate Use of Platforms in Cloud Computing.
3. Explain Cloud Infrastructure.
4. Identify Service Oriented Architecture: Basic concepts of message-based transactions.
5. Design Applications in the Cloud: Concepts of cloud transactions, functionality mapping .

**Subject Name: Cyber Security****Subject Code: PEC-CS702E****CO Code: PEC-CS702E.CO<Number>**

1. Impact of Multimedia, Multimedia Systems, Components and Its Applications.
2. Describe Text and Audio, Image and Video.
3. Explain Synchronization
4. Design various available Storage models and Access Techniques
5. Design Image and Video Database, Document Architecture and Content Management
6. Determine Multimedia Applications.

**Subject Name: Multimedia Systems****Subject Code: OEC-CS701B****CO Code: OEC-CS701B.CO<Number>**

1. Define and understand the motivation and objectives of research work.
2. Explain how to define and formulate a research problem.
3. Identify the importance of literature review in a research work.
4. Examine the appropriate statistical methods required for a particular research design and develop the appropriate research hypothesis for a research project.
5. Explain the ethical issues involved while undertaking research.
6. Develop the skill set to correctly present a research work by following the protocols of writing a standard research report.

**Subject Name: Project Management and Entrepreneurship**

**Subject Code: HSMC 701**

**CO Code: HSMC 701.CO<Number>**

1. To explain concepts of Entrepreneurship and build an understanding about business situations in which entrepreneurs act
2. Describe the steps to establish an enterprise
3. Compare and classify types of entrepreneurs
4. Explain the concept and attributes of projects, project management system, process and its principles, and various stages of a project.
5. Perform technical feasibility, marketing feasibility and commercial viability using NPV, and further to understand tax and legal aspects of a project
6. Analyze project appraisal in public & private sector and estimate shadow prices and social discount rate. Examine project risk and performance assessment. Evaluate project management techniques using case studies

**Subject Name: Project-II**

**Subject Code: PROJ-CS781**

**CO Code: PROJ-CS781.CO<Number>**

1. Identify the Problem & Problem Domain in the broad field of Computer Science & Engineering
2. Understand the Research Methodologies and Field Study
3. Understand the Tools and Techniques used
4. Identify of the Relevant Resources and Data Set
5. Prepare of s/w and h/w requirement analysis
6. Develop goal in line with flow of work

### **8th Semester**

**Subject Name: Cryptography and Network Security**

**Subject Code: PEC-CS801B**

**CO Code: PEC-CS801B.CO<Number>**

1. Identify Attacks on Computers & Computer Security
2. Describe Cryptography: Concepts & Techniques, Plaintext & Cipher text Substitution Techniques
3. Explain Symmetric Key Algorithm, Digital Signature & RSA
4. Apply the Asymmetric Key Algorithm
5. Design Internet Security Protocols, User Authentication - Basic Concepts, SSL protocol.
6. Determine Electronic Mail Security and Firewall

**Subject Name: Soft Skill & Interpersonal Communication**

**Subject Code: OEC-CS801E**

**CO Code: PROJ-CS601.CO<Number>**

1. Effectively communicates through verbal/oral communication and improves the listening skills
2. Write precise briefs or reports and technical documents
3. Actively participates in group discussion / meetings / interviews and prepares & delivers presentations
4. Design more effective individual through goal/target setting, self-motivation and practicing creative thinking
5. Determine function effectively in multi-disciplinary and heterogeneous teams through the knowledge of team work, Inter-personal

relationships, conflict management and leadership quality.

**Subject Name: E-Commerce & ERP**

**Subject Code: OEC-CS802A**

**CO Code: PEC-CS801B.CO<Number>**

1. Understand fundamental concepts and technologies related to ERP
2. Explain the different phases of ERP implementation life cycle.
3. Examine the modules, benefits and various tools of ERP.
4. Analyze the impact of e-commerce on business model and strategies.
5. Identify and solve the security issues related to communication.  
Assess the electronic payment systems and software
6. Elaborate the concept of Enterprise Resource Planning using different ERP Packages

**Subject Name: Project-III**

**Subject Code: PROJ-CS881**

**CO Code: PEC-CS801B.CO<Number>**

1. Understand the underlying technical concepts and theory.
2. Practice hands on experience to build the basic models
3. Develop mathematical generalize of the solution
4. Integrate all the parts and deployment of the project
5. Prepare a Dissertation and Presentation in the standard format for being evaluated by the department
6. Prepare a paper for Conference presentation/Publication in Journals, if possible.



## Elitte College of Engineering

Approved by AICTE and Affiliated to MAKAUT, West Bengal

PO: Karnamadhhabpur, PS: Ghola, Sodepur, Kolkata - 700113

### Contact Info

📍 PO: Karnamadhhabpur, PS: Ghola, Sodepur, Kolkata - 700113

☎ Telephone

+91 91633 16560 / +91 98315 00840

✉ Email

info@ece.ac.in

admission@ece.ac.in

### Trust Office

📍 PO: Karnamadhhabpur, PS: Ghola, Sodepur, Kolkata - 700113

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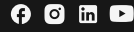
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## Civil Engineering

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### Department Overview

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#### Vision

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To work diligently for excellence in civil engineering education for developing technically proficient, creative, innovative, and moral engineers at the college who are motivated to serve the industry, society and nation.

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#### Mission

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**M1:** Providing quality education for fundamental knowledge and excellence in civil engineering and technology with global perspectives to our students and to make them creative, ethically strong engineers to build our nation.

**M2:** Creation of sustained environment of learning in which problem solving ability, analytical skills and new ideas of civil engineering students flourish, and from which the leaders and innovators of tomorrow emerge.

**M3:** Promoting innovative and original thinking in the minds of budding civil engineers to face the challenges of the future and to develop them towards employability, entrepreneurship, higher learning and research work.

**M4:** Establishment of a strong collaboration between civil engineering industries and institutes of higher learning in civil engineering, through participatory learning and knowledge-sharing for mutual gain and public service.

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#### Programme Educational Objectives (PEO)

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**PEO1:** Have skills to solve the problems by analysis, design, develop and implementation of concept, knowledge and skill leading to optimal solutions fulfilling the dynamic requirement of industry and society.

**PEO2:** Have good understanding of Engineering concepts, making them practicing engineers with sound knowledge of logic and design, in Industries.

**PEO3:** Undertake research in emerging fields in Engineering so as to face the challenges of global challenges in their higher studies and by lifelong learning.

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#### **Program Outcomes (PO)**

Engineering Graduates will be able to:

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**PO1:** Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

**PO2:** Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

**PO3:** Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

**PO4:** Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

**PO5:** Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

**PO6:** The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

**PO7:** Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**PO8:** Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

**PO9:** Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

**PO10:** Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

**PO11:** Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

**PO12:** Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

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#### **Program Specific Outcomes (PSO)**

At the end of the program students will be able to

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**PSO1:** understand the concepts of civil engineering and their applications.

**PSO2:** apply technical knowledge and usage of modern instruments related to civil engineering for solving real world problems.

**PSO3:** analyze, comprehend, design & develop civil engineering applications and thus demonstrating professional ethics & concern for societal well-being.

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#### Course Outcomes (COs)

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📞 Telephone

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## Course Outcomes (COs) of Civil Engineering

### Course Outcomes (COs)

On completion of the course students will be able to

#### 1st Semester

**Subject Name : Mathematics –IB**

**Subject Code : BS-M 102**

**CO Code: BS-M 102.CO<NUMBER>**

1. Apply the concept and techniques of differential and integral calculus to determine curvature and evaluation of different types of improper integrals.
2. Understand the domain of applications of mean value theorems to engineering problems.
3. Learn different types of matrices, concept of rank, methods of matrix inversion and their applications.
4. Learn the tools of power series and Fourier series to analyse engineering problems and apply the concept of convergence of infinite series in many approximation techniques in engineering disciplines.
5. Apply the knowledge for addressing the real life problems which comprises of several variables or attributes and identify extremum points of different surfaces of higher dimensions.

**Subject Name : Physics-I**

**Subject Code BS-PH 101**

**CO Code: BS-PH 101.CO<NUMBER>**

1. Apply basic concepts of mechanics
2. Discuss Physical optics and analyze principles of lasers with applications
3. Categorize di electric and magnetic properties of materials leading to Electromagnetic laws
4. Differentiate between Classical Physics and Quantum Physics by introducing Planck's law
5. Apply wave particle duality in real life problems followed by simple quantum mechanics calculations
6. Classify ensembles and differentiate between classical and Quantum statistical mechanics

**Subject Name : Basic Electrical Engineering**

**Subject Code: ES-EE 101**

**CO Code: ES-EE 101.CO<NUMBER>**

1. Understand and analyze basic electric and magnetic circuits.
2. Study the working principles of electrical machines and power converters.
3. Introduce the components of low voltage electrical installations.
4. Understand the general structure of electrical power system.
5. Understand the construction and operation of single-phase transformer.

6. Explain the working principle of power converters.

**Subject Name : Physics-I Lab.**

**Subject Code BS-PH 191**

**CO Code: BS-PH 191.CO<NUMBER>**

1. Observe and read data in slide calliper's, screw gauge. Calculate different modulus of elasticity to apply basic knowledge Physics of Elasticity and apply viscosity principle of streamline motion of water to calculate its viscosity coefficient required in fluid mechanics.
2. Arrange sequential connection in electrical experiment to verify principles of Kirchhoff's law to verify passive elements of electrical circuit.
3. Operate optical instruments to illustrate physical properties of light and to observe spectral lines of light to verify medium specific characteristics. Calculate Rydberg constant by studying Hydrogen spectrum to visualize visible spectra and to assess this empirical fitting parameter as a fundamental physical constant.
4. Determine Band Gap and Hall coefficient of a given intrinsic semiconductor and distinguish between different intrinsic semiconductors. Determine the dielectric constant of different capacitors to correlate their usage like insulator and limitation of their usage as a dielectric material.
5. Apply concepts of quantum mechanics to verify Bohr's atomic orbital theory.
6. Determine Planck's constant and Stefan's constant applying modern Physics.

**Subject Name : Basic Electrical Engineering Lab.**

**Subject Code: ES-EE 191**

**CO Code: ES-EE 191.CO<NUMBER>**

1. Calibrate Ammeter and Wattmeter.
2. Demonstrate the measuring instrument and electrical machines.
3. Conduct open circuit and short circuit test of single-phase transformer.
4. Measure 3 phase power using two wattmeters.
5. Identify the components of LT switchgear.
6. Understand the characteristic of RLC series and parallel circuit.

**Subject Name : Workshop.**

**Subject Code: ES-ME 192**

**CO Code: ES-ME192.CO<NUMBER>**

1. Understanding the application of hand tools and machinetools.
2. Comprehend the safety measure required to be taken while using the tools.
3. Select the appropriate tools required to manufacture an object of predetermined shape and size considering least wastage and cost.
4. Fabricate components with their own hands.
5. Practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.
6. Produce small device of their interest, by assembling different components.

## 2nd Semester

**Subject Name : Chemistry-I.**

**Subject Code: BS-CH 201**

**CO Code: BS-CH 201.CO<NUMBER>**

1. Apply first and second law of thermodynamics to different chemical and physical processes under specified condition to determine the equilibrium condition, spontaneity and thermo-chemical behavior of a reaction.
2. using the concept of conductance of ions analyze the design and working principle of different electrochemical cells.
3. Derive rate of a reaction at a specified temperature under different medium.
4. Explain the mechanism considering the structure of the molecules and type of electronic effect present in them.

5. Analyze different types of fuels for industrial application.
6. Distinguish different types of polymer for diverse application.

**Subject Name : Mathematics –IIA****Subject Code: BS-M201****CO Code: BS-M201.CO<NUMBER>**

1. Learn the basic mathematical tools to deal with problems of Engineering sciences.
2. Understand properties and application of Linear Algebra, Ordinary Differential Equations (ODE) and numerical analysis.
3. Analyze of physical or engineering problems.
4. Acquire problem solving skills related to engineering science.
5. Apply Linear Algebra, Ordinary Differential Equations (ODE) and Numerical analysis in real life problems.
6. Classify ensembles and differentiate among Linear Algebra, Ordinary Differential Equations (ODE) and numerical analysis.

**Subject Name : Mathematics –IIB****Subject Code: BS-M202****CO Code: BS-M202.CO<NUMBER>**

1. Learn the methods for evaluating multiple integrals and their applications to different physical problems.
2. Understand different techniques to solve first and second order ordinary differential equations with its formulation to address the modeling of systems and problems of engineering sciences.
3. Learn different tools of differentiation and integration of functions of a complex variable that are used with various other techniques for solving engineering problems.
4. Apply different types of transformations between two 2- dimensional planes for analysis of physical or engineering problems.

**Subject Name : Programming for ProblemSolving****Subject Code: ES-CS201****CO Code: ES-CS201.CO<NUMBER>**

1. Analyze the problem and formulate algorithms for them.
2. Translate the algorithms to programs (in C language).
3. Understand the correct syntax of logical expression, branch instruction, iteration,
4. Apply array and pointer to solve problem.
5. Understand the use of , function, recursion.
6. Build analytical skill.

**Subject Name : English****Subject Code: HM-HU201****CO Code: HM-HU201.CO<NUMBER>**

1. Understand and apply English Speech Sounds for enhancing English Communication
2. Apply English Language Presentation Skill in Academic and in Professional Communication
3. Apply Receptive Skills of English in Academics and in Engineering Profession
4. Apply Writing Skill of English in Academics and in Profession
5. Apply Grammar Skill of English in Academic and in Professional Communication
6. Apply Critical Thinking Skill of English in Academic and in professional Communication

**Subject Name : Chemistry-I****Subject Code: BS-CH291****CO Code: BS-CH291.CO<NUMBER>**

1. Determine some physical parameter like viscosity of a solution and rate constant of a reaction
2. Determine the strength of an acid using conductometric method.
3. Determine the strength of an acid using pH metric method.
4. Determine partition coefficient of a compound
5. Estimate the amount of an ion present in a given solution using permanganometric and argentometric methods.

- Evaluate alkalinity (in terms of CaCO<sub>3</sub> equivalent), hardness (in ppm) and amount of dissolved oxygen (in mg/l) present in a given water sample using volumetric method.

**Subject Name : Programming for Problem Solving**

**Subject Code: ES-CS291**

**CO Code: ES-CS291.CO<NUMBER>**

- Analyze the problem and formulate algorithms for them.
- Translate the algorithms to programs (in C language).
- Understand the correct syntax of logical expression, branch instruction, iteration,
- Apply array and pointer to solve problem.
- Understand the use of , function, recursion.
- Build analytical skill.

**Subject Name : Engineering Graphics & Design**

**Subject Code: ES-ME291**

**CO Code: ES-ME291.CO<NUMBER>**

- Understand the applications of hand tools and machine tools.
- Comprehend the safety measures required to be taken while using the tools.
- Select the appropriate tools required to manufacture an object of predetermined shape and size considering least wastage and cost.
- Fabricate components with their own hands.
- Confident on practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.
- Produce small devices of their interest by assembling different components.

**Subject Name : Language Laboratory**

**Subject Code: HM-HU291**

**CO Code: HM-HU291.CO<NUMBER>**

- Understand and apply English Speech Sounds for enhancing English Communication
- Apply English Language Presentation Skill in Academic and in Professional Communication
- Apply Receptive Skills of English in Academics and in Engineering Profession
- Apply Writing Skill of English in Academics and in Profession
- Apply Grammar Skill of English in Academic and in Professional Communication
- Apply Critical Thinking Skill of English in Academic and in professional Communication

### 3rd Semester

**Subject Name : Biology (Biology for Engineers)**

**Subject Code : CE(BS)301**

**CO Code: CE(BS)301.CO<Number>**

- Describe how biological observations of 18th Century that lead to major discoveries.
- Convey that classification per section is not what biology is all about but highlight the underlying criteria, such as morphological, biochemical and ecological.
- Highlight the concepts of recessiveness and dominance during the passage of genetic material from parent to offspring.
- Convey that all forms of life have the same building blocks and yet the manifestations are as diverse as one can imagine.
- Classify enzymes and distinguish between different mechanisms of enzyme action.
- Identify DNA as a genetic material in the molecular basis of information transfer.
- Analyse biological processes at the reductionistic level.

**Subject Name : Mathematics-III(Transform & Discrete Mathematics)**

**Subject Code : CE(BS)302**

**CO Code: CE(BS)302.CO<Number>**

1. Learn the tools of Laplace Transform, Fourier Transform and Z Transform to analyse engineering problems.
2. Learn the ideas of functions, relation and algebraic structure and their applications in engineering environment.
3. Understand the concept of Logic, partially ordered set and apply the Counting technique in the problems of engineering fields.
4. Learn Basics of Graph Theory which are useful to solve engineering problems.

**Subject Name : Engineering Mechanics****Subject Code : CE(ES)301****CO Code: CE(ES)301.CO<Number>**

1. Illustrate system of forces and its resultant and free body diagram of forces.
2. List the types of friction and the laws of friction.
3. Analysis of truss by method of joints and method of sections.
4. Locate the centroid of simple figures and composite sections.
5. Demonstrate particle dynamics and kinematics of rigid bodies.

**Subject Name : Energy Science and Engineering****Subject Code : CE(ES)302****CO Code: CE(ES)302.CO<Number>**

1. To discuss the ideas of scientific principles, energy systems and various non-renewable and renewable resources for energy.
2. To describe different energy generation systems and their environmental impacts.
3. To develop the idea about the role of civil engineering in energy sources
4. To use the concepts about green building LEED ratings, energy audit of facilities and optimization of energy consumption.
5. To relate the global policy initiatives and meet the emerging challenges with sustainable technological solutions in the field of energy and environment.
6. To relate the ideas of energy, environment and economic system.

**Subject Name : Humanities-I(Effective Technical Communication)****Subject Code : CE(HS)301****CO Code: CE(HS)301.CO<Number>**

1. Acquire basic proficiency in English including reading and listening comprehension, writing and speaking Skills. And understand the basics of Business Ethics and Corporate Communication

**Subject Name : Introduction to Civil Engineering****Subject Code : CE(HS)302****CO Code: CE(HS)302.CO<Number>**

1. Describe the basic of civil engineering.
2. Summarize the History of Civil engineering, National Planning for Construction and Infrastructure Development, Fundamentals of Architecture & Town Planning, Fundamentals of Building Materials.
3. Discuss the Basics of Construction Management & Contracts Management, Environmental Engineering & Sustainability, basics of Geotechnical Engineering.
4. Explain fundamentals of Hydraulics, Hydrology & Water Resources Engineering Ocean Engineering, Power Plant Structures, surveying techniques, & Geomatics, Traffic & Transportation Engineering, Repairs & Rehabilitation of Structures, Computational Methods, IT, IoT in Civil Engineering.
5. Analyze the cases of large civil engineering projects by industry professionals, covering comprehensive planning to commission.
6. Summarize Basics of Professionalism.

**Subject Name : Basic Electronics****Subject Code : CE(ES)391****CO Code: CE(ES)391.CO<Number>**

1. Understand the principles of semiconductor devices and their applications.
2. Design an application using Operational Amplifier.

3. Understand the working of timing circuit and oscillators.
4. Understand logic gates, flop flop as a building block of digital systems.
5. Learn the basics of Electronic communication system.

**Subject Name : Computer Aided Civil engineering Drawing**

**Subject Code : CE(ES)392**

**CO Code: CE(ES)391.CO<Number>**

1. Discuss the basic concepts of drawing.
2. Differentiate the various signs and symbols used in AUTOCAD.
3. Sketch the site plan, floor plan, elevation and section drawing of small residential buildings.
4. Illustrate isometric, perspective view of building and fundamentals of Building Information Modelling
5. Describe the types of masonry bonds.
6. Construct an Industrial building and roof truss.

