**Vidya Academy of Science & Technology**
**(A unit of Vidya International Charitable Trust)**
Thalakkottukara PO, Thrissur, Kerala, India, Pin- 680 501
Phone: +91-4885-287751, 287752, Fax: 288366

## Authentication Certificate

### 2.6.1. Programme Outcomes (POs) and Course Outcomes (COs) for all Programmes of the Institution are stated and displayed on website

The following documents are submitted for authenticating POs and COs

- COs, POs and PSOs in Institute Website Page.
- Programme Outcomes displayed at various location in campus.
- Documents related to OBE implementation.
    - CO, PO and PSO Mapping
    - Course Outcomes for a sample course
    - Sample Question Paper – Mapping and Outcome Analysis

The supporting documents for this metric are made available on HEI website.

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**CRITERIA 2.6.1 : Programme and course outcomes for all Programmes offered by the institution are stated and displayed on website and communicated to teachers and students**

## a) LIST OF COURSE OUTCOMES

| Branch: DEPARTMENT OF AIML ENGINEERING | | | | |
|---|---|---|---|---|
| **2019 SCHEME** | | | | |
| **After the completion of the course the Students will be able to** | | | | |
| **S. No.** | **SEM** | **Subject** | **CO** | **CO statement** |
| 1 | S1 | MAT 101 LINEAR ALGEBRA AND CALCULUS | MAT101.1 | solve systems of linear equations, diagonalize matrices and characterise quadratic forms |
| | | | MAT101.2 | compute the partial and total derivatives and maxima and minima of multivariable functions |
| | | | MAT101.3 | compute multiple integrals and apply them to find areas and volumes of geometrical shapes,mass and centre of gravity of plane laminas |
| | | | MAT101.4 | perform various tests to determine whether a given series is convergent, absolutely convergent or conditionally convergent |
| | | | MAT101.5 | determine the Taylor and Fourier series expansion of functions and learn their applications. |
| 2 | S1 | PHT 100 ENGINEERING PHYSICS | PHT100.1 | compute the quantitative aspects of waves and oscillations in engineering systems. |

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| | | | PHT100.2 | apply the interaction of light with matter through interference, diffraction and identify<br>these phenomena in different natural optical processes and optical instruments. |
| | | | PHT100.3 | analyze the behaviour of matter in the atomic and subatomic level through the principles of<br>quantum mechanics to perceive the microscopic processes in electronic devices. |
| | | | PHT100.4 | classify the properties of magnetic materials and apply vector calculus to static magnetic<br>fields and use Maxwell's equations to diverse engineering problem |
| | | | PHT100.5 | analyze the principles behind various superconducting applications, explain the working of<br>solid state lighting devices and fibre optic communication system |
| 3 | S1 | EST 100 ENGINEERING MECHANICS | EST100.1 | recall principles and theorems related to rigid body mechanics |
| | | | EST100.2 | identify and describe the components of system of forces acting on the rigid body |
| | | | EST100.3 | apply the conditions of equilibrium to various practical problems involving different force system. |
| | | | EST100.4 | choose appropriate theorems, principles or formulae to solve problems of mechanics. |
| | | | EST100.5 | solve problems involving rigid bodies, applying the properties of distributed areas and masses |

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| 4 | S1 | EST 120 BASICS OF CIVIL AND MECHANICAL ENGINEERING | EST120.1 | recall the role of civil engineer in society and to relate the various disciplines of Civil Engineering with special focus on Building construction and basics of Surveying |
| | | | EST120.2 | summarize the basic infrastructure services MEP, HVAC, elevators, escalators and ramps and discuss the Materials, energy systems, water management and environment for green buildings. |
| | | | EST120.3 | analyse thermodynamic cycles and their efficiency for illustrating working of IC Engines. |
| | | | EST120.4 | explain the basic principles of refrigeration, air conditioning, hydraulic turbines and power transmission elements. |
| | | | EST120.5 | describe the basic manufacturing, metal joining and machining processes. |
| 5 | S1 | HUN 101 LIFE SKILLS | HUN101.1 | define and identify different life skills required in personal and professional life |
| | | | HUN101.2 | develop an awareness of the self and apply well-defined techniques to cope with emotions and stress |
| | | | HUN101.3 | explain the basic mechanics of effective communication and demonstrate these through presentations and use appropriate thinking and problem solving techniques to solve new problems |
| | | | HUN101.4 | take part in group discussions |
| | | | HUN101.5 | understand the basics of teamwork and leadership |