**Subject Name : Life Science**

**Subject Code : CE(ES)392**

**CO Code: CE(ES)393.CO<Number>**

1. Comparison of stomatal index in different plants.
2. Study of mineral crystals in plants;
3. Determination of diversity indices in plant communities; To construct ecological pyramids of population sizes in an ecosystem;
4. Determination of Importance Value Index of a species in a plant community; Seminar (with PPTs) on EIA of a Mega-Project
5. Preparation and extraction of genomic DNA and determination of yield by UV absorbance;

#### 4th Semester

**Subject Name : Introduction to Fluid Mechanics**

**Subject Code : CE(ES)401**

**CO Code: CE(ES)401.CO<Number>**

1. Define basic terms, values and laws in the areas of fluids properties.
2. Use the basic equations of fluid statics to solve problems on submerged planes and manometers.
3. Identify the concept and application of fluid kinematics and fluid dynamics.
4. Relate dimensional analysis principle for problems in fluid mechanics.
5. Use fundamental theories of fluid flow for the analysis of flow through the pipeline system.
6. Design components of hydraulic machines, turbines, and pumps; and study their characteristics.

**Subject Name : Introduction to Solid Mechanics**

**Subject Code : CE(ES)402**

**CO Code: CE(ES)402.CO<Number>**

1. To identify different degrees of freedoms for support conditions, equilibrium conditions and elastic properties of axially loaded bars through stress-strain and force-displacement curves
2. To calculate the bending moment diagram, shear force diagram, bending and shear stresses and deflection of beams for uniformly distributed, concentrated, linearly varying and external concentrated moment.
3. To identify strain energy due to bending moment, axial force, shear force and the concepts of principal stresses, principal planes, and Mohr's circle.
4. To calculate the member forces in plane trusses; hoop and meridional stresses in thin cylinders and spherical shells.
5. To identify torsional moment and twist on a circular shaft and calculate the shear stress.
6. To calculate the buckling load of columns using Euler's theory for different support constraints.

**Subject Name : Civil Engineering- Societal & Global Impact**

**Subject Code : CE(HS)401**

**CO Code: CE(HS)401.CO<Number>**

1. Discuss the change in trends of civil engineering from the past to present and future in Indian as well as global scenario.
2. The impact, which Civil Engineering projects have on the Society and identifying the ancient and modern marvels of civil engineering to plan for a better world.
3. Recognise the different infrastructural requirements of civil engineering related to megacities, smart cities, energy generation and communication.
4. Classification of environmental engineering including waste managements, flood control, pollution control to build a sustainable society.
5. Identify the built environment and factors influencing the quality of life ensuring sustainability.
6. Understand the EIA procedures and apply advanced engineering techniques to contribute to GDP and generate employment.

**Subject Name : Soil Mechanics - I****Subject Code : CE(PC)401****CO Code: CE(PC)401.CO<Number>**

1. Classify soil as per grain size distribution curve and understand the index properties of soil.
2. Implement the concept of total stress, effective stress and pore water pressure for solving geotechnical problems
3. Assess the permeability of different types of soil and solve flow problems
4. Estimate the seepage loss, factor of safety against piping failure using flow net related to any hydraulic structure.
5. Explain vertical stress on a horizontal plane within a soil mass subjected to Different types of loading on the ground surface and also the maximum stressed zone or isobar below a loaded area
6. Use the concept of shear strength to analyse different geotechnical problems and determine the shear strength parameters from lab and field tests.

**Subject Name : Environmental Engineering-I****Subject Code : CE(PC)402****CO Code: CE(PC)402.CO<Number>**

1. Define the basic concepts and terminologies of water supply engineering and solid waste management.
2. Describe different surface and groundwater sources; and composition and characteristics of municipal solid waste.
3. Implement the methods of quantifying water requirement and MSW generation.
4. Solve different mathematical problems regarding different components of water supply systems, distribution networks and MSW management systems.
5. Compare between different water samples based on their physical, chemical and biological characteristics.
6. Design different unit processes and operations involved in wastewater treatment.

**Subject Name : Surveying & Geomatics****Subject Code : CE(PC)403****CO Code: CE(PC)403.CO<Number>**

1. To explain and state the scope of surveying and geomatics in civil engineering
2. To demonstrate the basic principles of surveying and geomatics engineering
3. To solve the problems using different methods of surveying and geomatics to measure the features of interest
4. To examine the traditional and advanced methods of surveying
5. To relate the different techniques of surveying and geomatics in solving real world problems.
6. To develop and construct solutions for real-world problems related to surveying and geomatics.

**Subject Name : CONCRETE TECHNOLOGY****Subject Code : CE(PC)404****CO Code: CE(PC)404.CO<Number>**

1. Explain the composition, manufacturing process, chemical compounds and types of cement, along with influence of aggregate and water in concrete making.
2. Examine the properties of materials required for concrete making and the properties of concrete at fresh and hardened state as per IS code and its strength characteristics.
3. Select the admixture as per requirement for concreting, its role and properties.
4. Design the concrete mix as per latest IS code methods.
5. Apply the basic knowledge of non-destructive testing in field operations.
6. Analyze various special types of concrete and their applications.

**Subject Name : Fluid Mechanics Laboratory****Subject Code : CE(ES)491****CO Code: CE(ES)491.CO<Number>**

1. To prepare the Coefficient of discharge, calibration of the notch and orifice meter.
2. Evaluate the performance of pump and turbine.
3. Calculate the various hydraulic coefficients.
4. Examine the minor losses through pipes.
5. Inspect the water surface profile due to formation of hydraulic jump.
6. Inspect the water surface profile for flow over Broad crested weir.

**Subject Name : Solid Mechanics Laboratory****Subject Code : CE(ES)492****CO Code: CE(ES)492.CO<Number>**

1. Demonstrate the method and findings of tension and compression tests on ductile, brittle materials and explain the method of bending tests on mild steel beam and concrete beam.
2. Demonstrate the method and findings of Torsion test on mild steel circular bar, concrete beam.
3. Interpret the concept of hardness and explain the procedure and findings of Brinnel and Rockwell tests
4. Demonstrate the concept, procedure and calculation of spring constant and execute its use in Civil Engineering.
5. Demonstrate the method and findings of Izod and Charpy impact tests.
6. Explain the concepts of fatigue test.

**Subject Name : Engineering Geology Laboratory****Subject Code : CE(ES)493****CO Code: CE(ES)493.CO<Number>**

1. Define and state the role of engineering geology in civil engineering
2. Identify the origin of rocks and geologic structures
3. Use different tools to identify rocks and minerals in hand specimens and under the microscope.
4. Relate the geological structures by drawing the cross sections from the geological maps.
5. Interpret the results obtained from different geological experiments.
6. Investigate the natural hazards/disasters that are caused by geological reasons.

**Subject Name : Surveying & Geomatics Laboratory****Subject Code : CE(PC)493****CO Code: CE(PC)493.CO<Number>**

1. Interpret the interdependency and advancement of different surveying methods
2. Explain the working principles of different surveying and geomatics instruments and experiments
3. Execute the different methods of surveying and geomatics to measure the features of interest
4. Examine the results obtained from the surveying and geomatics experiments

5. Assess the different techniques of surveying and geomatics in measuring and assessing the features of interest
6. Design and construct solutions for real world problems related to surveying and geomatics.

**Subject Name : Concrete Technology Laboratory**

**Subject Code : CE(PC)494**

**CO Code: CE(PC)494.CO<Number>**

1. Demonstrate the method and findings of tension and compression tests on concrete
2. Describe the concepts of different test on hardened concrete and different properties of cement.
3. Calculate the specific gravity of concrete ingredients.
4. Calculate the mix proportion of high grade of concrete.
5. Measure the workability of concrete mix.
6. Investigate the quality of concrete.

### 5th Semester

**Subject Name : Design of RC Structures**

**Subject Code : CE(PC)501**

**CO Code: CE(PC)501.CO<Number>**

1. To identify material properties and design methodologies for reinforced concrete structures.
2. Assess different type of loads and prepare layout for reinforced concrete structures.
3. To apply the applicable industrial design codes relevant to the design of reinforced concrete members
4. To analyse and design various structural elements of reinforced concrete building like beam, slab, column, footing, and staircase.
5. Assessment of serviceability criteria for reinforced concrete beam and slab.
6. Prepare structural drawings and detailing and produce design calculations and drawing in appropriate professional format

**Subject Name : Engineering Hydrology**

**Subject Code : CE(PC)502**

**CO Code: CE(PC)502.CO<Number>**

1. Explain the source, occurrence, movement and distribution of water which is a prime resource for development of a nation.
2. Interpret to Estimate and process the precipitation data.
3. Analyze the functioning of reservoirs and estimation of storage capacities.
4. Calculate to estimate the passage of floods through rivers and reservoirs.
5. Design the flood volumes and flood hazards for various structures.
6. Estimate the measurement of flow in rivers.

**Subject Name : Structural Analysis – I**

**Subject Code : CE(PC)503**

**CO Code: CE(PC)503.CO<Number>**

1. Distinguish between stable and unstable and statically determinate and indeterminate structures.
2. Solve equations of equilibrium to structures and compute the reaction.
3. Interpret the internal forces in cable and arch type structures.
4. Develop and draw the influence lines for reactions, shears and bending moments in beams due to moving loads
5. Use approximate methods to solve statically indeterminate structures.
6. Sketch the deflections of truss structures and beams.

**Subject Name : Soil Mechanics – II**

**Subject Code : CE(PC)504**

**CO Code: CE(PC)504.CO<Number>**

1. Assess the compaction and consolidation characteristics of soil for solving geotechnical problems.

2. Calculate earth pressure on rigid retaining walls on the basis of classical earth pressure theories.
3. Interpret the concept of different methods in design, construction of the pavement.
4. Solve the bearing capacity of shallow foundation by applying established theory.
5. Estimate settlement in soils by different methods.
6. Design safety of dams and embankments on the basis of various methods of slope stability analysis.

**Subject Name : Environmental Engineering – II****Subject Code : CE(PC)505****CO Code: CE(PC)505.CO<Number>**

1. Recognize the basic concepts and terminologies of waste water engineering and hazardous waste management.
2. Describe different home plumbing systems for water supply and wastewater disposal.
3. Implement the methods of quantifying sanitary sewage and storm sewage.
4. Solve different mathematical problems regarding different components of sewerage system
5. Compare between different wastewater samples based on their physical, chemical and biological characteristics.
6. Design different unit processes and operations involved in wastewater treatment.

**Subject Name : Transportation Engineering****Subject Code : CE(PC)506****CO Code: CE(PC)506.CO<Number>**

1. Summarize the knowledge of planning, design and the fundamental properties of highway materials in highway engineering.
2. Apply the knowledge of geometric design and draw appropriate conclusion.
3. Interpret the concept of different methods in design, construction of the pavement.
4. Interpret traffic parameters by applying the knowledge in traffic planning and intersection design.
5. Define the various pavement materials, types of pavement and their typical crosssections; Design parameters and design the Flexible Pavement rigid Pavement: with Design of rigid Pavement thickness
6. Illustrate the scope of adoption of sustainable construction techniques by using recyclable hazardous materials.

**Subject Name : RC Design Sessional****Subject Code : CE(PC)591****CO Code: CE(PC)591.CO<Number>**

1. Understand material properties and design methodologies for reinforced concrete structures.
2. Assess different type of loads and prepare layout for reinforced concrete structures.
3. Identify and apply the applicable industrial design codes relevant to the design of reinforced concrete members.
4. Analyse and design various structural elements of reinforced concrete building like beam, slab, column, footing, and staircase.
5. Assessment of serviceability criteria for reinforced concrete beam and slab.
6. Prepare structural drawings and detailing and produce design calculations and drawing in appropriate professional format.

**Subject Name : Soil Mechanics Laboratory****Subject Code : CE(PC)594****CO Code: CE(PC)591.CO<Number>**

1. Identify different types of soil by visual inspection.
2. Determine natural moisture content and specific gravity of various types of soil.
3. Estimate in-situ density by core cutter method and sand replacement method.

4. Analyze grain size distribution and Atterberg limits for soil.
5. Perform laboratory tests to determine permeability and compaction characteristics of soil.
6. Determine shear strength parameters of soil by unconfined compression test and vane shear test.
7. Determine shear strength parameters of soil by direct shear test.
8. Perform triaxial test to determine shear strength parameters of soil.
9. Determine California Bearing Ratio (CBR) of soil.
10. Prepare technical laboratory report

**Subject Name : Environmental Engineering Laboratory****Subject Code : CE(PC)595****CO Code: CE(PC)595.CO<Number>**

1. Experiment various physical characteristics for a given sample of water and wastewater
2. Determine various chemical characteristics for a given sample of water and wastewater
3. Examine the bacteriological characteristics for a given sample of water and wastewater
4. Examine the suitability of a few treatment options for a given sample of water and wastewater
5. Compare the determined quality parameters with standards to decide on the suitability of use for the tested water and disposal of tested wastewater

**Subject Name : Transportation Engineering Laboratory****Subject Code : CE(PC)596****CO Code: CE(PC)596.CO<Number>**

1. Identify and perform various experiments on soil, aggregate and bituminous materials in a group.
2. Interpret and apply the results of various experiments to design and solve various engineering problems related to bituminous overlay, sub base design and bituminous mix design.

**Subject Name : Computer Applications in Civil Engineering****Subject Code : CE(PC)597****CO Code: CE(PC)597.CO<Number>**

1. Use the computer as a problem-solving tool.
2. Identify and formulate Civil Engineering problems solvable by computers.
3. Perform linear algebra and matrix operations and their application to solve Civil Engineering problems
4. Solve sets of linear equations and determine roots and nonlinear equations
5. Construct, interpret and solve simple optimization problems
6. Develop programs for Civil Engineering analysis and design problems.
7. Use various software used in industries for analysis and design.

**6th Semester****Subject Name : Soft Skills and Interpersonal Communication – I****Subject Code : CE(OE)601A****CO Code: CE(OE)601A.CO<Number>**

1. Analyse the dynamics of business communication and communicate accordingly.
2. Write business letters and reports
3. Learn to articulate opinions and views with clarity
4. Appreciate the use of language to create beautiful expressions
5. Analyse and appreciate literature.
6. Communicate in an official and formal environment.

**Subject Name : Construction Engineering & Management****Subject Code : CE(PC)601****CO Code: CE(PC)601.CO<Number>**

1. An idea of how structures are built and projects are developed on the field
2. An understanding of modern construction practices
3. A good idea of basic construction dynamics- various stakeholders, project objectives, processes, resources required and project economics
4. A basic ability to plan, control and monitor construction projects with respect to time and cost
5. An idea of how to optimise construction projects based on costs
6. An idea how construction projects are administered with respect to contract structures and issues.

**Subject Name : Engineering Economics, Estimation & Costing**

**Subject Code : CE(PC)602**

**CO Code: CE(PC)602.CO<Number>**

1. Have an idea of Economics in general, Economics of India particularly for public sector agencies and private sector businesses
2. Be able to perform and evaluate present worth, future worth and annual worth analyses on one of more economic alternatives.
3. Be able to carry out and evaluate benefit/cost, life cycle and breakeven analyses on one or more economic alternatives.
4. Be able to understand the technical specifications for various works to be performed for a project and how they impact the cost of a structure.
5. Be able to quantify the worth of a structure by evaluating quantities of constituents, derive their cost rates and build up the overall cost of the structure.
6. Be able to understand how competitive bidding works and how to submit a competitive bid

**Subject Name : Water Resources Engineering**

**Subject Code : CE(PC)603**

**CO Code: CE(PC)603.CO<Number>**

1. Understand the fundamentals of flow in open channels.
2. Understand the concepts of irrigation.
3. Estimate the quantity of water required by different crops in different seasons, and accordingly the irrigation water requirement.
4. Design channels and other irrigation structures required for irrigation, drainage, soil conservation, flood control and other water-management projects.
5. Learn about groundwater resources, aquifers and wells.

**Subject Name : Design of Steel Structures**

**Subject Code : CE(PC)604**

**CO Code: CE(PC)604.CO<Number>**

1. Identify the material properties of structural steel. Moreover, the students will identify different bolted and welded connections, analyse and design them for axial and eccentric loads.
2. Design different steel sections subjected to axial compression and tension following Indian codes of practices.
3. Comprehend the differences between laterally supported and unsupported flexure members. Designing of the flexure members using Indian codes of practice.
4. Analyse and design rolled and built up compression members along with base connection subjected to axial compression, bending and tension.
5. Calculate shear force and bending moment on rolled and built up girders, dimension the section and finally design it following Indian standard design guidelines.
6. Identify different components of gantry system, calculate lateral and vertical loads acting on the system, dimension the components and design them.
7. Design different components of an industrial building.

**Subject Name : Foundation Engineering**

**Subject Code : CE(PE)601B**

**CO Code: CE(PE)601B.CO<Number>**

1. Determine the load carrying capacity of pile foundation.

2. Compute the efficiency and settlement of pile group.
3. Understand different subsoil exploration methods and interpret field and laboratory test data to obtain design parameters for geotechnical analysis.
4. Correlate bearing capacity of shallow foundation from field test data.
5. Analyze and design sheet pile structure on the basis of earth pressure theories.
6. Understand and apply various types of ground improvement methods for solving complex geotechnical problems.

**Subject Name : Structural Analysis – II****Subject Code : CE(PE)602B****CO Code: CE(PE)602B.CO<Number>**

1. Apply the Slope Deflection and Moment Distribution Method to analyze indeterminate structures.
2. Develop and analyze the concept of suspension bridge and stiffness girders
3. Apply and analyze the concepts of curved beam analysis in hooks, rings and Bow girders.
4. Develop the concept bending in unsymmetrical beams.
5. Develop the fundamental concepts of plastic analysis using kinematic method and apply them in frames and continuous beam analysis.
6. Develop and analyze the portal frames using Portal and Cantilever method. Develop and analyze the indeterminate structures (continuous beams and frames) using flexibility and stiffness matrix method.

**Subject Name : Water Resource Engineering Laboratory****Subject Code : CE(PC)693****CO Code: CE(PC)693.CO<Number>**

1. Determine Catchment area delineation (Manually and using DEM).
2. Compute average rainfall over a catchment area with arithmetic mean method, Thiessen polygon method and Isohyetal Method.
3. Use of different type of Rain gauges.
4. Measure infiltration rate using double ring infiltrometer.
5. Measure evaporation using evaporimeter.
6. Record bright sunshine hours using sunshine recorder.

**Subject Name : Steel Structure Design Sessional****Subject Code : CE(PC)694****CO Code: CE(PC)694.CO<Number>**

1. Identify the material properties of structural steel. Moreover, the students will identify different bolted and welded connections, analyse and design them for axial and eccentric loads.
2. Design different steel sections subjected to axial compression and tension following Indian codes of practices.
3. Comprehend the differences between laterally supported and unsupported flexure members. Designing of the flexure members using Indian codes of practice.
4. Analyse and design rolled and built up compression members along with base connection subjected to axial compression, bending and tension.
5. Calculate shear force and bending moment on rolled and built up girders, dimension the section and finally design it following Indian standard design guidelines.
6. identify different components of gantry system, calculate lateral and vertical loads acting on the system, dimension the components and design them.
7. Design different components of an industrial building.

**Subject Name : Quantity Survey Estimation and Valuation Sessional****Subject Code : CE(PC)695****CO Code: CE(PC)695.CO<Number>**

1. An introduction to quantity surveying.
2. The capability to know analysis and schedule of rates
3. The ability to know specification of materials

4. An understanding about specification of works
5. The introduction to valuation.

### 7th Semester

#### Subject Name : ICT for Development

Subject Code : CE(OE)701B

CO Code: CE(OE)701B.CO<Number>

1. Define ICT and list different types of ICT and use of it.
2. Discuss Digital Revolution and Digital Communication.
3. Extrapolate Technology and Development on the basis of ICT.
4. List different types of CMC and cite important theoretical framework of CMC.

#### Subject Name : Hydraulic Structures

Subject Code : CE(PE)701C

CO Code: CE(PE)701C.CO<Number>

1. Identify the characteristics of various types of dams and their selection procedure.
2. Perform the reconnaissance survey and, geophysical investigations necessary for selection of suitable dam site
3. Estimate forces acting on a gravity dams and perform stability analysis.
4. Estimate the seepage loss through embankment dams and suggest necessary remedial measures.
5. Calculate the discharge through the overflow section and design the appropriate energy dissipation structures.

#### Subject Name : Prestressed Concrete

Subject Code : CE(PE)702A

CO Code: CE(PE)702A.CO<Number>

1. Learn the introduction of prestressed concrete member and its deflection properties
2. Develop the design criteria of prestressed concrete section for flexure and shear properties
3. Analyze the anchorage zone stress for post-tensioned members
4. Impart knowledge regarding the methods of Analysis of Statically Indeterminate Structures.
5. Impart knowledge regarding the composite construction of Prestress and In-situ concrete.
6. Impart knowledge regarding Design of Prestressed concrete poles and sleepers and introduction of partial prestressing.

#### Subject Name : Air and Noise Pollution and Control

Subject Code : CE(PE)703A

CO Code: CE(PE)703A.CO<Number>

1. Define the basic concepts and terminologies regarding air pollution and noise pollution
2. Describe the physics of air pollution and noise pollution
3. Apply the methods of air pollution and noise pollution measurements
4. Analyze different concepts of air and noise pollution solving mathematical problems
5. Compare air and noise quality with allowable standards and limits
6. Choose and design proper techniques for air pollution control and noise pollution control

#### Subject Name : Structural Dynamics

Subject Code : CE(PE)704A

CO Code: CE(PE)704A.CO<Number>

1. Fundamental theory of dynamic equation of motion
2. Fundamental analysis methods for dynamic systems
3. Dynamic properties and behaviour of civil structures
4. Modelling approach of dynamic response in civil engineering applications

#### Subject Name : Pavement Design

Subject Code : CE(PE)705B

**CO Code: CE(PE)705B.CO<Number>**

1. Differentiate between different types of pavements, both structurally and functionally.
2. Conduct Axle Load Survey and Estimate Design Traffic.
3. Analyze and design bituminous and cement concrete pavement using.
4. Understand the principles of Pavement Maintenance and identify various pavement distresses.

**Subject Name : Industrial Internship****Subject Code : CE(IN)791****CO Code: CE(IN)791.CO<Number>**

1. Participate in the projects in industries during his or her industrial training
2. Describe use of advanced tools and techniques encountered during industrial training and visit
3. Interact with industrial personnel and follow engineering practices and discipline prescribed in industry
4. Develop awareness about general workplace behavior and build interpersonal and team skills
5. Prepare professional work reports and presentation

**Subject Name : Project-1 (Project Work)****Subject Code : CE(PROJ)792****CO Code: CE(PROJ)792.CO<Number>**

1. Selecting topic of the project & Generating its objectives
2. Practice finding relevant course material on the Internet and non-electronic sources
3. Preparing work plan and Preliminary report
4. Preparing presentation and explaining it to the audience
5. Selecting topic of the project & generating its objectives

**8th Semester****Subject Name : Professional Practice, law & Ethics****Subject Code : CE(HS)801A****CO Code: CE(PROJ)792.CO<Number>**

1. Recognize the importance of Values and Ethics in their Personal lives and professional careers.
2. Discuss the key principles, aspects and purpose of contract management
3. Implement the process for tender, bid evaluation, contract documentation, and contract notices
4. Discuss Arbitration, Conciliation and ADR (Alternative Dispute Resolution) system
5. Identify the role of labour in civil engineering and methods of engaging labour
6. Identify the need for intellectual property, main forms of IP, Copyright, Trademarks, and the process of obtaining Patents.

**Subject Name : Groundwater Contamination****Subject Code : CE(OE)801D****CO Code: CE(OE)801D.CO<Number>**

1. To be able to understand the principles and theories regarding groundwater contamination with
2. To be able to formulate the various remedial measures for groundwater contamination

**Subject Name : Soft Skills and Personality Development****Subject Code : CE(OE)802A****CO Code: CE(OE)802A.CO<Number>**

1. Discuss about the Self growth theory of soft skill.
2. Study the concept of Competitive Spirit and Responsibility Factor to operate Professional Communication.
3. Develop the leadership quality and team playing strategies

**Subject Name : Pavement Materials****Subject Code : CE(PE)801D**

**CO Code: CE(PE)801D.CO<Number>**

1. Identify the engineering properties and characteristics of the different materials that concern the pavement engineer.
2. Understanding and evaluation of modern testing techniques of soil, granular, and bituminous materials for pavement analysis and design.
3. Describe different Super pave aggregate tests and requirements.
4. Analysis of design mix for rigid pavements.

**Subject Name : Comprehensive Viva Voce****Subject Code : CE(CV)881****CO Code: CE(CV)881.CO<Number>**

1. DEMONSTRATING qualitative solutions to research/industry problems involving contemporary issues.
2. FORMULATING hypothesis/design/methodology
3. ACQUIRING the knowledge of the techniques, skills, and modern engineering tools necessary for Civil Engineering practice
4. PRESENTING features of the developed project to the targeted group through written and oral communication.
5. CONTRIBUTING in a team in development of technical seminar.

**Subject Name : Project****Subject Code : CE(PROJ)882****CO Code: CE(PROJ)882.CO<Number>**

1. Demonstrate systematic understanding of knowledge related to 4 years study of B. Tech. in CE
2. Apply critical thinking skills to analyze and evaluate complex engineering problems.
3. Demonstrate effective communication skills in presenting technical concepts and ideas to both technical and non-technical audiences.
4. Demonstrate confidence and versatility in answering the varieties of questions posed by a group of interviewer in a moderately short duration.



## Elitte College of Engineering

Approved by AICTE and Affiliated to MAKAUT, West Bengal

PO: Karnamadhhabpur, PS: Ghola, Sodepur, Kolkata - 700113

### Contact Info

📍 PO: Karnamadhhabpur, PS: Ghola, Sodepur, Kolkata - 700113

☎ Telephone

+91 91633 16560 / +91 98315 00840

✉ Email

info@ece.ac.in

admission@ece.ac.in

### Trust Office

📍 PO: Karnamadhhabpur, PS: Ghola, Sodepur, Kolkata - 700113

☎ Telephone

+91 91633 16560 / +91 98315 00840

### Admission Enquiry

☎ Telephone

+91 91633 16560 / +91 98315 00840

✉ Email

[info@ece.ac.in](mailto:info@ece.ac.in)

[admission@ece.ac.in](mailto:admission@ece.ac.in)

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## Electrical Engineering

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### Department Overview

#### Vision

Offering excellent technical education in Electrical Engineering to produce ethical Electrical Engineers with technically strong, innovative and entrepreneurial abilities fit for global needs for modern era.

#### Mission

**M1:** Catering high quality educational base in Electrical Engineering to the Students with strong analytical ability and skill so as to confidently work in various fields of Electrical Engineering and emerge as future leaders.

**M2:** Imparting high quality technical education to develop recognized professionals in Electrical Engineering with innovative and entrepreneurial abilities fit for frequently changing global needs.

**M3:** Providing up-to-date knowledge in emerging technology in Electrical Engineering with passion for innovations and life-long learning skill through a proper teaching –learning processes.

**M4:** Encouraging the collaboration between industry and the department through sharing of knowledge and experiences in higher learning and research to produce industry-ready professionals.

#### Programme Educational Objectives (PEO)

**PEO1:** Have skills to solve the problems by analysis, design, develop and implementation of concept, knowledge and skill leading to optimal solutions fulfilling the dynamic requirement of industry and society.

**PEO2:** Have good understanding of Engineering concepts, making them practicing engineers with sound knowledge of logic and design, in Industries.

**PEO3:** Undertake research in emerging fields in Engineering so as to face the challenges of global challenges in their higher studies and by lifelong learning.

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#### **Program Outcomes (PO)**

Engineering Graduates will be able to:

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**PO1:** Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

**PO2:** Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

**PO3:** Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

**PO4:** Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

**PO5:** Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

**PO6:** The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

**PO7:** Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**PO8:** Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

**PO9:** Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

**PO10:** Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

**PO11:** Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

**PO12:** Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

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#### **Program Specific Outcomes (PSO)**

At the end of the program, the student

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**PSO1:** Apply the fundamentals of mathematics, science and engineering knowledge to identify, formulate, design and investigate complex engineering

problems of electric circuits, analog and digital electronics circuits, control systems, electrical machines and Power system. Apply the fundamentals of mathematics, science and engineering knowledge to identify, formulate, design and investigate complex engineering problems of electric circuits, analog and digital electronics circuits, control systems, electrical machines and Power system

**PSO2:** Apply the appropriate techniques and modern engineering hardware and software tools in electrical engineering to engage in life-long learning and to successfully adapt in multi-disciplinary environments

**PSO3:** Design and analyze the novel solutions to the real life problems related to power grids, Renewable energy systems, micro grids, electric vehicles, electro-mechanical devices and Electronic circuitry.

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#### Course Outcomes (COs)

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## Elite College of Engineering

Approved by AICTE and Affiliated to MAKAUT, West Bengal

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## Course Outcomes (COs) of Electrical Engineering

### Course Outcomes (COs)

On completion of the course students will be able to

#### 1st Semester

**Subject Name : Mathematics –IB**

**Subject Code : BS-M 102**

**CO Code: BS-M 102.CO<NUMBER>**

1. Apply the concept and techniques of differential and integral calculus to determine curvature and evaluation of different types of improper integrals.
2. Understand the domain of applications of mean value theorems to engineering problems.
3. Learn different types of matrices, concept of rank, methods of matrix inversion and their applications.
4. Learn the tools of power series and Fourier series to analyse engineering problems and apply the concept of convergence of infinite series in many approximation techniques in engineering disciplines.
5. Apply the knowledge for addressing the real life problems which comprises of several variables or attributes and identify extremum points of different surfaces of higher dimensions.

**Subject Name : Chemistry-I.**

**Subject Code: BS-CH 101**

**CO Code: BS-CH 101.CO<NUMBER>**

1. Apply first and second law of thermodynamics to different chemical and physical processes under specified condition to determine the equilibrium condition, spontaneity and thermo-chemical behavior of a reaction.
2. using the concept of conductance of ions analyze the design and working principle of different electrochemical cells.
3. Derive rate of a reaction at a specified temperature under different medium.
4. Explain the mechanism considering the structure of the molecules and type of electronic effect present in them.
5. Analyze different types of fuels for industrial application.
6. Distinguish different types of polymer for diverse application.

**Subject Name : Basic Electrical Engineering**

**Subject Code: ES-EE 101**

**CO Code: ES-EE 101.CO<NUMBER>**

1. Understand and analyze basic electric and magnetic circuits.
2. Study the working principles of electrical machines and power converters.
3. Introduce the components of low voltage electrical installations.
4. Understand the general structure of electrical power system.

5. Understand the construction and operation of single-phase transformer.
6. Explain the working principle of power converters.

**Subject Name : Chemistry-I**

**Subject Code: BS-CH191**

**CO Code: BS-CH191.CO<NUMBER>**

1. Determine some physical parameter like viscosity of a solution and rate constant of a reaction
2. Determine the strength of an acid using conductometric method.
3. Determine the strength of an acid using pH metric method.
4. Determine partition coefficient of a compound
5. Estimate the amount of an ion present in a given solution using permanganometric and argentometric methods.
6. Evaluate alkalinity (in terms of CaCO<sub>3</sub> equivalent), hardness (in ppm) and amount of dissolved oxygen (in mg/l) present in a given water sample using volumetric method.

**Subject Name : Basic Electrical Engineering Lab.**

**Subject Code: ES-EE 191**

**CO Code: ES-EE 191.CO<NUMBER>**

1. Calibrate Ammeter and Wattmeter.
2. Demonstrate the measuring instrument and electrical machines.
3. Conduct open circuit and short circuit test of single-phase transformer.
4. Measure 3 phase power using two wattmeters.
5. Identify the components of LT switchgear.
6. Understand the characteristic of RLC series and parallel circuit.

**Subject Name : Workshop.**

**Subject Code: ES-ME 192**

**CO Code: ES-ME192.CO<NUMBER>**

1. Understanding the application of hand tools and machinetools.
2. Comprehend the safety measure required to be taken while using the tools.
3. Select the appropriate tools required to manufacture an object of predetermined shape and size considering least wastage and cost.
4. Fabricate components with their own hands.
5. Practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.
6. Produce small device of their interest, by assembling different components.

## 2nd Semester

**Subject Name : Physics-I**

**Subject Code BS-PH 201**

**CO Code: BS-PH 201.CO<NUMBER>**

1. Apply basic concepts of mechanics
2. Discuss Physical optics and analyze principles of lasers with applications
3. Categorize dielectric and magnetic properties of materials leading to Electromagnetic laws
4. Differentiate between Classical Physics and Quantum Physics by introducing Planck's law
5. Apply wave particle duality in real life problems followed by simple quantum mechanics calculations
6. Classify ensembles and differentiate between classical and Quantum statistical mechanics

**Subject Name : Mathematics –IIB**

**Subject Code: BS-M202**

**CO Code: BS-M202.CO<NUMBER>**

1. Learn the methods for evaluating multiple integrals and their applications to different physical problems.
2. Understand different techniques to solve first and second order ordinary differential equations with its formulation to address the modeling of

systems and problems of engineering sciences.

3. Learn different tools of differentiation and integration of functions of a complex variable that are used with various other techniques for solving engineering problems.
4. Apply different types of transformations between two 2- dimensional planes for analysis of physical or engineering problems.

**Subject Name : Programming for ProblemSolving**

**Subject Code: ES-CS201**

**CO Code: ES-CS201.CO<NUMBER>**

1. Analyze the problem and formulate algorithms for them.
2. Translate the algorithms to programs (in C language).
3. Understand the correct syntax of logical expression, branch instruction, iteration,
4. Apply array and pointer to solve problem.
5. Understand the use of , function, recursion.
6. Build analytical skill.

**Subject Name : English**

**Subject Code: HM-HU201**

**CO Code: HM-HU201.CO<NUMBER>**

1. Understand and apply English Speech Sounds for enhancing English Communication
2. Apply English Language Presentation Skill in Academic and in Professional Communication
3. Apply Receptive Skills of English in Academics and in Engineering Profession
4. Apply Writing Skill of English in Academics and in Profession
5. Apply Grammar Skill of English in Academic and in Professional Communication
6. Apply Critical Thinking Skill of English in Academic and in professional Communication

**Subject Name : Physics-I Lab.**

**Subject Code BS-PH 291**

**CO Code: BS-PH 291.CO<NUMBER>**

1. Observe and read data in slide calliper's, screw gauge. Calculate different modulus of elasticity to apply basic knowledge Physics of Elasticity and apply viscosity principle of streamline motion of water to calculate its viscosity coefficient required in fluid mechanics.
2. Arrange sequential connection in electrical experiment to verify principles of Kirchhoff's law to verify passive elements of electrical circuit.
3. Operate optical instruments to illustrate physical properties of light and to observe spectral lines of light to verify medium specific characteristics. Calculate Rydberg constant by studying Hydrogen spectrum to visualize visible spectra and to assess this empirical fitting parameter as a fundamental physical constant.
4. Determine Band Gap and Hall coefficient of a given intrinsic semiconductor and distinguish between different intrinsic semiconductors. Determine the dielectric constant of different capacitors to correlate their usage like insulator and limitation of their usage as a dielectric material.
5. Apply concepts of quantum mechanics to verify Bohr's atomic orbital theory.
6. Determine Planck's constant and Stefan's constant applying modern Physics.

**Subject Name : Programming for Problem Solving**

**Subject Code: ES-CS291**

**CO Code: ES-CS291.CO<NUMBER>**

1. Analyze the problem and formulate algorithms for them.
2. Translate the algorithms to programs (in C language).
3. Understand the correct syntax of logical expression, branch instruction, iteration,
4. Apply array and pointer to solve problem.
5. Understand the use of , function, recursion.

6. Build analytical skill.

**Subject Name : Engineering Graphics & Design**

**Subject Code: ES-ME291**

**CO Code: ES-ME291.CO<NUMBER>**

1. Understand the applications of hand tools and machine tools.
2. Comprehend the safety measures required to be taken while using the tools.
3. Select the appropriate tools required to manufacture an object of predetermined shape and size considering least wastage and cost.
4. Fabricate components with their own hands.
5. Confident on practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.
6. Produce small devices of their interest by assembling different components.

**Subject Name : Language Laboratory**

**Subject Code: HM-HU291**

**CO Code: HM-HU291.CO<NUMBER>**

1. Understand and apply English Speech Sounds for enhancing English Communication
2. Apply English Language Presentation Skill in Academic and in Professional Communication
3. Apply Receptive Skills of English in Academics and in Engineering Profession
4. Apply Writing Skill of English in Academics and in Profession
5. Apply Grammar Skill of English in Academic and in Professional Communication
6. Apply Critical Thinking Skill of English in Academic and in professional Communication

### 3rd Semester

**Subject Name :** Electric Circuit Theory

**Subject Code :** PC-EE-301

**CO Code:** PC-EE-301.CO<NUMBER>

1. **Match** concepts in trigonometry, complex algebra, and matrix algebra to utilize techniques, skills, and modern engineering tools necessary for electrical engineering practices.
2. **Select** proper network reduction techniques, circuit laws and theorems for magnetic / electric circuit solution considering economic, performance, efficiency and availability constraints.
3. **Estimate** parameters for different types of attenuators and filters used in signal modulation for power systems and communication systems
4. **Analyze** circuits and systems by their standard parameters to identify their characteristics in general form, applicable for generation, transmission and distribution considering economical, ethical and practical limitation.
5. **Develop** various methodology/strategies through various domain of analysis to evaluate performance characteristics of electrical networks and analyze their operation under different operating conditions for various electrical/electromagnetic systems.
6. **Apply** computer mathematical and simulation programs to solve various real life multi- disciplinary topics through circuit solution.

**Subject Name :** Analog Electronics

**Subject Code :** PC-EE-302

**CO Code:** PC-EE-302.CO<NUMBER>

1. Describe analog electronic components and analog electronics circuits
2. Explain principle of operation of analog electronic components, filters, regulators and analog electronic circuits.
3. Compute parameters and operating points of analog electronic circuits.
4. Determine response of analog electronic circuits. Distinguish different types amplifier and different types oscillators based on application. construct operational amplifier based circuits for different applications

**Subject Name :** Electromagnetic Field Theory

**Subject Code :** PC-EE-303

**CO Code:** PC-EE-303.CO<NUMBER>

1. Relate different coordinate systems for efficient solution of electromagnetic problems
2. Describe mathematical tools to solve electromagnetic problems
3. Explain laws applied to electromagnetic field
4. Apply mathematical tools and laws to solve electromagnetic problems
5. Analyze electromagnetic wave propagation
6. Estimate transmission line parameters

**Subject Name :** BIOLOGY FOR ENGINEERS

**Subject Code :** BS- 301

**CO code:** BS-301.CO<NUMBER>

1. Describe with examples the biological observations lead to major discoveries.
2. Explain the classification of kingdom of life, the building blocks of life, different techniques of bio physics used to study biological phenomena and the role of imaging in the screening, diagnosis, staging, and treatments of cancer
3. Identify DNA as a genetic material in the molecular basis of information transfer
4. Analyze biological processes at the reductionistic level.
5. Apply thermodynamic principles to biological systems.
6. Identify microorganisms.

**Subject Name:** Engineering Mechanics

**Subject Code:** ES-ME-301

**CO Code:** ES-ME-301.CO<NUMBER>

1. Explain the co-ordinate system, principle of three dimensional rotation, kinematics and kinetics of rigid bodies
2. Elaborate the theory of general motion, bending moment, torsional motion and friction
3. Develop free body diagram of different arrangements
4. Solve problems with the application of theories and principle of motion , friction and rigid bodies
5. Analyze torsional motion and bending moment

**Subject Name :** Mathematics-III

**Subject Code :** BS-M-301

**CO. Code:** BS-M-301.CO<NUMBER>

1. Explain basics of probability theories, rules, distribution and properties of Z Transform
2. Describe different methods of numerical analysis
3. Solve numerical problems based on probability theories, numerical analysis and Z transform
4. Apply numerical methods to solve engineering problems
5. Solve engineering problems using z transform and probability theory

**Subject Name :** Indian Constitution

**Subject Code:** MC-EE-301

**CO Code:** MC-EE-301.CO<NUMBER>

1. describe different features of Indian constitution.
2. describe power and functioning of Union, state and local self-government.
3. describe structure, jurisdiction and function of Indian Judiciary.
4. describe basics of PIL and guideline for admission of PIL.
5. describe Functioning of local administration starting from block to Municipal Corporation
6. Identify authority to redress a problem in the profession and in the society.