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| 6 | S1 | PHL 120 ENGINEERING PHYSICS LAB | PHL120.1 | develop analytical/experimental skills and impart prerequisite hands on experience for engineering laboratories |
| | | | PHL120.2 | understand the need for precise measurement practices for data recording |
| | | | PHL120.3 | understand the principle, concept, working and applications of relevant technologies and comparison of results with theoretical calculations |
| | | | PHL120.4 | analyze the techniques and skills associated with modern scientific tools such as lasers and fiber optics |
| | | | PHL120.5 | develop basic communication skills through working in groups in performing the laboratory experiments and by interpreting the results |
| 7 | S1 | ESL 120 CIVIL AND MECHANICAL WORKSHOP | ESL120.1 | name different devices and tools used for civil engineering measurements and Explain the use of various tools and devices for various field measurements |
| | | | ESL120.2 | demonstrate the steps involved in basic civil engineering activities like plot measurement, setting out operation, evaluating the natural profile of land, plumbing and undertaking simple construction work. |
| | | | ESL120.3 | choose materials and methods required for basic civil engineering activities like field measurements, masonry work and plumbing and Compare different techniques and devices used in civil engineering measurements |
| | | | ESL120.4 | identify Basic Mechanical workshop operations with appropriate Tools and |

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| | | | | Instruments with respect to the mechanical workshop trades in accordance with the material and Objects. |
| | | | ESL120.5 | apply appropriate safety measures with respect to the mechanical workshop trades. |
| 8 | S2 | MAT 102 VECTOR CALCULUS, DIFFERENTAIL EQUATIONS AND TRASNFORM | MAT102.1 | compute the derivatives and line integrals of vector functions and learn their applications |
| | | | MAT102.2 | evaluate surface and volume integrals and learn their inter-relations and applications. |
| | | | MAT102.3 | solve homogeneous and non-homogeneous linear differential equation with constant coefficients |
| | | | MAT102.4 | compute Laplace transform and apply them to solve ODEs arising in engineering |
| | | | MAT102.5 | determine the Fourier transforms of functions and apply them to solve problems arising in engineering |
| 9 | S2 | CYT 100 ENGINEERING CHEMISTRY | CYT100.1 | apply the basic concepts of electrochemistry and corrosion to explore its possible applications in various engineering fields. |
| | | | CYT100.2 | understand various spectroscopic techniques like UV-Visible, IR, NMR and its applications. |
| | | | CYT100.3 | apply the knowledge of analytical method for characterizing a chemical mixture or a compound. Understand the basic concept of SEM for surface characterisation of nanomaterials. |

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| | | | CYT100.4 | learn about the basics of stereochemistry and its application. Apply the knowledge of conducting polymers and advanced polymers in engineering. |
| | | | CYT100.5 | study various types of water treatment methods to develop skills for treating wastewater. |
| 10 | S2 | EST 110 ENGINEERING GRAPHICS | EST110.1 | draw the projection of points and lines located in different quadrants |
| | | | EST110.2 | prepare multi-view orthographic projections of objects by visualizing them in different positions |
| | | | EST110.3 | draw sectional views and develop surfaces of a given object |
| | | | EST110.4 | prepare pictorial drawings using the principles of isometric and perspective projections to visualize objects in three dimensions |
| | | | EST110.5 | convert 3D views to orthographic views and vice versa using CAD tools |
| 11 | S2 | EST 130 BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING | EST130.1 | apply fundamental concepts and circuit laws to solve simple DC electric circuits. |
| | | | EST130.2 | develop and solve models of magnetic circuits. |
| | | | EST130.3 | apply the fundamental laws of electrical engineering to solve simple ac circuits in steady state. |
| | | | EST130.4 | describe the working of a voltage amplifier and to outline the principle of an electronic instrumentation system. |
| | | | EST130.5 | explain the principle of radio and cellular communication. |
| 12 | S2 | | HUN102.1 | develop vocabulary and language skills relevant to engineering as a profession. |