**Subject Name :** Electric Circuit Theory Laboratory

**Subject Code :** PC-EE-391

**CO Code:** PC-EE-391.CO<NUMBER>

1. Determine Transient response of different electrical circuit, Parameters of two port network, Frequency response of filters and Laplace transform and inverse Laplace transform.
2. Generate different signals in both discrete and analog form.
3. Analyze amplitude and phase spectrum of different signals.
4. Verify network theorems.
5. Construct circuits with appropriate instruments and safety precautions.
6. Simulate electrical circuit experiments using suitable software.

**Subject Name :** Analog Electronics Lab

**Subject Code :** PC-EE-392

**CO Code:** PC-EE-392.CO<NUMBER>

1. Identify appropriate equipment and instruments for the experiment.
2. Test the instrument for application to the experiment.
3. Construct circuits with appropriate instruments and safety precautions.
4. Validate different characteristics of transmission line.
5. Determine earth resistance, dielectric strength of insulating oil, breakdown strength of solid insulating material and dielectric constant of transformer oil.
6. Analyze an electrical transmission line circuit with the help of software

**Subject Name :** Numerical Methods Laboratory

**Subject Code :** PC-CS-391

**CO Code:** PC-CS-391.CO<NUMBER>

1. Solve Problems with Newton forward /backward, Lagrange's interpolation,
2. Solve Problems of numerical integration using Trapezoidal rule, Simpson's 1/3 rule, Weddle's rule
3. Solve Problems to find numerical solution of a system of linear equations using Gauss elimination and Gauss-Seidel iterations.
4. Solve Problems to find numerical solution of Algebraic Equation by Regularfalsi and Newton Raphson methods.
5. Solve Ordinary differential equation by Euler's and Runge-Kutta methods.
6. Find appropriate numerical methods to solve engineering problems.
7. Use software package to solve numerical problems.

#### 4th Semester

**Subject Name :** Electric Machine-I

**Subject Code :** PC-EE-401

**CO Code:** PC-EE-401.CO<NUMBER>

1. Describes the function of different components of magnetic circuit, DC machines and transformer.
2. Explain the principle of operation of different types of DC machines and transformers.
3. Solves numerical problems of DC machines and transformers.
4. estimates the parameters and efficiency of transformer
5. determine the characteristics of DC machines
6. recommend methods to control output of DC machines

**Subject Name :** Digital Electronic

**Subject Code :** PC-EE-402

**CO Code:** PC-EE-402.CO<NUMBER>

1. Describe the function of different building blocks of digital electronics, semiconductor memories and programmable logic devices
2. Explain the principle of operation of combinational and sequential digital circuits, A/D and D/A converter
3. Solve numerical problems of Boolean algebra, number system, combinational & sequential digital circuits and A/D and D/A converter
4. Specify applications of combinational and sequential digital circuits
5. Determine specifications of different digital circuits
6. Design combinational and sequential digital circuits

**Subject Name :** Electrical and Electronics Measurement

**Subject Code :** PC-EE-403

**CO Code:** PC-EE-403.CO<NUMBER>

1. Explain the terms accuracy, precision, resolution, speed of response, errors in measurement, loading effect
2. Describe methods of measurement of power, energy by instruments and resistance, capacitance and inductance by bridges and potentiometer
3. Explain the principle of operation of analog meters, instrument transformer, digital multi-meter, digital voltmeter, digital frequency meter, signal generator, strain gauge, LVDT and temperature transducers
4. Explain the different building block, principle of operation of oscilloscope and measurement techniques of voltage, current, frequency and phase by

oscilloscope

5. Solve numerical problems related to analog meters, instrument transformer, measurement of power, energy, resistance, inductance and capacitance
6. Specify applications of analog and digital measuring instruments, sensors and transducers

**Subject Name :** Thermal Power Engineering

**Subject Code :** ES-EE-401

**CO Code:** ES-EE-401.CO<NUMBER>

1. Describe the function of different components of boilers. Engines and turbines
2. Explain the principle of operation of different types of boilers, turbines, IC engines and Gas turbines
3. Solve numerical problems of boilers, turbines, IC engines and Gas turbines
4. Analyze the performance of boilers, engines and turbines
5. Determine efficiency of boilers, engines and turbines
6. Explain methods to control boiler, engines and turbines parameters.

**Subject Name :** Values and Ethics in Profession

**Subject Code :** HM-EE-401

**CO Code:** HM-EE-401.CO<NUMBER>

1. Illustrate different aspects of human values, ethics, engineers' responsibility and duties
2. Explain different principles, different theories and laws of engineering ethics and social experimentation
3. Identify different factors in the light of Engineers' responsibility towards safety and risk
4. Correlate ethics of different work environment
5. Explain the need for intellectual property rights

**Subject Name :** Environmental Science

**Subject Code :** MC-EE-401

**CO Code:** MC-EE-401.CO<NUMBER>

1. Understand the natural environment and its relationships with human activities
2. Apply the fundamental knowledge of science and engineering to assess environmental and health risk
3. Develop guidelines and procedures for health and safety issues obeying the environmental laws and regulations
4. Acquire skills for scientific problem-solving related to air, water, noise & land pollution

**Subject Name :** Electric Machine-I Laboratory

**Subject Code :** PC-EE-491

**CO Code:** PC-EE-491.CO<NUMBER>

1. Identify appropriate equipment and instruments for the experiment.
2. Test the instrument for application to the experiment.
3. Construct circuits with appropriate instruments and safety precautions
4. Validate different characteristics of DC machine , methods of speed control of DC motor and parallel operation of the transformer
5. Work effectively in a team

**Subject Name :** Digital Electronics Laboratory

**Subject Code :** PC-EE-492

**CO Code:** PC-EE-492.CO<NUMBER>

1. Identify appropriate equipment and instruments for the experiment.
2. Test the instruments for application to the experiment.
3. Construct decoder, multiplexer, adder and subtractor circuits with appropriate instruments and precaution.
4. Realize RS-JK and D flip flop, universal register with gates, multiplexer and flip-flops and asynchronous and synchronous up down counters.
5. Validate the operation of code conversion circuit –BCD to Excess 3 & vice versa, 4 bit parity generator & comparator circuits.
6. Work effectively in a team.

**Subject Name :** Thermal Power Engineering

**Subject Code :** ES-EE-401

**CO Code:** ES-EE-401.CO<NUMBER>

1. Describe the function of different components of boilers. Engines and turbines
2. Explain the principle of operation of different types of boilers, turbines, IC engines and Gas turbines
3. Solve numerical problems of boilers, turbines, IC engines and Gas turbines
4. Analyze the performance of boilers, engines and turbines
5. Determine efficiency of boilers, engines and turbines
6. Explain methods to control boiler, engines and turbines parameters.

**Subject Name :** Electrical and Electronics Measurement Laboratory

**Subject Code :** PC-EE-493

**CO Code:** PC-EE-493.CO<NUMBER>

1. Identify appropriate equipment and instruments for the experiment.
2. Test the instrument for application to the experiment.
3. Construct circuits with appropriate instruments and safety precautions
4. Evaluate and adjust the precision and accuracy of AC energy meter, moving iron and dynamometer type ammeter, voltmeter and wattmeter by potentiometer
5. Measure voltage, current, power, energy, phase , frequency, resistance, inductance, Capacitance
6. Work effectively in a team.

### 5th Semester

**Subject Name :** Electric Machine-II

**Subject Code :** PC-EE-501

**CO Code:** PC-EE-501. CO<NUMBER>

1. Describes the arrangement of winding of AC machines.
2. Explain the principle of operation of Induction machines, Synchronous and special machines.
3. Solve numerical problems of Induction machines, Synchronous machines and Special machines.
4. estimates the parameters and efficiency of Induction and Synchronous machines
5. determine the characteristics of Induction machines and Synchronous machines
6. select appropriate methods for starting, braking and speed control of Induction machines

**Subject Name :** Power System-I

**Subject Code :** PC-EE-502

**CO Code:** PC-EE-502.CO<NUMBER>

1. Explain the principle of generation of Electric power from different sources
2. Determine parameters of transmission lines and its performance
3. Explain the principle of formation of corona and methods of its reduction
4. Conduct electrical tests on insulators
5. Solve numerical problems related to overhead transmission line, cable, insulators and tariff
6. Analyze overhead transmission line based on short medium and long lines.

**Subject Name :** Control System

**Subject Code :** PC-EE-503

**CO Code:** PC-EE-503.CO<NUMBER>

1. Develop mathematical model of mechanical, electrical, thermal, fluid system and different control system components like servomotors, synchros, potentiometer, tacho-generators etc.
2. Analyse stability of LTI system using routh-hurwitz (RH) criteria, root locus techniques in time domain and bode plot and nyquist technique in frequency domain
3. Design different control law or algorithms like proportional control, proportional plus derivative(PD) control, proportional plus integration(PI) control, and proportional plus integration plus derivative (PID) control and compensators like lag, lead, lag-lead for LTI systems.
4. Apply state variable techniques for analysis of linear systems.
5. Analyze the stability of linear discrete system.

- Solve numerical problems on LTI system modelling, responses, error dynamics and stability

**Subject Name :** Power Electronics

**Subject Code :** PC-EE-504

**CO Code:** PC-EE-504.CO<NUMBER>

- Differentiate between signal level and power level devices
- Construct triggering and commutation circuits of SCR
- Explain the principle of operation of AC-DC, DC-DC and DC-AC converters
- Analyse the performance of AC-DC, DC-DC and DC-AC converters
- Apply methods of voltage control and harmonic reduction to inverters
- Solve numerical problems of switching devices, AC-DC, DC-DC and DC-AC converters

**Subject Name :** Renewable & Nonconventional Energy

**Subject Code :** PE-EE-501C

**CO Code:** PE-EE-501C.CO<NUMBER>

- Explain the principle of conversion of solar energy, wind energy, biomass, Geothermal energy, Ocean energy and Hydrogen energy to other form of energy
- Explain the principle of operation of magneto hydrodynamic power generation
- Use Solar energy, Wind energy, Biomass, Geothermal energy, Ocean energy, Hydrogen energy and fuel cell for different applications
- Suggest location to set up wind mill and biogas generation plant
- Estimate conversion efficiency of fuel cell
- Solve numerical problems relating to conversion of Solar energy, Wind energy, Biomass, Ocean energy and Hydrogen energy to heat and electric energy

**Subject Name :** Computer Organization

**Subject Code :** OE-EE-501C

**CO Code:** OE-EE-501C.CO<NUMBER>

- Explain basic structure of digital computer, stored program concept, different arithmetic and control unit operations, operating systems and compiler/assembler, memory and I/O operations
- Differentiate between RISC vs CISC architectures, cache memory, virtual memory
- Perform fixed point multiplication and division
- Apply restoring and non-restoring algorithms, floating point - IEEE 754 standard.
- Design adder, memory unit and control unit, data path for read/write access

**Subject Name :** Electric Machine-II Laboratory

**Subject Code :** PC-EE-591

**CO Code:** PC-EE-591.CO<NUMBER>

- Identify appropriate equipment and instruments for the experiment.
- Test the instrument for application to the experiment.
- Construct circuits with appropriate instruments and safety precautions
- Validate different characteristics of single phase Induction motor, three phase Induction motor, Induction generator and synchronous motor, methods of speed control of Induction motors and parallel operation of the 3 phase Synchronous generator.
- Work effectively in a team.

**Subject Name :** Power System-I Laboratory

**Subject Code :** PC-EE-592

**CO Code:** PC-EE-592.CO<NUMBER>

- Identify appropriate equipment and instruments for the experiment.
- Test the instrument for application to the experiment.
- Construct circuits with appropriate instruments and safety precautions.
- Validate different characteristics of transmission line.
- Determine earth resistance, dielectric strength of insulating oil, breakdown strength of solid insulating material and dielectric constant of transformer oil.
- Analyze an electrical transmission line circuit with the help of software

**Subject Name :** CONTROL SYSTEM LABORATORY

**Subject Code :** PC-EE 593

**CO Code:** PC-EE-593.CO<NUMBER>

1. Identify appropriate equipment and instruments for the experiment.
2. Test the instrument for application to the experiment.
3. Construct circuits with appropriate instruments and safety precautions.
4. Use MAT-Lab control system tool box, MAT-Lab- simulink tool box & PSPICE for simulation of systems.
5. Determine control system specifications of first and second order systems.
6. Validate step response & impulse response for type-0, type-1 & Type-2 system with unity feedback using MATLAB & PSPICE.
7. Work effectively in a team

**Subject Name :** POWER ELECTRONICSLABORATORY

**Subject Code :** PC-EE 594

**CO Code:** PC-EE-594.CO<NUMBER>

1. Identify appropriate equipment and instruments for the experiment.
2. Test the instrument for application to the experiment.
3. Construct circuits with appropriate instruments and safety precautions.
4. Validate characteristics of SCR, Triac, and performance of phase controlled converter, DC-DC converter, inverters and resonant pulse converters.
5. Demonstrate the relation between the speed and firing angle of Universal motor.
6. Work effectively in a team

### 6th Semester

**Subject Name :** POWER SYSTEM-II

**Subject Code :** PC-EE-601

**CO Code:** PC-EE-601.CO<NUMBER>

1. Represent power system components in line diagrams.
2. Determine the location of distribution substation.
3. Determine the performance of power system with the help of load flow studies.
4. Analyse faults in Electrical systems.
5. Determine the stability of Power system.
6. Explain principle of operation of different power system protection equipments.
7. Solve numerical problems related to representation, load flow, faults, stability and protection of power system

**Subject Name :** MICROPROCESSOR & MICROCONTROLLER

**Subject Code :** PC-EE-602

**CO Code:** PC-EE-602.CO<NUMBER>

1. Explain the architecture of 8086 and 8051.
2. Do assembly language programming of 8086, 8051.
3. Interface different peripheral with 8086 and 8051.
4. Develop microprocessor/ microcontroller based systems.
5. Compare microprocessor, microcontroller, PIC and ARM processors

**Subject Name :** DIGITAL CONTROL SYSTEM

**Subject Code :** PE-EE-601A

**CO Code:** PE-EE-601A.CO<NUMBER>

1. Explain the principle of sampling and reconstruction of analog signal.
2. Perform Z-transformation and inverse Z-transformation of systems.
3. Analyse and design digital control systems.
4. Design compensators for digital control system to achieve desired specifications.
5. Represent digital control systems using state space models.
6. Analyze the effect sampling on stability, controllability and observability.

**Subject Name :** POWER QUALITYANDFACTS

**Subject Code :** PE-EE-602B

**CO Code:** PE-EE-602B.CO<NUMBER>

1. Analyse uncompensated AC transmission line.
2. Explain the working principles of FACTS devices and their operating characteristics.

3. Apply FACTS devices for power flow control and stability.
4. Identify different issues of power quality in distribution system.
5. Apply different compensation and control techniques for DSTATCOM.
6. Explain working principle of dynamic voltage restorer and UPQC.

**Subject Name :** COMMUNICATION ENGINEERING

**Subject Code :** OE-EE-601B

**CO Code:** OE-EE-601B.CO<NUMBER>

1. Compare the performance of AM, FM and PM schemes with reference to SNR
2. Explain noise as a random process and its effect on communication receivers
3. Evaluate the performance of ASK, FSK, PSK, BPSK, QPSK in a digital communication system
4. Identify source coding and channel coding schemes for a given communication link
5. Analyze various digital modulation methods
6. Compute band width requirement and probability of error in various digital modulation systems

**Subject Name :** ECONOMICS FOR ENGINEERS

**Subject Code :** HM-EE-601

**CO Code:** HM-EE-601.CO<NUMBER>

1. Evaluate the economic theories, cost concepts and pricing policies.
2. Explain the market structures and integration concepts.
3. Apply the concepts of financial management for project appraisal.
4. Explain accounting systems, the impact of inflation, taxation, depreciation.
5. Analyze financial statements using ratio analysis.
6. Explain financial planning, economic basis for replacement, project scheduling, legal and regulatory issues applied to economic investment and project-management problem.

**Subject Name :** Power System-II Laboratory

**Subject Code :** PC-EE-691

**CO Code:** PC-EE-691.CO<NUMBER>

1. Identify appropriate equipment and instruments for the experiment
2. Test the instrument for application to the experiment
3. Construct circuits with appropriate instruments and safety precautions
4. Validate the characteristics of under voltage relay, over current relay, earth fault relay, on load
5. time delay relay, off load time delay relay, CT and PT
6. Validate protection schemes of transformer, generator, motor and feeder
7. Apply software tools to find bus voltage, currents and power flows throughout the electrical system
8. work effectively in a team

**Subject Name :** Microprocessor & Microcontroller Laboratory

**Subject Code :** PC-EE-692

**CO Code:** PC-EE-692.CO<NUMBER>

1. Identify appropriate equipment and instruments for the experiment
2. Test the instrument for application to the experiment
3. Construct circuits with appropriate instruments and safety precautions
4. Program 8086 for arithmetic operation, sorting of array, searching for a number in a string and string manipulation
5. Interface ADC/DAC, 8255, 8251 to 8086 and LCD, keyboard to 8051
6. Program 8051 using arithmetic, logical and bit manipulation instructions of 8051
7. Work effectively in a team

**Subject Name :** Electrical & Electronic Design Laboratory

**Subject Code :** PC-EE-681

**CO Code:** PC-EE-681.CO<NUMBER>

1. Explain basic concept of measurement, noise in electronic system, sensor and signal conditioning circuits
2. Implement PC based data acquisition systems
3. Construct circuits with appropriate instruments and safety precaution

4. Design heating elements, air core grounding reactor, power distribution system for small
5. Township, double circuit transmission line and Electric machines
6. Do wiring and installation design of a multi-storied residential building with lift and pump
7. Design electronic hardware for controller of lift, speed of AC/DC motor, and for an application with analog, digital, mixed signal, microcontroller and PCB

### 7th Semester

**Subject Name :** Electric Drive Laboratory

**Subject Code :** PC-EE-701

**CO Code:** PC-EE-701.CO<NUMBER>

1. Explain the principle of operation of Electric Drive
2. Describe different methods of starting and braking of Electric Drive.
3. Model and control DC Drive.
4. Control speed of Induction and Synchronous motors.
5. Recommend drives for different applications.
6. Estimate ratings, variables and parameters of Electric Drives.

**Subject Name :** POWER GENERATION ECONOMICS

**Subject Code :** PE-EE 701C

**CO Code:** PE-EE-701C.CO<NUMBER>

1. Explain the different terms e.g. load factor etc for economics of generation.
2. Apply different types of tariff for electricity pricing.
3. Optimize the operation of power system with unit commitment.
4. Determine generation levels such that the total cost of generation becomes minimum for a defined level of load.
5. Determine the state of the system given by the voltage magnitudes and phase angles at all buses.
6. Predict the power or energy needed to balance the supply and load demand at all the times.

**Subject Name :** ARTIFICIAL INTELLIGENCE

**Subject Code :** OE-EE-701A

**CO Code:** OE-EE-701A.CO<NUMBER>

1. Explain the concept of knowledge representation and predicate logic and transform the real life information in different representation.
2. Describe state space and its searching strategies.
3. Demonstrate proficiency in applying scientific method to models of machine learning.
4. Apply the machine learning concepts in real life problems.
5. Demonstrate an ability to share in discussions of AI, its current scope and limitations, and societal implications.

**Subject Name :** EMBEDDED SYSTEM

**Subject Code :** OE-EE-702A

**CO Code:** OE-EE-702A.CO<NUMBER>

1. Discuss the definition, purpose, application, classification, quality characteristics and attributes of Embedded Systems.
2. Explain the internal structure of the Embedded system.
3. Interface IO devices and other peripherals with micro controllers in Embedded systems.
4. Write programs for Micro controllers in Embedded systems.
5. Apply the concept of Embedded firmware in design of Embedded systems.
6. Design RTOS based Embedded systems.

**Subject Name :** PRINCIPLE OF MANAGEMENT

**Subject Code :** HM-EE 701

**CO Code:** HM-EE-701.CO<NUMBER>

1. Explain the concepts and approaches of management.
2. Demonstrate the roles, skills and functions of management.
3. Diagnose and solve organizational problems.

4. Identify the complexities associated with management of human resources in the organizations and integrate the learning in handling these complexities.
5. Apply different methods of Customer, Operation and Technology management.
6. Acquire skills of good leader in an organization.

**Subject Name :** Electric Drive Laboratory

**Subject Code :** PC-EE-791

**CO Code:** PC-EE-791.CO<NUMBER>

1. Identify appropriate equipment and instruments for the experiment
2. Test the instrument for application to the experiment.
3. Construct circuits with appropriate instruments and safety precautions.
4. Apply different methods of control of Electric Drive in the laboratory
5. Analyse experimental data obtained in the laboratory
6. Work effectively in a team

**Subject Name :** Project Stage-I

**Subject Code :** PW-EE-781

**CO Code:** PW-EE-781.CO<NUMBER>

1. Participate in the projects in industries during his or her industrial training
2. Describe use of advanced tools and techniques encountered during industrial training and visit
3. Interact with industrial personnel and follow engineering practices and discipline prescribed in industry
4. Develop awareness about general workplace behavior and build interpersonal and team skills
5. Prepare professional work reports and presentation

**Subject Name :** Seminar

**Subject Code :** PW-EE-782

**CO Code:** PW-EE-782.CO<NUMBER>

1. Participate in the projects in industries during his or her industrial training
2. Describe use of advanced tools and techniques encountered during industrial training and visit
3. Interact with industrial personnel and follow engineering practices and discipline prescribed in industry
4. Develop awareness about general workplace behavior and build interpersonal and team skills
5. Prepare professional work reports and presentation

### 8th Semester

**Subject Name :** UTILIZATION OF ELECTRIC POWER

**Subject Code :** PC-EE-801

**CO Code:** PC-EE-801.CO<NUMBER>

1. Explain the fundamentals of illumination and different lighting schemes.
2. Explain the fundamental of Electrolytic processes, Electric heating and Welding
3. Able to select appropriate lighting, heating and welding techniques for specific applications.
4. Apply different electrolysis process for different applications.
5. Explain the principle of different aspect of Electric traction and control of traction motor.

**Subject Name :** POWER SYSTEM DYNAMICS AND CONTROL

**Subject Code :** PE-EE 801B

**CO Code:** PE-EE-801B.CO<NUMBER>

1. Explain the model of power system components.
2. Select the appropriate model for required analysis.
3. Analyze the performance of the system with small signal analysis.
4. Evaluate the stability of the single and multi-machine systems.
5. Develop measures for enhancing the stability of the system.
6. Solve numerical problems of linear dynamical system, modeling of different components and stability.

**Subject Name :** SENSORS AND TRANSDUCERS

**Subject Code :** OE-EE 801D

**CO Code:** OE-EE-801D.CO<NUMBER>

1. Explain the basic principle of operation of Transducers and Sensors
2. Distinguish different sensors and transducers.
3. Identify suitable transducer by comparing different industrial standards and procedures for measurement of physical parameters
4. Estimate the performance of different transducers.
5. Design real life electronics and instrumentation measurement systems.
6. Apply smart sensors, bio-sensors, PLC and Internet of Things to different applications.

**Subject Name :** Project Stage-II

**Subject Code :** PW-EE-881

**CO Code:** PW-EE-881.CO<NUMBER>

1. Participate in the projects in industries during his or her industrial training.
2. Describe use of advanced tools and techniques encountered during industrial training and visit.
3. Interact with industrial personnel and follow engineering practices and discipline prescribed in industry.
4. Develop awareness about general workplace behavior and build interpersonal and team skills.
5. Prepare professional work reports and presentation.



## Elitte College of Engineering

Approved by AICTE and Affiliated to MAKAUT, West Bengal  
PO: Karnamadhhabpur, PS: Ghola, Sodepur, Kolkata - 700113

### Contact Info

📍 PO: Karnamadhhabpur, PS: Ghola, Sodepur, Kolkata - 700113

☎ Telephone

+91 91633 16560 / +91 98315 00840

✉ Email

info@ece.ac.in

admission@ece.ac.in

### Trust Office

📍 PO: Karnamadhhabpur, PS: Ghola, Sodepur, Kolkata - 700113

☎ Telephone

+91 91633 16560 / +91 98315 00840

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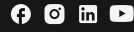
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## Mechanical Engineering

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### Department Overview

#### Vision

To put hard efforts to provide excellent education in Mechanical Engineering to produce technically competent and innovative entrepreneurs and engineers with ethicality suitable for global competence as well as dedicated to the nation.

#### Mission

**M1:** Providing high quality education in the field of Mechanical Engineering to develop ethical future engineers with innovative, entrepreneurs and engineers to face the ever changing competitive environment.

**M2:** Providing students with strong mechanical engineering knowledge base, analytical capability and confidence to face the challenges in intra and interdisciplinary activities suitable to prevailing culture, society and environmental conditions with technological leadership.

**M3:** Imparting the state of the art Mechanical Engineering knowledge to the students and to create wisdom creativeness and everlasting crave for learning and innovation.

**M4:** Creating a relationship between the department and industry for advanced learning and research and also to have sharing of up to date knowledge in the field of Mechanical Engineering mutually thus benefitting each other.

#### Programme Educational Objectives (PEO)

**PEO1:** Have skills to solve the problems by analysis, design, develop and implementation of concept, knowledge and skill leading to optimal solutions fulfilling the dynamic requirement of industry and society.

**PEO2:** Have good understanding of Engineering concepts, making them practicing engineers with sound knowledge of logic and design, in Industries.

**PEO3:** Undertake research in emerging fields in Engineering so as to face the challenges of global challenges in their higher studies and by lifelong learning.

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#### **Program Outcomes (PO)**

Engineering Graduates will be able to:

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**PO1:** Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

**PO2:** Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

**PO3:** Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

**PO4:** Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

**PO5:** Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

**PO6:** The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

**PO7:** Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**PO8:** Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

**PO9:** Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

**PO10:** Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

**PO11:** Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

**PO12:** Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

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#### **Program Specific Outcomes (PSO)**

At the end of the program, the student

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PSO1: Graduates will demonstrate the knowledge of applied mathematics and

advanced software tools for design specification, development such as fabrication, analysis such as testing and operation of the physical systems, components and processes involved in mechanical engineering.

PSO2: Graduates will demonstrate the knowledge, skill and attitude to analyze the cause and effects on machine elements, processes and systems.

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#### Course Outcomes (COs)

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📍 PO: Karnamadhhabpur, PS: Ghola, Sodepur, Kolkata - 700113

📞 Telephone

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## Course Outcomes (COs) of Mechanical Engineering

### Course Outcomes (COs)

On completion of the course students will be able to

#### 1st Semester

**Subject Name : Mathematics –IB**

**Subject Code : BS-M 102**

**CO Code: BS-M 102.CO<NUMBER>**

1. Apply the concept and techniques of differential and integral calculus to determine curvature and evaluation of different types of improper integrals.
2. Understand the domain of applications of mean value theorems to engineering problems.
3. Learn different types of matrices, concept of rank, methods of matrix inversion and their applications.
4. Learn the tools of power series and Fourier series to analyse engineering problems and apply the concept of convergence of infinite series in many approximation techniques in engineering disciplines.
5. Apply the knowledge for addressing the real life problems which comprises of several variables or attributes and identify extremum points of different surfaces of higher dimensions.

**Subject Name : Physics-I**

**Subject Code BS-PH 101**

**CO Code: BS-PH 101.CO<NUMBER>**

1. Apply basic concepts of mechanics
2. Discuss Physical optics and analyze principles of lasers with applications
3. Categorize di electric and magnetic properties of materials leading to Electromagnetic laws
4. Differentiate between Classical Physics and Quantum Physics by introducing Planck's law
5. Apply wave particle duality in real life problems followed by simple quantum mechanics calculations
6. Classify ensembles and differentiate between classical and Quantum statistical mechanics

**Subject Name : Basic Electrical Engineering**

**Subject Code: ES-EE 101**

**CO Code: ES-EE 101.CO<NUMBER>**

1. Understand and analyze basic electric and magnetic circuits.
2. Study the working principles of electrical machines and power converters.
3. Introduce the components of low voltage electrical installations.
4. Understand the general structure of electrical power system.
5. Understand the construction and operation of single-phase transformer.

6. Explain the working principle of power converters.

**Subject Name : Physics-I Lab.**

**Subject Code BS-PH 191**

**CO Code: BS-PH 191.CO<NUMBER>**

1. Observe and read data in slide calliper's, screw gauge. Calculate different modulus of elasticity to apply basic knowledge Physics of Elasticity and apply viscosity principle of streamline motion of water to calculate its viscosity coefficient required in fluid mechanics.
2. Arrange sequential connection in electrical experiment to verify principles of Kirchhoff's law to verify passive elements of electrical circuit.
3. Operate optical instruments to illustrate physical properties of light and to observe spectral lines of light to verify medium specific characteristics. Calculate Rydberg constant by studying Hydrogen spectrum to visualize visible spectra and to assess this empirical fitting parameter as a fundamental physical constant.
4. Determine Band Gap and Hall coefficient of a given intrinsic semiconductor and distinguish between different intrinsic semiconductors. Determine the dielectric constant of different capacitors to correlate their usage like insulator and limitation of their usage as a dielectric material.
5. Apply concepts of quantum mechanics to verify Bohr's atomic orbital theory.
6. Determine Planck's constant and Stefan's constant applying modern Physics.

**Subject Name : Basic Electrical Engineering Lab.**

**Subject Code: ES-EE 191**

**CO Code: ES-EE 191.CO<NUMBER>**

1. Calibrate Ammeter and Wattmeter.
2. Demonstrate the measuring instrument and electrical machines.
3. Conduct open circuit and short circuit test of single-phase transformer.
4. Measure 3 phase power using two wattmeters.
5. Identify the components of LT switchgear.
6. Understand the characteristic of RLC series and parallel circuit.

**Subject Name : Workshop.**

**Subject Code: ES-ME 192**

**CO Code: ES-ME192.CO<NUMBER>**

1. Understanding the application of hand tools and machinetools.
2. Comprehend the safety measure required to be taken while using the tools.
3. Select the appropriate tools required to manufacture an object of predetermined shape and size considering least wastage and cost.
4. Fabricate components with their own hands.
5. Practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.
6. Produce small device of their interest, by assembling different components.

## 2nd Semester

**Subject Name : Chemistry-I.**

**Subject Code: BS-CH 201**

**CO Code: BS-CH 201.CO<NUMBER>**

1. Apply first and second law of thermodynamics to different chemical and physical processes under specified condition to determine the equilibrium condition, spontaneity and thermo-chemical behavior of a reaction.
2. using the concept of conductance of ions analyze the design and working principle of different electrochemical cells.
3. Derive rate of a reaction at a specified temperature under different medium.
4. Explain the mechanism considering the structure of the molecules and type of electronic effect present in them.

5. Analyze different types of fuels for industrial application.
6. Distinguish different types of polymer for diverse application.

**Subject Name : Mathematics –IIA**

**Subject Code: BS-M201**

**CO Code: BS-M201.CO<NUMBER>**

1. Learn the basic mathematical tools to deal with problems of Engineering sciences.
2. Understand properties and application of Linear Algebra, Ordinary Differential Equations (ODE) and numerical analysis.
3. Analyze of physical or engineering problems.
4. Acquire problem solving skills related to engineering science.
5. Apply Linear Algebra, Ordinary Differential Equations (ODE) and Numerical analysis in real life problems.
6. Classify ensembles and differentiate among Linear Algebra, Ordinary Differential Equations (ODE) and numerical analysis.

**Subject Name : Mathematics –IIB**

**Subject Code: BS-M202**

**CO Code: BS-M202.CO<NUMBER>**

1. Learn the methods for evaluating multiple integrals and their applications to different physical problems.
2. Understand different techniques to solve first and second order ordinary differential equations with its formulation to address the modeling of systems and problems of engineering sciences.
3. Learn different tools of differentiation and integration of functions of a complex variable that are used with various other techniques for solving engineering problems.
4. Apply different types of transformations between two 2- dimensional planes for analysis of physical or engineering problems.

**Subject Name : Programming for ProblemSolving**

**Subject Code: ES-CS201**

**CO Code: ES-CS201.CO<NUMBER>**

1. Analyze the problem and formulate algorithms for them.
2. Translate the algorithms to programs (in C language).
3. Understand the correct syntax of logical expression, branch instruction, iteration,
4. Apply array and pointer to solve problem.
5. Understand the use of , function, recursion.
6. Build analytical skill.

**Subject Name : English**

**Subject Code: HM-HU201**

**CO Code: HM-HU201.CO<NUMBER>**

1. Understand and apply English Speech Sounds for enhancing English Communication
2. Apply English Language Presentation Skill in Academic and in Professional Communication
3. Apply Receptive Skills of English in Academics and in Engineering Profession
4. Apply Writing Skill of English in Academics and in Profession
5. Apply Grammar Skill of English in Academic and in Professional Communication
6. Apply Critical Thinking Skill of English in Academic and in professional Communication

**Subject Name : Chemistry-I**

**Subject Code: BS-CH291**

**CO Code: BS-CH291.CO<NUMBER>**

1. Determine some physical parameter like viscosity of a solution and rate constant of a reaction
2. Determine the strength of an acid using conductometric method.
3. Determine the strength of an acid using pH metric method.
4. Determine partition coefficient of a compound
5. Estimate the amount of an ion present in a given solution using permanganometric and argentometric methods.

- Evaluate alkalinity (in terms of CaCO<sub>3</sub> equivalent), hardness (in ppm) and amount of dissolved oxygen (in mg/l) present in a given water sample using volumetric method.

**Subject Name : Programming for Problem Solving****Subject Code: ES-CS291****CO Code: ES-CS291.CO<NUMBER>**

- Analyze the problem and formulate algorithms for them.
- Translate the algorithms to programs (in C language).
- Understand the correct syntax of logical expression, branch instruction, iteration,
- Apply array and pointer to solve problem.
- Understand the use of , function, recursion.
- Build analytical skill.

**Subject Name : Engineering Graphics & Design****Subject Code: ES-ME291****CO Code: ES-ME291.CO<NUMBER>**

- Understand the applications of hand tools and machine tools.
- Comprehend the safety measures required to be taken while using the tools.
- Select the appropriate tools required to manufacture an object of predetermined shape and size considering least wastage and cost.
- Fabricate components with their own hands.
- Confident on practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.
- Produce small devices of their interest by assembling different components.

**Subject Name : Language Laboratory****Subject Code: HM-HU291****CO Code: HM-HU291.CO<NUMBER>**

- Understand and apply English Speech Sounds for enhancing English Communication
- Apply English Language Presentation Skill in Academic and in Professional Communication
- Apply Receptive Skills of English in Academics and in Engineering Profession
- Apply Writing Skill of English in Academics and in Profession
- Apply Grammar Skill of English in Academic and in Professional Communication
- Apply Critical Thinking Skill of English in Academic and in professional Communication

**3rd Semester****Subject Name : BS-M301****Subject Code : Mathematics III****CO Code : BS-M301.CO<Number>**

- Apply gradient, divergence & curl to scalar and vector point functions and also physically interpret their meaning.
- Apply the concepts of Vector calculus & the corresponding theorems to evaluate line, surface and flux integrals
- Solve both first & higher order partial differential equations by different techniques and apply to two dimensional heat conduction equations, vibrations of a string etc.
- Apply infinite Fourier series to represent discontinuous function which occurs in signal processing & electrical circuits.
- Apply the principles of Fourier transforms to Boundary value problems.

**Subject Name : BIOLOGY****Subject Code : BS-BIO 301****CO Code : BS-BIO 301.CO<Number>**

- Describe** how biological observations of 18th Century that lead to major discoveries.
- Find** that classification per se is not what biology is all about but highlight the underlying criteria, such as morphological, biochemical and ecological

3. **Classify** the concepts of recessiveness and dominance during the passage of genetic material from parent to offspring.
4. **Examine** that all forms of life have the same building blocks and yet the manifestations are as diverse as one can imagine and Analyse biological processes at the reductionistic level
5. **Justify** enzymes and distinguish between different mechanisms of enzyme action and Apply thermodynamic principles to biological systems
6. **Identify** DNA as a genetic material in the molecular basis of information transfer and microorganisms

**Subject Name : Basic Electronics Engineering**

**Subject Code : ES-ECE301**

**CO Code : ES-ECE301.CO<Number>**

1. **Understand** the principles of semiconductor devices and their applications
2. **Understanding** the operating principle and output characteristics of pn junction diodes, zener diode, rectifiers and different diode circuits. BJT.
3. **Design** an application using Operational amplifier
4. **Understand** the working of timing circuits and oscillators
5. **Understand** logic gates, flip flop as a building block of digital systems.
6. **Learn** the basics of Electronic communication system

**Subject Name : Engineering Mechanics**

**Subject Code : ES-ME301**

**CO Code : ES-ME301.CO<Number>**

1. To calculate Forces and Moments acting on the given statically determinant Structure & support reaction by using of concept of Free Body Diagram (FBD).
2. To explain Friction, limiting friction, static and dynamic friction, wedge friction
3. To analysis of having structure like trusses, beams and frames
4. To determine centroid, centre of gravity, moment of inertia for both area and mass of the given lamina and solid- standard and composite
5. To illustrate the stability of an equilibrium and equilibrium of rigid body using the concept of virtual work and energy method
6. To calculate the velocity, acceleration, dynamics forces acting on practical and rigid bodies under rectilinear and curve linear motion.

**Subject Name : Thermodynamics**

**Subject Code : PCME301**

**CO Code : PC-ME301.CO<Number>**

1. Explain the fundamental thermodynamic properties to solve the problems involving thermodynamic properties viz. Internal energy, enthalpy, entropy, temperature, pressure and specific volume etc
2. Interpret the phases of the pure substances from their thermodynamic properties
3. Evaluate changes in thermodynamic properties of pure substances.
4. Apply the first and second law of thermodynamics to the thermodynamic process, cycles and devices.
5. Analyse thermodynamic systems using entropy and exergy.
6. Understand the basics of Vapour power cycles and Gas Power cycles.

**Subject Name : Manufacturing Processes**

**Subject Code : PCME302**

**CO Code : ES-ME302.CO<Number>**

1. Describe the fundamental principles and concepts of various manufacturing processes used in industry.
2. Apply the knowledge of metal casting principles to effectively address shrinkage, casting defects, and residual stresses in manufacturing.
3. Explain the fundamentals of hot and cold working and Estimate loads and forces involved in bulk forming and sheet forming processes.
4. Apply the principles of orthogonal machining, chip formation and tool geometry in machining operations for improved tool performance and surface finish.
5. Examine the various force components involved in machining to address tool wear, and tool life
6. Discuss the physics behind welding, brazing, and soldering processes.

**Subject Name : Practice of Manufacturing Processes**

**Subject Code : PCME391**

**CO Code : PC-ME391.CO<Number>**

1. Practice pattern & mould making
2. Illustrate the fitting operation using hand tools

3. Perform basic forging processes
4. Perform sheet metal works
5. Practice GMAW, SMAW & Gas Welding
6. Demonstrate machining of typical products involving lathe, milling/shaping/machines

#### 4th Semester

**Subject Name : Materials Engineering**

**Subject Code : ES-ME401**

**CO Code : ES-ME401.CO<Number>**

1. **Analyze** and classify crystal structures and imperfections in solids using unit cells and defect mechanisms.
2. **Evaluate** mechanical properties of materials through testing methods and understand their relationships, including stress-strain curves, hardness, and strength.
3. **Apply** static failure theories and fracture mechanics to predict failure modes and analyze fatigue behaviour and nondestructive testing methods.
4. **Interpret** phase diagrams and microstructures in alloys, including the iron carbide phase diagram and micro structural aspects of the given steel types.
5. **Apply** heat treatment techniques to control microstructure development in steel and understand the effects on properties.
6. **Examine** the properties and applications of alloyed steels, cast irons, copper alloys, aluminium alloys, nickel-based super alloys, and titanium alloys.

**Subject Name : Applied Thermodynamics**

**Subject Code : PC-ME401**

**CO Code : PC-ME401.CO<Number>**

1. **ANALYSE** reacting systems using mass, energy and entropy balance and to determine chemical equilibrium composition.
2. **ILLUSTRATE** vapour power cycles, gas power cycles and vapour compression refrigeration cycles.
3. **USE** psychrometric processes in real world air-conditioning systems. **PCME401.CO4: EXPLORE** the compressible fluid flow through nozzles, diffusers etc
4. **UNDERSTAND** the operation of reciprocating compressors and to determine its performances.
5. **ANALYSE** steam turbines thermodynamically.