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| | | HUN 102 PROFESSIONAL COMMUNICATION | HUN102.2 | get the capability to analyze, interpret and effectively summarize a variety of textual content. |
| | | | HUN102.3 | create effective technical presentations. |
| | | | HUN102.4 | discuss a topic in a group setting and arrive at generalizations/ conclusions. |
| | | | HUN102.5 | create professional and technical documents with required relevance and clarity. |
| 13 | S2 | EST 102 PROGRAMING IN C | EST102.1 | analyze a computational problem and develop an algorithm/flowchart to find its solution. |
| | | | EST102.2 | develop readable C programs with branching and looping statements, which uses Arithmetic, Logical, Relational or Bitwise operators. |
| | | | EST102.3 | write readable C programs with arrays,structure or union for storing the data to be processed. |
| | | | EST102.4 | divide a given computational problem into a number of modules and develop a readable multi-function C program by using recursion if required, to find the solution to the computational problem. |
| | | | EST102.5 | write readable C programs which use pointers for array processing and parameter passing. Develop readable C programs with files for reading input and storing output. |
| 14 | S2 | CYL 120 ENGINEERING CHEMISTRY LAB | CYL120.1 | understand and practice different techniques of quantitative chemical analysis to generate experimental skills and apply these skills to various analyses |
| | | | CYL120.2 | develop skills relevant to synthesize organic polymers and acquire the |

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| | | | | practical skill to use TLC for the identification of drugs |
| | | | CYL120.3 | develop the ability to understand and explain the use of modern spectroscopic techniques for analysing and interpreting the IR spectra and NMR spectra of some organic compounds |
| | | | CYL120.4 | acquire the ability to understand, explain and use instrumental techniques for chemical analysis |
| | | | CYL120.5 | learn to design and carry out scientific experiments as well as accurately record and analyze the results of such experiments |
| 15 | S2 | ESL 130 ELECTRICAL AND ELECTRONICS WORKSHOP | ESL130.1 | demonstrate safety measures against electric shocks. |
| | | | ESL130.2 | identify the tools used for electrical wiring, electrical accessories, wires, cables, batteries and standard symbols. |
| | | | ESL130.3 | develop the connection diagram, identify the suitable accessories and materials necessary for wiring simple lighting circuits for domestic buildings |
| | | | ESL130.4 | identify and test various electronic components |
| | | | ESL130.5 | make use of BIS/IEEE symbols to draw circuit schematics and experiment with and test electronic circuits on board |
| 16 | S3 | MAT 203 DISCRETE MATHEMATICAL STRUCTURES | MAT203.1 | check the validity of predicates in Propositional and Quantified Propositional Logic using truth tables, deductive reasoning and inference theory on Propositional Logic |
| | | | MAT203.2 | solve counting problems by applying the elementary counting techniques - Rule |

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| | | | | of Sum, Rule of Product, Permutation, Combination, Binomial Theorem, Pigeonhole Principle and Principle of Inclusion and Exclusion |
| | | | MAT203.3 | classify binary relations into various types and illustrate an application for each type of binary relation, in Computer Science Illustrate an application for Partially Ordered Sets and Complete Lattices, in Computer Science |
| | | | MAT203.4 | explain Generating Functions and solve First Order and Second Order Linear Recurrence Relations with Constant Coefficients |
| | | | MAT203.5 | illustrate the abstract algebraic systems – Semigroups , Monoids, Groups, Homomorphism and Isomorphism of Monoids and Groups |
| 17 | S3 | CST 201 DATA STRUCTURES | CST201.1 | design an algorithm for a computational task and calculate the time/space complexities of that algorithm |
| | | | CST201.2 | produce algorithms for given computational problems like searching, scheduling and expression conversions by understanding basic data structures such as array, stack and queue. |
| | | | CST201.3 | identify the suitable data structure (array or linked list) to represent a data item required to be processed and write an algorithm to solve a given computational problem by understanding the basic concepts of memory allocation and deallocation. |