**Subject Name : Fluid Mechanics and Fluid Machines**

**Subject Code : PCME 402**

**CO Code : PC-ME402.CO<Number>**

1. **UNDERSTAND** the fluid properties and conservation laws in fluid mechanics
2. **APPLY** the conservation laws in fluid flow system
3. **EVALUATE** pressure drop in pipe flow using Hagen- Poiseuli's equation for laminar flow in pipe
4. **DEMONSTRATE** boundary layer concept
5. **ANALYSE** the dimensional analysis in fluid machines and in fluid flow systems
6. Analyse the simple flow situation mathematically and **EVALUATE** the performance of hydraulic machines (Turbine and pump)

**Subject Name : Strength of Materials**

**Subject Code : PC-ME403**

**CO Code : PC-ME403.CO<Number>**

1. **EXPLAIN** the concept of normal and shear stresses and strains and the relation amongst three elastic constants (E, K, G).
2. **Discuss** the bending theory to **CALCULATE** shear force and bending moment.
3. **DETERMINE** the slope and deflection of cantilever, simply supported beams under the given loading conditions (UDL, point load, varying loads).
4. **CALCULATE** the critical load by using the buckling theory of columns.
5. **SOLVE** the parameters (maximum shear stress, diameter, working stress, factor of safety) of the given problem related to torsion of circular shaft, helical springs.
6. **CALCULATE** the hoop and longitudinal stresses in thin/ thick walled cylindrical/ spherical pressure vessels.

**Subject Name : Metrology & Instrumentation**

**Subject Code : PC-ME404**

**CO Code : PC-ME404.CO<Number>**

1. **Understand** the working of linear and angular measuring instruments and **Determine** the error and least count

2. **Calculate** the limits, fits and tolerances of the Hole and Shaft system
3. **Apply** measurement techniques to determine the screw thread and surface roughness parameters
4. Acquire an overview of performance characteristics of sensors and transducers for motion and dimension measurement
5. **Demonstrate** the working principle and applications of devices for measurement of force, torque, strain and stress
6. **Interpret** the use of vibration and temperature measuring instruments

**Subject Name : Practice of Manufacturing Processes & system laboratory**

**Subject Code : PCME491**

**CO Code : PC-ME491.CO<Number>**

1. Measure the surface roughness & angles of different jobs
2. Develop simple digital logic circuit using 7400 series ICs.
3. Design and develop simple pneumatic circuits
4. Acquire skill set to use precision length measuring instruments (Micro meter, Vernier, Height Gauge)
5. Determine angles using sign bar & profile protector
6. Assess errors & correction factors of measuring devices (Micro meter, Vernier, Height Gauge)

**Subject Name : Machine Drawing I**

**Subject Code : PC-ME492**

**CO Code : PC-ME492.CO<Number>**

1. **UNDERSTAND** the product symbol of standard components in mechanical, electrical & electronic engineering symbol, welding symbol and pipe joints
2. **DRAW** orthographic projection, sectional and auxiliary sections of given machine components
3. **DRAW** assembly and detailed drawing of different mechanical components and tools such as plumber block, flange coupling etc.
4. **UNDERSTAND** the commands and GUI of AutoCAD software
5. **DRAW** orthographic and isometric projections of given mechanical components by using Auto CAD or similar software

**Subject Name : Environmental Science (Sessional)**

**Subject Code : MC-481(ME)**

**CO Code : MC-481ME.CO<Number>**

1. **Understand** the natural environment and its relationships with human activities.
2. **Apply** the fundamental knowledge of science and engineering to assess environmental and health risk.
3. **Develop** guidelines and procedures for health and safety issues obeying the environmental laws and regulations.
4. **Acquire** skills for scientific problem-solving related to air, water, noise & land pollution.
5. **Apply** the laws and protection act of India for Environmental Management and Environmental Audit.
6. **Analyze** the population growth in different perspectives of environmental scenarios.

### 5th Semester

**Subject Name : Heat Transfer**

**Subject Code : PCME501**

**CO Code : PC-ME501.CO<Number>**

1. **CLASSIFY** the modes of heat transfer.
2. **ANALYSE** steady and unsteady conduction phenomena.
3. **SOLVE** convections problems of laminar and turbulent flow situations.
4. **CALCULATE** radiation heat transfer between surfaces, using radiative properties, view factors etc.
5. **ILLUSTRATE** and design of heat exchangers.
6. **UNDERSTAND** similarities between heat and mass transfer.

**Subject Name :Solid Mechanics**

**Subject Code : PC-ME502**

**CO Code : PC-ME502.CO<Number>**

1. **Understand** the basic tensors, notations of the theory of elasticity including strain/displacement and Hooke's law relationship to solve the practical problems related to the theory of elasticity.
2. **Discuss** derivation of Cauchy's relations, principal stresses and directions.

3. **Determine** plane stress & plane strain of the given axisymmetric problems by using governing equations in cartesian, cylindrical and spherical coordinates.
4. **To Solve** problem by using concept of solid mechanics in thick cylinders, rotating discs, torsion of noncircular cross sections & stress concentration including thermo elasticity & 2D contact stresses.
5. **Examine** the influence the influence of geometric and loading parameters in plain stress and plain strain problems.
6. **To Solve** given structural problems by applying the concepts of potentials and energy methods and plasticity.

**Subject Name : Kinematics and Theory of Machines**

**Subject Code : PCME503**

**CO Code : PC-ME503.CO<Number>**

1. **ANALYZE** the motion of simple mechanisms in terms of the displacement, velocity and acceleration at any point on a rigid link. Also, determine the degree of freedom of simple mechanisms and their inversions.
2. **SYNTHESIZE** higher pair mechanisms (cam & gear systems) to generate specified output motion.
3. Understand the relative motion of friction surfaces in contact and **APPLY** the knowledge during the design of the machine parts which work on the principle of rolling and sliding friction.
4. Understand basic concepts of vibration and **DETERMINE** vibration parameters related to problems of SDOF vibratory systems (Free, Forced with or without damping).
5. **EXPLORE** rotary and reciprocating unbalanced systems.
6. Understand the working principle of governors, flywheel & gyroscope and **DETERMINE** their operational parameters.

**Subject Name : Humanities I- Effective Technical Communication**

**Subject Code : HM-HU501**

**CO Code : HM-HU501.CO<Number>**

1. **Understand** the dynamics of Verbal and Non Verbal aspects of technical communication
2. Practice multi-step writing process to plan, draft, and revise reports, correspondence, and presentations.
3. **Illustrate** and examine the knowledge of ethical aspects of engineering
4. **Demonstrate** and explain social and professional etiquettes
5. **Plan** self-development and practice self assessment to function on multi-disciplinary teams.
6. **Organize** and write business correspondence properly and correctly, using appropriate formats, grammar, vocabulary, and syntax, and demonstrate effective writing and editing skills.

**Subject Name : Mechanical Engineering Laboratory (Thermal) I**

**Subject Code : PCME 591**

**CO Code : PC-ME591.CO<Number>**

1. **DEMONSTRATE** the operation of fluid flow measuring devices.
2. **CONDUCT** experiments on water turbines and pumps.
3. **DETERMINE** the calorific value of fuels and their flash and fire points.
4. **DETERMINE** the performance parameters of four stroke Diesel engines.
5. **EXAMINE** the thermal conductivity, emissivity and the convective heat transfer coefficient of solid and fluid materials

**Subject Name : Project-I (Summer internship) (Sessional)**

**Subject Code : PW-ME581**

**CO Code : PW-ME581.CO<Number>**

1. Develop the skills, knowledge and points of view needed by engineering professionals
2. Develop critical thinking and problem solving skills by analysing underlying issue/s to challenges
3. Communicate with different professionals in the work environment through written and oral means
4. Exhibit professional ethics by displaying positive disposition during internship

## 6th Semester

**Subject Name : Manufacturing Technology**

**Subject Code : PC-ME601**

**CO Code : PC-ME601.CO<Number>**

1. Illustrate principles of tooling design and selection for conventional and non-conventional machining processes.
2. Use the principle of measurement for tool wear, part quality, and inspection in manufacturing processes.

3. Describe assembly practices, process planning, and material handling in manufacturing and assembly operations.
4. Discuss the understanding of NC/CNC machine tools and systems, including their components, functions, and automation capabilities
5. Write the part programming for CNC lathe and milling machines.
6. Demonstrate rapid prototyping methods and their applications in manufacturing

**Subject Name : Design of Machine Elements**

Subject Code : PC-ME602

CO Code : PC-ME602.CO&lt;Number&gt;

1. Understand the failure criteria, concept of mechanics of materials, empirical design formula & safety considerations, codes & standards for design
2. Analyse permanent and temporary joints viz. riveted joints, welded joints and bolted joints based on design aspect
3. Analyse design of shafts, belts, gears, chains and pulleys.
4. Solve design problems on spring, cotter joint, knuckle joint based on optimum criteria.
5. Determine optimum design of Coupling, brakes and screw jack based on friction principle.
6. Apply knowledge of design principles and calculations to design springs, clutches and bearings.

**Subject Name : Internal Combustion Engines & Gas Turbines**

Subject Code : PEME601A

CO Code : PE-ME601A.CO&lt;Number&gt;

1. **UNDERSTAND** the basic concepts, components and operations of IC Engines.
2. **ILLUSTRATE** the process of carburation and ignition of SI Engines and injections of CI Engines.
3. **DESCRIBE** the conventional and alternative fuels and combustion phenomena in SI and CI engines.
4. **EVALUATE** the performance parameters of IC engines.
5. **CLASSIFY** the essential components of gas turbines along with its performance improving methods (inter cooling, reheating and regenerating).
6. **ILLUSTRATE** the working principles of various types jet propulsive rockets.

**Subject Name : Refrigeration and Air- Conditioning**

Subject Code : PEME601B

CO Code : PE-ME601B.CO&lt;Number&gt;

1. **Analyze** the reversed Carnot cycle and vapour compression refrigeration cycle (VCR).
2. **Select** the air-refrigeration systems for aircraft, and vapour absorption refrigeration system for rural and remote areas and select environmental friendly refrigerants considering the international standards.
3. **Identify** the Psychometric processes for different applications and design the parameters of air conditioning system as per standards.
4. **Understand** the human comfort, ASHRAE chart and concept of effective temperature.
5. **Estimate** cooling load and heating load considering human comfort and optimize the air conditioning system as per requirements.

**Subject Name : Material Handling**

Subject Code : PEME602I

CO Code : PE-ME602AI.CO&lt;Number&gt;

1. **Explain** the scope of materials and spare parts management in an organization.
2. **Explain** the key characteristics of the purchasing system.
3. **Apply** the policies of Inventory Management and Develop overall materials requirement plan.
4. **Explain** the ERP System for Materials management.
5. **Understand** the importance of warehouse and supplier development in materials management.

**Subject Name : Robotics**

Subject Code : PEME602H

CO Code : PE-ME602H.CO&lt;Number&gt;

1. **Demonstrate** knowledge of industrial robots, characteristics, end effectors and actuator
2. To **understand** the significance, social impact and future prospects of robotics and automation in various engineering applications.
3. To **Identify** and describe the components and anatomy of robotic system.
4. To **Know** about various path planning techniques and analyze different motions of robotics system.
5. **Use** the suitable drives and end-effectors for a given robotics application.
6. **Apply** robotics concept to automate the monotonous and hazardous tasks and categorize various types of robots based on the design and applications in real world scenarios.

**Subject Name : Humanities II (Operations Research)**

**Subject Code : HMHU601**

**CO Code : HMHU601.CO<Number>**

1. To understand the methodology of OR problem solving and formulate linear programming problem.
2. To develop formulation skills in transportation models and finding solutions
3. To understand the basics in the field of game theory and assignment problems
4. To know how project management techniques help in planning and scheduling a project \
5. To know the basics of dynamic programming and simulation.

**Subject Name : Project-II (Summer internship)**

**Subject Code : PW-ME681**

**CO Code : PW-ME681.CO<Number>**

1. **Develop** the skills, knowledge and points of view needed by engineering professionals
2. **Develop** critical thinking and problem solving skills by analysing underlying issue/s to challenges
3. **Communicate** with different professionals in the work environment through written and oral means.
4. **Exhibit** professional ethics by displaying positive disposition during internship

**Subject Name : Mechanical Engineering Laboratory II (Design)**

**Subject Code : PC-ME691**

**CO Code : PC-ME691.CO<Number>**

1. **DEMONSTRATE** kinematic characteristics of mechanisms (Cam-Follower, 4 BAR linkages)
2. **ANALYZE** rotating balancing problem and vibration characteristics of different un damped and damped system (free, forced)
3. **CONDUCT** the experiment of hardness and toughness of given materials and apply them practically
4. **DETERMINE** elastic parameters of given materials in tension/compression and in shear test
5. **PREPARE** standard metallographic heat treated samples for the given engineering materials to examine microstructure.
6. **MEASURE** strain of the given materials by using strain gauge rosettes.

## 7th Semester

**Subject Name : Advanced Manufacturing Technology**

**Subject Code : PC-ME701**

**CO Code : PC-ME701.CO<Number>**

1. **Identify** different non traditional machining processes and their applications.
2. **Describe** the basic working principles and mechanism of metal removal in ultrasonic machining and Abrasive jet machining and assess its effectiveness in various applications
3. **Apply** the knowledge of process parameters, tool selection, and working medium to achieve desired MRR and accuracy in ECM & EDM
4. **Illustrate** the characteristics and applications of laser beam machining, electron beam machining, ion beam machining, and plasma arc machining.
5. **Discuss** the working principles, process variables, and performance of advanced finishing processes such as abrasive flow machining (AFM), magnetic abrasive finishing (MAF), and chemo mechanical polishing.
6. **Describe** the principles of micromachining, including chip formation and size effect, and identify the challenges associated with micromachining and its applications

**Subject Name : Advanced Welding Technology**

**Subject Code : PE-ME701H**

**CO Code : PC-ME701H.CO<Number>**

1. **Understand** the principles and characteristics of various welding processes and their parametric influences.
2. **Discuss** appropriate welding techniques and joint design for different types of materials and welding processes.
3. **Apply** the knowledge of power sources, polarity, and electrode characteristics for the selection of suitable arc welding technique.
4. **Explain** critical and precision welding processes, such as USW, PAW, LBW, and EBW, in terms of their advantages and limitations.
5. **Assess** the weldability of different materials, including plain carbon steel, stainless steel, cast iron, and aluminium alloys, based on their metallurgical properties and behaviour during welding.

6. **Identify** common welding defects, understand their causes and remedies, and Select appropriate inspection and testing methods for welded joints.

**Subject Name : Automobile Engineering**

**Subject Code : PEME701A**

**CO Code : PC-ME701A.CO<Number>**

1. **Understand** the basic lay-out of an automobile and engines for two-wheelers, three wheelers, four wheelers, & other passenger and commercial vehicles.
2. **Explain** the operation of engine cooling, lubrication, ignition, electrical, electronics and air conditioning systems.
3. **Illustrate** the principles of transmission, suspension, steering and braking systems and construction of wheels and tyres.
4. **Determine** the tractive effort and power requirements & learn the use of torque-speed curve.
5. **Learn** automobile restraint system.
6. **Know** the latest developments in automobiles.

**Subject Name : Non Conventional Energy Source**

**Subject Code : OE-ME 701D**

**CO Code : OE-ME701D.CO<Number>**

1. Describe the environmental aspects of non-conventional energy resources. In Comparison with various conventional energy systems, their prospects and limitations.
2. Know the need of renewable energy resources, historical and latest developments.
3. Describe the use of solar energy and the various components used in the energy production with respect to applications like-heating, cooling, desalination, power generation, drying, cooking etc
4. Appreciate the need of Wind Energy and the various components used in energy generation and know the classifications
5. Understand the concept of Biomass energy resources and their classification, types of biogas Plants applications
6. Acquire the knowledge of fuel cells, wave power, tidal power and geothermal principles and Applications

**Subject Name : Economics for Engineers**

**Subject Code : HM-HU 701**

**CO Code : HM-HU701.CO<Number>**

1. **EXPLAIN** principles of decision making in fixed and variable cost, life cycle cost, estimating models, improvement and learning curve.
2. **ANALYZE** economic conditions viz. inflation, deflation, economic criterion and present worth.
3. **ANALYZE** cash flow, rate of return, cost ratio, and break even analysis.
4. **UNDERSTAND** depreciation, types of property, tax regulation and capital allowance.
5. **DESCRIBE** inflation, price change, types of index and use of price index.
6. **UNDERSTAND** accounting, balance sheet, income statement, cost accounting, direct and indirect cost.

**Subject Name : Mechanical Engineering Laboratory III (Manufacturing)**

**Subject Code : PC-ME791**

**CO Code : PC-ME791.CO<Number>**

1. **Perform** Part Programming on CNC Lathe for Multi Stepped Shaft & Single Stepped Shaft with Round End.
2. **Apply** Part Programming on CNC Milling for Single Slot, Curve Slot and Square Loop.
3. **Demonstrate** various axes movement of vertically articulated robot arm.
4. **Determine** cutting forces in turning by using Dynamometer
5. **Conduct** experiment in MMA welding and Examine dye penetration test for determination of welding joint defect.
6. **Determine** fineness number, AFS clay content and permeability number of moulding sand.

**Subject Name : Project III (Sessional)**

**Subject Code : PWME 781**

**CO Code : PW-ME781.CO<Number>**

1. Selecting topic of the project & Generating its objectives
2. Practice finding relevant course material on the Internet and non-electronic sources
3. Preparing work plan and Preliminary report
4. Preparing presentation and explaining it to the audience
5. Selecting topic of the project & generating its objectives

### 8th Semester

**Subject Name : Total Quality Management**

**Subject Code : OE ME 801A**

**CO Code : OE-ME801A.CO<Number>**

1. To **Understand** the fundamental principles of Total Quality Management.
2. To get **Familiarized** with the basic concept and framework of Total Quality management.
3. To **Understand** the contribution of Quality Gurus in TQM Journey.
4. To **Grasp** the nature and importance of various components that constitutes TQM.
5. To **Describe** and discuss the role of techniques used in TQM.
6. To **Develop** research skills that will allow them to keep abreast of changes in the field of Total Quality Management

**Subject Name : Power Plant Engineering**

**Subject Code : PEME 801B**

**CO Code : PE-ME801B.CO<Number>**

1. **Analyze** the vapour power cycles and their modifications
2. **Understand** boilers & calculate its performance parameters.
3. **Analyze** the combustion phenomenon of fuels.
4. **Determine** the performance parameters of steam nozzles and steam turbines.
5. **Illustrate** and Design the condensers and cooling towers.
6. **Determine** power plant economic parameters and know about the Diesel and gas plants, pollution and its control.

**Subject Name : Energy Conservation and Management**

**Subject Code : OE ME 802E**

**CO Code : OE-ME802E.CO<Number>**

1. Apply energy conservation policy, regulations in industrial practices.
2. Recognize opportunities for enabling rational use of energy
3. Evaluate energy economics.
4. Apply knowledge of Energy Conservation Opportunities in a range of contexts.
5. Develop innovative energy efficiency solutions and demand management strategies.
6. Analyze the thermal systems for energy efficiency.

**Subject Name : Maintenance Engineering**

**Subject Code : PE ME 802I**

**CO Code : PE-ME802I.CO<Number>**

1. **UNDERSTAND** maintenance systems through condition monitoring; Maintainability, failure pattern, availability of equipment / systems and design for maintainability.
2. **ANALYZE** the Total Productive Maintenance (TPM).
3. **UNDERSTAND** the Organizational structures for maintenance.
4. **ANALYZE** the Economic Aspect of Maintenance.
5. **UNDERSTAND** the Function and use of Maintenance Equipment.
6. **UNDERSTAND** the lubrication, Repair & Maintenance Procedures

**Subject Name : Project-IV (Sessional)**

**Subject Code : PWME 881**

**CO Code : PW-ME881A.CO<Number>**

1. **DEMONSTRATING** qualitative solutions to research/industry problems involving contemporary issues.
2. **FORMULATING** hypothesis/design/methodology
3. **ACQUIRING** the knowledge of the techniques, skills, and modern engineering tools necessary for Mechanical Engineering practice
4. **PRESENTING** features of the developed project to the targeted group through written and oral communication.
5. **CONTRIBUTING** in a team in development of technical seminar.