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| | | | CST201.4 | write an algorithm to find the solution of a computational problem by selecting an appropriate data structure (binary tree/graph) to represent a data item to be processed. |
| | | | CST201.5 | store a given dataset using an appropriate hash function to enable efficient access of data in the given set. Understand various sorting algorithms, select appropriate sorting algorithms to be used in specific circumstances |
| 18 | S3 | CST 203 LOGIC SYSTEM DESIGN | CST203.1 | illustrate decimal, binary, octal, hexadecimal and BCD number systems, perform conversions among them and do the operations - complementation, addition, subtraction, multiplication and division on binary numbers |
| | | | CST203.2 | simplify a given Boolean Function and design a combinational circuit to implement the simplified function using Digital Logic Gates |
| | | | CST203.3 | design combinational circuits - Adders, Code Convertors, Decoders, Magnitude Comparators, Parity Generator/Checker and design the Programmable Logic Devices - ROM and PLA. |
| | | | CST203.4 | design sequential circuits - Registers, Counters and Shift Registers |
| | | | CST203.5 | dse algorithms to perform addition and subtraction on binary, BCD and floating point numbers |
| 19 | S3 | CST 205 OBJECT ORIENTED PROGRAMMING USING JAVA | CST205.1 | write Java programs using the object oriented concepts - classes, objects, constructors, data hiding, inheritance and polymorphism |

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| | | | CST205.2 | utilise datatypes, operators, control statements, built in packages & interfaces, Input/ Output Streams and Files in Java to develop programs |
| | | | CST205.3 | illustrate how robust programs can be written in Java using exception handling mechanism |
| | | | CST205.4 | write application programs in Java using multithreading and database connectivity |
| | | | CST205.5 | Write Graphical User Interface based application programs by utilising event handling features and Swing in Java |
| 20 | S3 | EST 200 DESIGN AND ENGINEERING | EST200.1 | explain different concepts and principles involved in design engineering. |
| | | | EST200.2 | discuss and demonstrate the workability of solutions for design problems and Apply design thinking while learning and practicing engineering. |
| | | | EST200.3 | compare designs covering function, cost, environmental sensitivity, safety factors along with engineering analysis. |
| | | | EST200.4 | develop innovative, reliable, sustainable and economically viable designs incorporating knowledge in engineering. |
| | | | EST200.5 | judge the optimal solution from the available choice. |
| 21 | S3 | MCN 201 SUSTAINABLE ENGINEERING | MCN201.1 | understand the relevance and the concept of sustainability and the global initiatives in this direction |
| | | | MCN201.2 | explain the different types of environmental pollution problems and their sustainable solutions |
| | | | MCN201.3 | discuss the environmental regulations and standards |

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| | | | MCN201.4 | outline the concepts related to conventional and non-conventional energy |
| | | | MCN201.5 | demonstrate the broad perspective of sustainable practices by utilizing engineering knowledge and principles |
| 22 | S3 | CSL 201 DATA STRUCTURES LAB | CSL201.1 | write a time/space efficient program using arrays to provide necessary functionalities meeting a given set of user requirements |
| | | | CSL201.2 | write a time/space efficient program using linked lists to provide necessary functionalities meeting a given set of user requirements |
| | | | CSL201.3 | write a time/space efficient program graphs to provide necessary functionalities meeting a given set of user requirements |
| | | | CSL201.4 | write a time/space efficient program to sort a list of records based on a given key in the record |
| | | | CSL201.5 | design and implement an efficient data structure to represent given data |
| 23 | S3 | CSL203 OBJECT ORIENTED PROGRAMMING LAB | CSL203.1 | implement the Object Oriented concepts - constructors, inheritance, method overloading & overriding and polymorphism in Java |
| | | | CSL203.2 | implement programs in Java which use datatypes, operators, control statements, built in packages & interfaces, Input/Output streams and Files |
| | | | CSL203.3 | implement robust application programs in Java using exception handling |

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| | | | CSL203.4 | implement application programs in Java using multithreading and database connectivity |
| | | | CSL203.5 | implement Graphical User Interface based application programs by utilizing event handling features and Swing in Java |
| 24 | S4 | MAT 216 MATHEMATICAL FOUNDATIONS FOR MACHINE LEARNING | MAT206.1 | make use of the concepts, rules and results about linear equations, matrix algebra and vector spaces to solve computational problems |
| | | | MAT206.2 | make use of the concepts of eigenvalues & eigenvectors and orthogonality & diagonalization to solve computational problems |
| | | | MAT206.3 | perform calculus operations on functions of several variables and matrices, including partial derivatives and gradients |
| | | | MAT206.4 | utilize the concepts, rules and results about probability, random variables, additive & multiplicative rules, conditional probability, probability distributions and Bayes' theorem to find solutions of computational problems |
| | | | MAT206.5 | Train Machine Learning Models using unconstrained and constrained optimization methods |
| 25 | S4 | CST 202 COMPUTER ORGANIZATION AND ARCHITECTURE | CST202.1 | identify the basic structure and roles of various functional units of a computer and analyze the effect of addressing modes during the execution time of a program. |
| | | | CST202.2 | explore the complete steps in an instruction execution and demonstrate |