**Subject Name : Comprehensive Viva-Voce (Sessional)**

**Subject Code : PW-ME882**

**CO Code : PW-ME882.CO<Number>**

1. **Demonstrate** systematic understanding of knowledge related to 4 years study of B. Tech. in ME
2. **Apply** critical thinking skills to analyze and evaluate complex engineering problems.
3. **Demonstrate** effective communication skills in presenting technical concepts and ideas to both technical and non-technical audiences.

4. **Demonstrate** confidence and versatility in answering the varieties of questions posed by a group of interviewer in a moderately short duration.



## Elite College of Engineering

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PO: Karnamadhhabpur, PS: Ghola, Sodepur, Kolkata - 700113

### Contact Info

📍 PO: Karnamadhhabpur, PS: Ghola, Sodepur, Kolkata - 700113

📞 Telephone

+91 91633 16560 / +91 98315 00840

✉ Email

info@ece.ac.in

admission@ece.ac.in

### Trust Office

📍 PO: Karnamadhhabpur, PS: Ghola, Sodepur, Kolkata - 700113

📞 Telephone

+91 91633 16560 / +91 98315 00840

### Admission Enquiry

📞 Telephone

+91 91633 16560 / +91 98315 00840

✉ Email

info@ece.ac.in

admission@ece.ac.in

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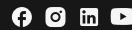
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### Department Overview

#### Vision

To be a centre of excellence in emerging areas of business management education through teaching, learning and research in a manner to exceed the expectations of all our stakeholders in general and society/ community at large.

#### Mission

**M1:** To create an environment of academic excellence ,research and innovation, beneficial to student, faculty and stakeholders.

**M2:** To develop a practice – oriented knowledge, skill and attitude to meet the needs of the emerging areas of social economic environment.

**M3:** To transform of our student by encouraging high quality research, teaching and industry institute interaction.

**M4:** To develop competencies among student by proving exposure of advanced areas of knowledge through teaching and learning processes.

**M5:** To enhance employability and provide adequate opportunities for gainful employment.

**M6:** To foster a collaborative learning environment to create ethical and value based learning to create socially responsible managers.

**M7:** To impart advanced management concepts and skill by adopting application based pedagogy

**M8:** To enhance employability and provide adequate opportunities for

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**Programme Educational Objectives (PEO)**

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**PEO1:** To train the students of the Management program for logical and practical approach to problem solving and function effectively as skilled managers who can respond to changing environment in a social and global context.

**PEO2:** To groom the students to work in multicultural and multidisciplinary teams for effective problem solving and understand the principles of group dynamics, Team work and growth of Management profession.

**PEO3:** To encourage and train the students as a way that they can pursue higher studies, start independent ventures, thereby contributing to the fields of Education and Business world.

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**Program Outcomes (PO)**

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Engineering Graduates will be able to:

**PO1:** Ability to apply Management fundamentals in practical world.

**PO2:** An ability to identify, formulate, and solve Managerial problems.

**PO3:** Demonstrate abilities such as initiative taking and innovative thinking in their acts.

**PO4:** An ability to function in multi-disciplinary teams.

**PO5:** To inculcate zeal of self-learning.

**PO6:** Enhancing Entrepreneurship abilities so that the students are induced to undertake independent ventures.

**PO7:** An ability to understand professional and ethical responsibility.

**PO8:** An ability to communicate effectively.

**PO9:** Enhancing knowledge of contemporary issues.

**PO10:** Recognition of the need for, and an ability to engage in life-long learning.

**PO11:** An ability to understand the impact of Managerial solutions in a global, economic, environmental, and societal context.

**PO12:** Ensuring holistic development of students.

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**Program Specific Outcomes (PSO)**

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At the end of the program, the student

**PSO1:** An ability to apply conceptual foundations of management to solve practical decision-making problems.

**PSO2:** An ability to adapt to dynamic changes in an environment with an understanding of societal and ecological issues relevant to professional managerial practice through life-long learning.

**PSO3:** Excellent adaptability to function in multi-disciplinary work environment, good interpersonal skills as a leader in a team in appreciation of professional ethics and societal responsibilities.

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**Course Outcomes (COs)**

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📍 PO: Karnamadhhabpur, PS: Ghola, Sodepur, Kolkata - 700113

📞 Telephone

+91 91633 16560 / +91 98315 00840

✉ Email

info@ece.ac.in

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+91 91633 16560 / +91 98315 00840

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admission@ece.ac.in

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## Course Outcomes (COs) of MBA

### Course Outcomes (COs)

On completion of the course students will be able to

#### 1st Semester

**Subject Name : MANAGERIAL ECONOMICS (MICRO)**

**Subject Code : MB101**

**CO Code: MB101.CO<NUMBER>**

1. Identify the basics of Managerial economics
2. Analyze the core concepts of Economics which are necessary for managers
3. Classify different economic goals of managers
4. Classify alternative market structures for corresponding managerial decision making
5. Estimate the prices under different situations of an economy

**Subject Name : ORGANIZATIONAL BEHAVIOUR**

**Subject Code : MB102**

**CO Code: MB102.CO<NUMBER>**

1. Develop the concepts of various components including structure & design of Organization
2. Interpret individual behaviour in the organizational settings.
3. Discuss various work motivation and leadership principles for managing employees behaviour in the organization
4. Elaborate the complexities associated with management of individual behaviour in the organization CO5 Interpret the complexities of group behaviour in the organization

**Subject Name : BUSINESS COMMUNICATION**

**Subject Code : MB103**

**CO Code: MB103.CO<NUMBER>**

1. Explain the purpose of business communication
2. Illustrate the stages of writing different documents relevant to business communication
3. Discuss different aspects of internal communication of a business organization
4. Develop different important concepts of external communication
5. Organize different ways of handling business information

**Subject Name : LEGAL AND BUSINESS ENVIRONMENT(MICRO& MACRO)**

**Subject Code : MB104**

**CO Code: MB104.CO<NUMBER>**

1. List the legal terms commonly used in business
2. Select various legal alternatives
3. Develop concept of business contracting
4. Evaluate the methodology of settlement of commercial disputes

**Subject Name : INDIAN ETHOS AND BUSINESS ETHICS****Subject Code : MB105****CO Code: MB105.CO<NUMBER>**

1. Assess the relationship between ethics and business and relate the subsequent theories of justice and economics across different cultural traditions.
2. Examine the relationship between ethics, morals and values in the workplace
3. Analyze and understand various ethical philosophies to explain how they contribute to current management practices.
4. Apply understanding of ethics of real-world contexts.
5. Assess the importance of building moral goals in business and devising effective ways to fulfil it.

**Subject Name : QUANTITATIVE TECHNIQUES****Subject Code : MB106****CO Code: MB106.CO<NUMBER>**

1. Explain basic concepts of operations planning
2. Classify Manufacturing systems
3. Apply the concepts of inventory management in given situations
4. Analyze the factors in plant location and layout decisions
- CO5 Discuss the issues involved plant maintenance

**2nd Semester****Subject Name : INDIAN ECONOMY AND POLICY****Subject Code : MB201****CO Code: MB201.CO<NUMBER>**

1. Identify the basic macro issues of an economy
2. Elaborate different indicators of Indian economy
3. Analyze different economic reforms of Indian economy
4. Classify the core economic policies
5. Apply the knowledge of economic policy studying the trade policy reform of India

**Subject Name : FINANCIAL REPORTING, STATEMENT AND ANALYSIS****Subject Code : MB202****CO Code: MB202.CO<NUMBER>**

1. Summarize different accounting procedures and standards
2. Explain the concepts of financial accounting and accounting standards..
3. Develop the skills of students to record financial transactions in different forms of books of accounts.
4. Classify management accounting concepts with the cost accounting concepts
5. Make use of the interpretation of financial statements for managerial decisions

**Subject Name : MARKETING MANAGEMENT****Subject Code : MB203****CO Code: MB203.CO<NUMBER>**

1. Analyze the importance of the customer/consumer in the context of business, the growth of and the role played by Marketing Management as one of the functional areas of modern business organizations in order to achieve overall business objectives.
2. Access the role played by the various dynamic actors and factors in the firm's micro and macro-environment and how marketing as a function will have to respond to the ever-changing external environment.
3. Apply the various concepts in relation to the 4 verticals within Marketing ,namely the Product, Price, Promotion and Place in order to arrive at balanced marketing decisions.
4. Formulate marketing strategies pertaining to the aforesaid verticals at different stages in the life-cycle of goods/services in order to arrive at important functional level decisions that are aligned with corporate goals.

**Subject Name : OPERATIONS MANAGEMENT****Subject Code : MB204**

**CO Code: MB204.CO<NUMBER>**

1. Understand production and the development of operations
2. Explain the different aspects of Operation Management: Manufacturing ,Service and Project Management in the value addition process.
3. Understand the purchasing strategy and inventory management
4. Apply the short term planning process through Planning Techniques, Production Planning, and Shop Floor scheduling.
5. Analyze the Quality Systems for proactive system development to prevent defects and control process defects.

**Subject Name : MANAGEMENT INFORMATION SYSTEM****Subject Code : MB205****CO Code: MB205.CO<NUMBER>**

1. Apply the knowledge of E-commerce / E-business
2. Apply the knowledge in day to day working of Data Communication & Networking
3. Analyze and details view of Database Management Systems (DBMS) like MS-Access , Oracle, MS SQL Server etc.
4. Knowledge of Data warehouse and discovery of data mining applications.
5. Concept of MS Office Applications like MS Excel, MS Access and MS Power Point.

**Subject Name : HUMAN RESOURCE MANAGEMENT****Subject Code : MB206****CO Code: MB206.CO<NUMBER>**

1. Interpret the terms used in HRM
2. Apply the knowledge in day to day working
3. Compare between various options in HRM
4. Evaluate the human capital
5. Formulate HR policies and procedures

**3rd Semester****Subject Name : ENTREPRENEURSHIP & PROJECTMANAGEMENT****Subject Code : MB301****CO Code: MB301.CO<NUMBER>**

1. Discuss the concepts of Project Management from planning to execution of projects
2. Apply Project Appraisal & Management techniques and Analyze the techniquesPERT & CPM for Project planning, scheduling and Execution Control.
3. Develop the strategies employed in managing project risk & termination
4. Discuss the nature of entrepreneurship and have the ability to discern distinct entrepreneurial traits.
5. Assess personal attributes that enable best use of entrepreneurial opportunities and also know the parameters to assess opportunities and constraints for new business ideas.

**Subject Name : CORPORATE STRATEGY****Subject Code : MB302****CO Code: MB302.CO<NUMBER>**

1. Differentiate between the nature of Strategic Decisions and Operational/Administrative Decisions. CO2 Undertake an external environment analysis and an internal environment analysis for a firm.
2. Analyze the various forces of competition for a firm.
3. Design a road map for implementation of strategic decisions for a firm
4. Assess and evaluate the performance of strategic decisions taken by a firm

**ELECTIVE PAPERS****SPECIALIZATION: MARKETING**

**Subject Name : IMC/ PROMOTION****Subject Code : MM303****CO Code: MM303.CO<NUMBER>**

1. CO1 Explain the basic concept of IMC and its relevance to marketing promotion
2. CO2 Illustrate different elements of IMC and distinguish between their features
3. CO3 Evaluate the growth, prospect and types of sales promotion and their importance in marketing
4. CO4 Organize the concept of advertising and media planning, budgeting
5. CO5 Explain strategies involved in the different forms of media selection

**Subject Name : MARKETING RESEARCH****Subject Code : MM304****CO Code: MM304.CO<NUMBER>**

1. Explain the role of Marketing Research as a tool for making better marketing decisions, its scope, its process, its importance and its utility in solving problems in the domain of marketing.
2. Develop an end-to-end research design, formulate the research problems, set up the research objectives and identify the information needs and the sources from which such information can be collected.
3. Design suitable data collection methods & instruments, use different types of scales for measurement of data, organize field data collection and choose appropriate data analysis plans.
4. Construct research hypotheses, test them using different criteria, analyze data using different data analysis techniques.
5. Interpret data into findings, draw certain conclusions, propose certain recommendations and compile a research report

**SPECIALIZATION: HUMAN RESOURCE MANAGEMENT****Subject Name : TEAM DYNAMICS AT WORK****Subject Code : HR301****CO Code: HR301.CO<NUMBER>**

1. Discuss the foundation of groups and teams, group dynamics and the different types of decision-making techniques at the workplace
2. Illustrate the development of organizational behavior and its importance in interpersonal competence and team effectiveness
3. Evaluate the complexities of managing teams efficiently. CO4 Assess the various types of team interventions and the significance of communication and creativity strategies for organizational effectiveness

**Subject Name : HUMAN RESOURCE METRICS AND ANALYTICS****Subject Code : HR302****CO Code: HR302.CO<NUMBER>**

1. Understand the growing importance of Analytics in HRM
2. Develop an idea on the functioning of HRM, in creating value in terms of business
3. Create figures from intangibles in HRM, and foster Decision Making
4. Organize qualitative factors of HRM for better People Management
5. Create new ways in terms of Employee Management utilizing an Data Driven Approach CO6 Apply HRM as a strategic business function

**Subject Name : CROSS CULTURAL MANAGEMENT****Subject Code : HR303****CO Code: HR303.CO<NUMBER>**

1. Develop the importance of culture and its various dimensions in managing the organization
2. Classify the issues of diverse workforce belong to various culture and ethnicity within the organization
3. Develop the concept of negotiation and effective decision making in a multi-cultural organization setting
4. Illustrate global Human resource management CO5 Develop critical thinking and analytical skills through the case study.

**Subject Name : ORGANIZATIONAL DESIGN**

**Subject Code : HR304**

**CO Code: HR304.CO<NUMBER>**

1. Create the most suitable organization
2. Evaluate the importance of designing an organisation
3. Construct organisation structure
4. Categorise organisation functioning
5. Design organisation depending on changes in business operations

#### **4th Semester**

#### **ELECTIVE PAPERS**

#### **SPECIALIZATION: MARKETING**

**Subject Name : CONSUMER BEHAVIOUR**

**Subject Code : MM401**

**CO Code: MM401.CO<NUMBER>**

1. Explain the consumer's decision-making process and to look at marketing programs from the point of view of the consumer.
2. Apprise the different individual determinants that influence consumers' decision-making – the various psychological constructs that make every consumer unique.
3. Appreciate the impact of different external factors in the consumer's environment that have a bearing on his choice process.
4. Understand of the consumer's buying process and make suitable adjustments in the firm's marketing program for better marketing outcomes.

**Subject Name : RETAIL MANAGEMENT**

**Subject Code : MM402**

**CO Code: MM402.CO<NUMBER>**

1. Describe basic concepts in retail management.
2. Describe the strategies existing in the retail managements.
3. Discuss about the different opportunities available in selecting a location.
4. Discuss about the different store layouts & designs existing in the retail management
5. Explain the various pricing approaches available in the retail marketing

**Subject Name : SALES & DISTRIBUTION MANAGEMENT**

**Subject Code : MM403**

**CO Code: MM403.CO<NUMBER>**

1. Understand role of personal selling and its management as a component of Integrated Marketing Communications, its uniqueness, its application and its relationship with the other components of IMC.
2. Organize nuances of personal selling, the art and craft of salesmanship, the sales cycle, the different types of selling situations and some characteristics of successful salespersons.
3. Implement the various functions of sales force management like recruitment, selection, training, equipping & motivating the sales force, designing sales territories & quotas, sales force compensation and management of sales performance.
4. Decide pertaining to setting up of distribution channels & their management, This based on an understanding of their different formats, functions, specializations, capabilities & constraints.

**Subject Name : SERVICE MARKETING**

**Subject Code : MM404**

**CO Code: MM404.CO<NUMBER>**

1. Understand the importance and criticality of services marketing .
2. Understand and apply the seven marketing mixes in the area of services marketing
3. Appreciate the differentiating role of services marketing in today's business context

4. Understand and relate to the issues of marketing in terms of customer expectation and develop a services strategy.
5. Develop an understanding of services marketing in multiple sectors.

**Subject Name : PRODUCT & BRAND MANAGEMENT****Subject Code : MM405****CO Code: MM405.CO<NUMBER>**

1. Develop perspective on various aspects of managing products successfully and developing strong brands, Determine variables that drive the success of brands and product lines and the interrelationships among these variables.
2. Utilize practical tools to interpret, relate and evaluate product and brand strategies in an array of customer and competitive contexts and Evaluate strategies for brand management at the global level and adapt them to suit the requirement of managing the brand in different cultural contexts.
3. Examine the importance of the ethical dimension in new product innovations and brand building.
4. Discuss the process and methods of brand management, including how to establish brand identity and build brand equity.
5. Compose, assess, and incorporate individual input to produce effective team project output for the purpose of branding and product management.

**Subject Name : INTERNATIONAL MARKETING****Subject Code : MM406****CO Code: MM406.CO<NUMBER>**

1. Explain major concepts and issues of international marketing
2. Assess the cross cultural issues in the internationalization of firms
3. Analyze emerging trends in international markets
4. Assess the role of regional agreements and public policy in international marketing.
5. Identify and evaluate different frameworks for market entry strategies in the international market

**SPECIALIZATION: HUMAN RESOURCEMANAGEMENT****Subject Name : MANPOWER PLANING, RECRUITMENT AND SELECTION****Subject Code : HR401****CO Code: HR401.CO<NUMBER>**

1. CO1 Plan the effective deployment of human resource in the organization
2. CO2 Make use of various methods and techniques HR demand forecasting
3. CO3 Classify the factors that affect manpower planning
4. CO4 Examine different HR Audit methods for the effective utilization of human resources in the organization evaluate various recruitment and selection strategies for on boarding employees in the organization

**Subject Name : EMPLOYEE RELATIONS & LABOUR LAWS****Subject Code : HR402****CO Code: HR402.CO<NUMBER>**

1. Define terminologies used in IR and labour laws
2. Understand the importance of employee relations in an organization
3. Apply the knowledge in day day work
4. Analyze situations and find out solutions
5. Evaluate from time to time, the relationship to take corrective action.

**Subject Name : COMPENSATION AND BENEFITS MANAGEMENT****Subject Code : HR403****CO Code: HR403.CO<NUMBER>**

1. Define terminologies used in IR and labour laws
2. Understand the importance of employee relations in an organization
3. Apply the knowledge in day day work
4. Analyze situations and find out solutions
5. Evaluate from time to time, the relationship to take corrective action.

**Subject Name : PERFORMANCE MANAGEMENT SYSTEMS**

**Subject Code : HR404**

**CO Code: HR404.CO<NUMBER>**

1. Identify various challenges of performance management system in the organization
2. Develop an effective performance management system applicable in the organization
3. Plan effective monitoring method for performance management
4. Classify various financial and non-financial reward system for managing effective performance of the employees
5. Measure various drivers of employee engagement for the benefit of organization



## Elitte College of Engineering

Approved by AICTE and Affiliated to MAKAUT, West Bengal

PO: Karnamadhhabpur, PS: Ghola, Sodepur, Kolkata - 700113

### Contact Info

📍 PO: Karnamadhhabpur, PS: Ghola, Sodepur, Kolkata - 700113

☎ Telephone

+91 91633 16560 / +91 98315 00840

✉ Email

info@ece.ac.in

admission@ece.ac.in

### Trust Office

📍 PO: Karnamadhhabpur, PS: Ghola, Sodepur, Kolkata - 700113

☎ Telephone

+91 91633 16560 / +91 98315 00840

### Admission Enquiry

☎ Telephone

+91 91633 16560 / +91 98315 00840

✉ Email

info@ece.ac.in

admission@ece.ac.in

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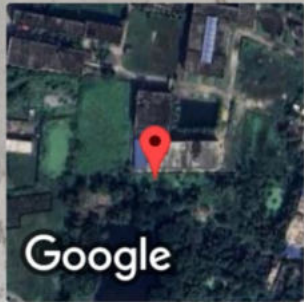
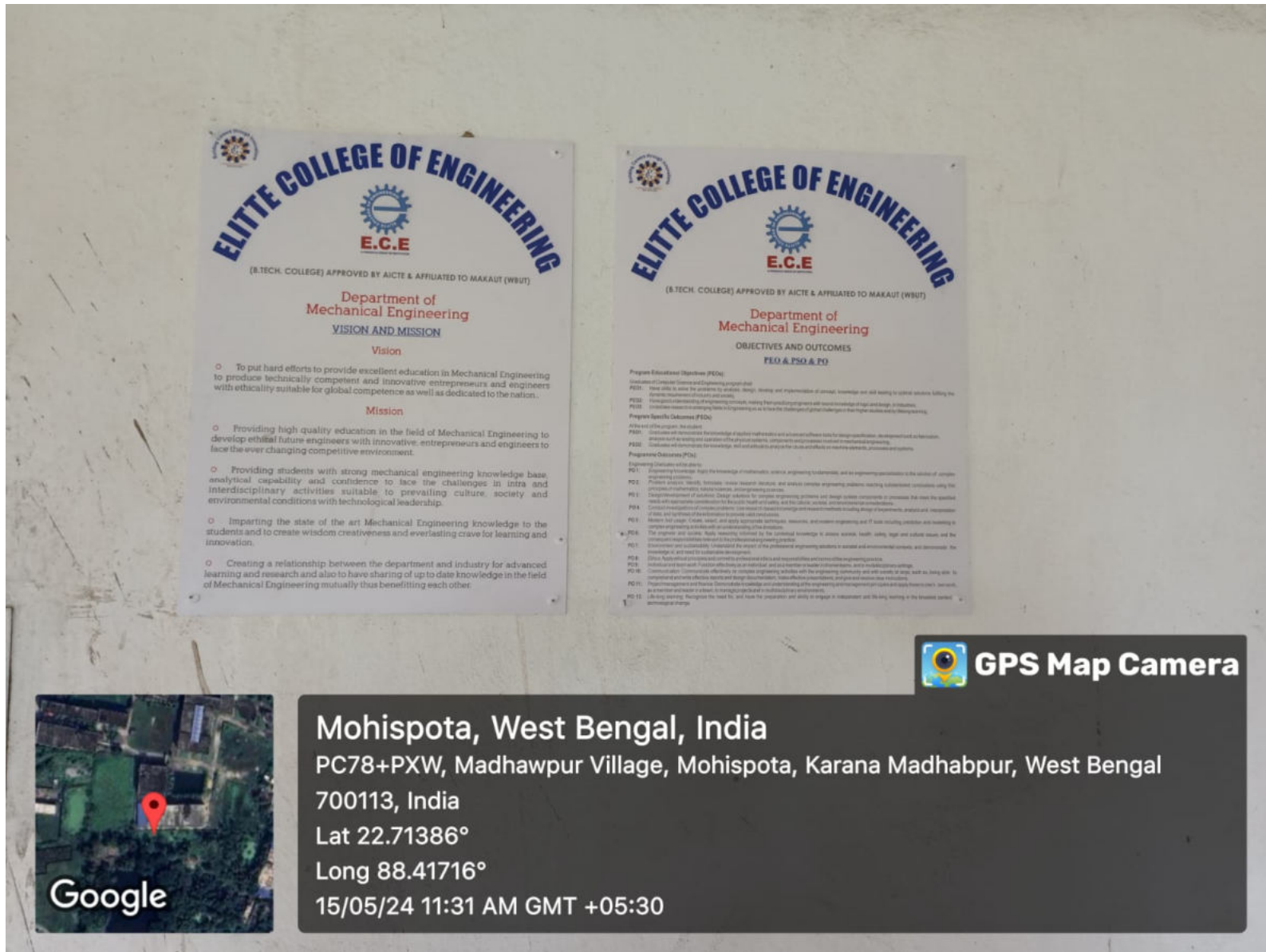
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**Sample Images of Poster Displayed in different locations in the Institute to promote awareness on  
Institute Vision & Mission, Departmental Vision & Mission, Program Educational Objectives (PEOs),  
Program Outcome (POs), Program Specific Outcomes (PSOs) & Course Outcomes (COs)**



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**ELITE COLLEGE OF ENGINEERING**  
**E.C.E**  
(B-Tech - COURSE) APPROVED BY AICTE & AFFILIATED TO MAHARAJA UNIVERSITY

**Department of  
Computer Science & Engineering**

Subject Name: Data Structure & Algorithm Lab  
Subject Code: HCC-CE330

Laboratory Experiments


**Linear Data Structure**

1. Implementation of array operations.
2. Stack and Queue: adding, deleting elements, Circular Queue, Adding & deleting elements.
3. Merging Problem: Evaluation of expressions operations on Multiple Stack & queues.
4. Implementation of linked lists: inserting, deleting, inserting at linked list, implementation of stack & queues using linked list.
5. Polynomial addition, Polynomial multiplication using linked Data Structure.
6. Recursive and Non-recursive traversal of Trees.
7. Threaded binary tree traversal, AVL tree implementation.
8. Application of Trees, Application of sorting and searching algorithms.
9. Hash table implementation: searching, inserting and deleting, searching & sorting techniques.

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 **GPS Map Camera**



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**ELITE COLLEGE OF ENGINEERING**  
**E.C.E**

(A TECH. COLLEGE) APPROVED BY AICTE & AFFILIATED TO MAKAUT (WBUT)  
 Electrical Engineering Department

**Vision**  
 Offering excellent technical education in Electrical Engineering to produce efficient Electrical Engineers with technical vision, innovative and entrepreneurial abilities for global needs for tomorrow.

**Mission**

- M1: Conveying high quality educational base in Electric Engineering to the students with strong analytical ability and skill set to confidently work in various fields of Electrical Engineering and emerging related fields.
- M2: Imparting high quality technical education to develop well-grounded professionals in Electrical Engineering with innovative and entrepreneurial abilities for frequently changing global needs.
- M3: Providing up to date knowledge in emerging technology in Electrical Engineering with passion for innovations and lifelong learning skill through continuous learning processes.
- M4: Encouraging the collaboration between industry and the environment through sharing of knowledge and experiences in higher learning and research to produce industry-ready professionals.


**ELITE COLLEGE OF ENGINEERING**  
**E.C.E**

(A TECH. COURSE) APPROVED BY AICTE & AFFILIATED TO MAKAUT (WBUT)  
 Electrical Engineering Department

**Programme Intentional Objectives (PIO)**

- PIO1: Have skills to solve the problems by analysis, design, synthesis and implementation of algorithms leading to optimal solutions fulfilling the dynamic requirement of industry and society.
- PIO2: Have good understanding of Electrical Engineering concepts, making them practicing engineers with sound knowledge of logic and design, in industry.
- PIO3: Undertake research in emerging fields in Electrical Engineering in order to face the challenges of global challenges in their higher studies and by sharing learning.



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Quality Policy and Core values: As suggested by the Board of Directors

**VISION OF THE INSTITUTE**  
 To attain **World-class excellence** in technical education to bring forward technically competent innovative, entrepreneurial and ethical engineers in the knowledge for a globally competitive environment with motivation for the service of the nation.

**MISSION OF THE INSTITUTE**

- To impart high quality technical education to develop innovative, entrepreneurial and ethical future engineering professionals fit for ever changing and globalized world.
- To provide the students with strong engineering foundation with analytical abilities so as to work with confidence in intra and interdisciplinary activities with appropriate cultural, societal, and environmental considerations and emerge as future technological leaders.
- To equip the students with requisite knowledge of cutting-edge, emerging technology, wisdom, creativity and passion for innovation and lifelong learning path.
- To develop an effective partnership between industry and Institute of Higher learning and research, through exchange programs and sharing experience for mutual benefit.

**QUALITY POLICY**  
 We are committed to providing avenue of student success and to provide an environment conducive to learning and teaching by creating and ensuring educational opportunities and support services so that highest quality is achieved.

**CORE VALUES**  
 (1) Honor (2) Integrity (3) Transparency (4) Discipline (5) Leadership (6) Commitment (7) Excellence (8) Teamwork (9) Social service.

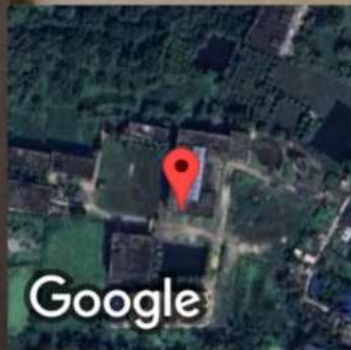
**ELITTE COLLEGE OF ENGINEERING**  
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**INTAKE**

<b>MECHANICAL ENGINEERING</b>	<b>108</b>
<b>CIVIL ENGINEERING</b>	<b>54</b>
<b>ELECTRICAL ENGINEERING</b>	<b>54</b>
<b>COMPUTER SC. &amp; ENGINEERING</b>	<b>54</b>
<b>CSE - ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING</b>	<b>30</b>
<b>CSE - INTERNET OF THINGS AN CYBER SECURITY INCLUDING BLOCK CHAIN TECHNOLOGY</b>	<b>30</b>
<b>MASTER OF BUSINESS ADMINISTRAT</b>	<b>60</b>



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**9831500840 / 9163316560 / 63 / 8336917478**  
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**Civil Engineering Department**

**Course Outcomes (CO)**

Subject Name : Engineering Mathematics  
 Subject Code : EEPC2014  
 Course Reference (CR):

Objectives of the course are as follows:-

- CO1/EN2011 Use the different types of vector in 2D and 3D.
- CO2/EN2012 Determine the scalar and vector product and apply to solve problems of geometry.
- CO3/EN2013 Determine the double and triple integrals and apply to solve problems of geometry.
- CO4/EN2014 Apply the method of integration to solve problems of geometry.
- CO5/EN2015 Apply the method of integration to solve problems of geometry.
- CO6/EN2016 Apply the method of integration to solve problems of geometry.
- CO7/EN2017 Apply the method of integration to solve problems of geometry.
- CO8/EN2018 Apply the method of integration to solve problems of geometry.
- CO9/EN2019 Apply the method of integration to solve problems of geometry.
- CO10/EN2020 Apply the method of integration to solve problems of geometry.

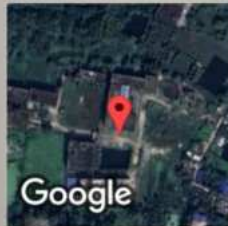

**ELITE COLLEGE OF ENGINEERING**  
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**Civil Engineering Department**

**List of Experiments**

Subject Name : Engineering Mathematics  
 Subject Code : EEPC2014  
 Laboratory Experiments:

Sl. No.	Experiment
1	Verification of vector addition and subtraction.
2	Verification of scalar and vector product.
3	Verification of double and triple integrals.
4	Verification of the method of integration.
5	Verification of the method of integration.
6	Verification of the method of integration.
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**ELITTE COLLEGE OF ENGINEERING**  
**E.C.E**  
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**Department of Mechanical Engineering**

Subject Name : Practice of Manufacturing Processes  
 Subject Code : PCME391

**Course Outcomes (COs):**  
 On completion of the course students will be able to:

- PCME391.CO1: Practice pattern & mould making
- PCME391.CO2: Illustrate the fitting operation using hand tools
- PCME391.CO3: Perform basic forging processes
- PCME391.CO4: Perform sheet metal works
- PCME391.CO5: Practice GMAW, SMAW & Gas Welding
- PCME391.CO6: Demonstrate machining of typical products involving lathe, milling/shaping/tractors

**ELITTE COLLEGE OF ENGINEERING**  
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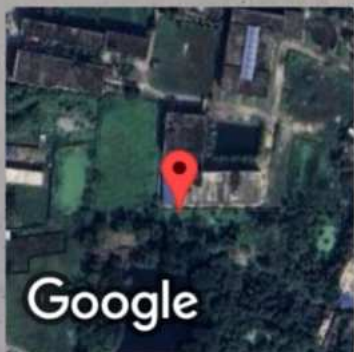
**Department of Mechanical Engineering**

Subject Name : Practice of Manufacturing Processes  
 Subject Code : PCME391

**Laboratory Experiments:**

1. **Machining Shop:** Taper turning, drilling, boring, shaping and milling operations- 3 modules
  - (a) Turning Operations Performed on a Given Mild Steel Work Piece
  - (b) To perform Shaping Operations on a given Mild Steel Work Piece as per the figure given
  - (c) To perform gear cutting operation on milling machine
2. **Pattern Making:** 1 or 2 wooden patterns to make- 2 modules
  - (a) To make a T lap joint as shown in figure from the given rasper of size 50 x 50 x 250 mm
  - (b) To make a Dovetail lap joint
3. **Moulding:** 1 module
  - (a) To prepare a sand mould cavity using One Stepped shaft (single piece pattern)
4. **Smithy Shop:** 2 module
  - (a) To make an S-hook from a given round rod, by following hand forging operation
5. **Welding Shop:** Practicing SMAW, Gas Welding and/or GMAW- 2 modules
  - (a) To make a double lap joint, using the given mild steel pieces and by arc welding & Preparation of butt joint as shown in figure using shielded metal arc welding process
  - (b) Preparation of lap joint as shown in figure using oxyacetylene gas welding process & Preparation of butt joint as shown in figure using oxyacetylene gas welding process
6. **Fitting Shop:** 2 modules
  - (a) To make a V-fit from the given two M.S pieces
  - (b) To make a Semi-Circular fit from the given two M.S pieces
7. **Sheet Metal Shop:** 1 module
  - (a) To make a tapered tray using the given G.I. Sheet

**CARPENTRY SHOP**



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**Vision, Mission, Quality Policy and Core values:** As suggested by the Board of Directors

The Vision, Mission, Quality Policy and Core values statement is a tool to help an organization accomplish what it has set out to do and help provide a framework for strategy, focus and decision making.

A Vision statement describes the ideal future state of Elite College of Engineering. It articulates what the college is trying to accomplish. The objectives of the mission statement are to accelerate and optimize the effective and economical use of resources with commitment, concern and care for the benefits of students and society.

Following statements of Vision, Mission, Quality Policy and Core values are hereby suggested by the Board of Directors of Elite College of Engineering:

**VISION OF THE INSTITUTE**  
 To strive tirelessly towards excellence in technical education to bring forward technically competent, innovative, entrepreneurial and ethical engineers in the tribute fit for globally competitive environments with motivation to the service of the nation.

**MISSION OF THE INSTITUTE**

- To impart high quality technical education to develop innovative, entrepreneurial and ethical future engineering professionals fit for ever changing competitive environment.
- To provide the students with strong engineering foundation with analytical abilities so as to work with confidence in intra and interdisciplinary activities with appropriate cultural, societal, and environmental considerations and emerge as future technological leaders.
- To equip the students with up-to-date knowledge of cutting-edge, emerging technology, wisdom, creativity and passion for innovations and life-long learning skills.
- To develop an effective partnership between industry and institute of higher learning and research, through exchange programs and sharing experience for mutual benefits.

**QUALITY POLICY**  
 We are committed to promoting climate of student success and to provide an environment conducive to learning and teaching by creating and expanding educational opportunities and support services so that highest quality is achieved.

**CORE VALUES**  
 (1) Ethics (2) Integrity (3) Transparency (4) Discipline (5) Leadership (6) Commitment (7) Excellence (8) Teamwork (9) Social service.



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(B.TECH. COURSE) APPROVED BY AICTE & AFFILIATED TO MAHARAJ (WBUT)

Department of Mechanical Engineering

Subject Name : Mechanical Engineering Laboratory II (Design)  
Subject Code : ME40202

Laboratory Experiments:

1. Universal tester test on mild steel test
2. Stress and strain test on steel
3. Impact test on a metallic specimen
4. Brinell, Vickers and Rockwell hardness tests on suitable specimens
5. Hardness measurement using Brinell stress gauge on steel
6. Measurement of coefficient of thermal and volumetric thermal expansion
7. Determination of velocity ratio of simple compound, gear and differential gear system
8. Finding the modulus of elasticity, shear modulus, Poisson's ratio, double shear and crushing of brittle materials
9. Finding the modulus of rigidity of rubber materials
10. Finding the modulus of rigidity of metal materials like paraffin, lead, wrought iron, brass, aluminium, steel, rubber etc.
11. Mohr's circle of stress and strain
12. Mohr's circle of stress and strain
13. Mohr's circle of stress and strain
14. Determination of natural frequency of single and double mass system
15. Determination of natural frequency of single and double mass system
16. Determination of natural frequency of single and double mass system
17. Determination of natural frequency of single and double mass system
18. Determination of natural frequency of single and double mass system
19. Determination of natural frequency of single and double mass system
20. Determination of natural frequency of single and double mass system
21. Determination of natural frequency of single and double mass system



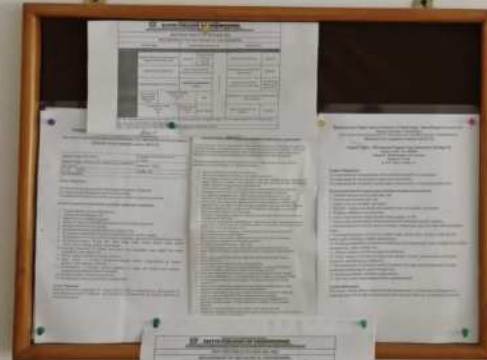
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Department of Mechanical Engineering

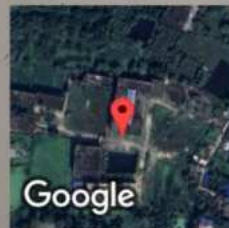
Subject Name : Mechanical Engineering Laboratory II (Design)  
Subject Code : ME40202

Course Outcomes (COs):

- CO1: Demonstrate the ability to identify and analyze the characteristics of mechanical components.
- CO2: ANALYZE various industrial problems and identify the various of failure on design and design system.
- CO3: CONDUCT the experiment of hardness and toughness of given materials and apply them practically.
- CO4: DETERMINE stress distribution of given materials in compression and in shear.
- CO5: PREPARE suitable photographs for model samples for the given engineering materials in various mechanical tests.
- CO6: MEASURE stress of the given materials by using strain gauge method.



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**ELITTE COLLEGE OF ENGINEERING**  
**E.C.E**

(A TECH. COURSE) APPROVED BY KCELT & AFFILIATED TO MAHAR (WBIT)

**Department of  
Computer Science & Engineering**

Subject Name : Data Structure & Algorithm (4th)  
Subject Code : PCC-CS303

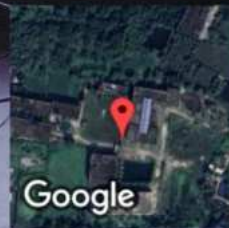
**Course Outcomes (COs):**  
On completion of the course students will be able to:

- PCC-CS303.CO1: Construct algorithms from problems.
- PCC-CS303.CO2: Understand the basics of Stack, Queue and Hashing.
- PCC-CS303.CO3: Categorize the necessity of linked list and array implementation.
- PCC-CS303.CO4: Learn the need for use of tree and graph.
- PCC-CS303.CO5: Compare different traversing and searching methods.
- PCC-CS303.CO6: Understand the implementation mechanism of sorting and searching.

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**ELITE COLLEGE OF ENGINEERING**  
**E.C.E**  
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**Civil Engineering Department**  
**List of Experiments**

Subject Name: Soil Mechanics & Foundation Engineering  
 Subject Code: CE220224

**Objective Experiments**

Experiment 1	Direct shear test of aggregate
Experiment 2	Triaxial compression test of aggregate
Experiment 3	Unconfined compression test of aggregate
Experiment 4	Atterberg limits test of soil
Experiment 5	Liquid limit test of soil
Experiment 6	Plasticity index test of soil
Experiment 7	Shrinkage test of soil
Experiment 8	Standard Proctor test
Experiment 9	Modified Proctor test
Experiment 10	Free swell test of soil
Experiment 11	Consolidation test
Experiment 12	One dimensional consolidation test
Experiment 13	Secondary consolidation test
Experiment 14	Permeability test

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**DEPARTMENT OF CIVIL ENGINEERING**  
**NAME OF EXPERIMENT**  
**DETERMINATION OF CALIFORNIA BEARING RATIO (IS: 2720/Part 1A)-1987**

Penetration of Plunger (mm)	Standard Load (kN)
2.5	1370
5.0	2055




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