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| | | | | computer arithmetic operations on integer and real numbers |
| | | | CST202.3 | select appropriate interfacing standards for I/O devices. |
| | | | CST202.4 | understand memory hierarchy and its impact on computer cost/performance |
| | | | CST202.5 | build simple arithmetic and logical units.Identify and analyze pros and cons of different types of control logic design in processors. |
| 26 | S4 | CST 204 DATABASE MANAGEMENT SYSSTEMS | CST204.1 | summarize and exemplify fundamental nature and characteristics of database systems |
| | | | CST204.2 | model real word scenarios given as informal descriptions, using Entity Relationship diagrams. |
| | | | CST204.3 | model and design solutions for efficiently representing and querying data using relational model |
| | | | CST204.4 | demonstrate the features of indexing and hashing in database applications |
| | | | CST204.5 | discuss and compare the aspects of Concurrency Control and Recovery in Database Systems and Explain various types of NoSQL databases |
| 27 | S4 | CST 206 OPERATING SYSTEMS | CST206.1 | explain the relevance, structure and functions of Operating Systems in computing devices. |
| | | | CST206.2 | illustrate the concepts of process management and process scheduling mechanisms employed in Operating Systems. |
| | | | CST206.3 | explain process synchronization in Operating Systems and illustrate process |

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| | | | | synchronization mechanisms using Mutex Locks, Semaphores and Monitors |
| | | | CST206.4 | explain any one method for detection, prevention, avoidance and recovery for managing deadlocks in Operating Systems. |
| | | | CST206.5 | After the completion of the course the students will be able to Explain the memory management algorithms, security aspects and algorithms for file and storage management in Operating Systems. |
| 28 | S4 | HUT 200 PROFESSIONAL ETHICS | HUT200.1 | understand the core values that shape the ethical behaviour of a professional. |
| | | | HUT200.2 | adopt a good character and follow an ethical life. |
| | | | HUT200.3 | explain the role and responsibility in technological development by keeping personal ethics and legal ethics. |
| | | | HUT200.4 | solve moral and ethical problems through exploration and assessment by established experiments. |
| | | | HUT200.5 | apply the knowledge of human values and social values to contemporary ethical values and global issues. |
| 29 | S4 | MCN 202 CONSTITUTION OF INDIA | MCN202.1 | explain the background of the present constitution of India and features. |
| | | | MCN202.2 | utilize the fundamental rights and duties. |
| | | | MCN202.3 | understand the working of the union executive, parliament and judiciary. |
| | | | MCN202.4 | understand the working of the state executive, legislature and judiciary. |
| | | | MCN202.5 | utilize the special provisions and statutory institutions. |

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| 30 | S4 | CSL 202 DIGITAL LAB | CSL202.1 | design and implement combinational logic circuits using Logic Gates |
| | | | CSL202.2 | design and implement sequential logic circuits using Integrated Circuits |
| | | | CSL202.3 | simulate functioning of digital circuits using programs written in a Hardware Description Language |
| | | | CSL202.4 | function effectively as an individual and in a team to accomplish a given task of designing and implementing digital circuits. |
| | | | CSL202.5 | familiarize with different logic gates and IC's |
| 31 | S4 | CSL 204 OPERATING SYSTEMS LAB | CSL204.1 | illustrate the use of systems calls in Operating Systems |
| | | | CSL204.2 | implement Process Creation and Inter Process Communication in Operating Systems. |
| | | | CSL204.3 | implement Fist Come First Served, Shortest Job First, Round Robin and Priority- based CPU Scheduling Algorithms |
| | | | CSL204.4 | illustrate the performance of First In First Out, Least Recently Used and Least Frequently Used Page Replacement Algorithms |
| | | | CSL204.5 | implement modules for Deadlock Detection and Deadlock Avoidance in Operating Systems, implement storage management and disk scheduling algorithms |

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| COURSE OUTCOMES | | | | |
|---|---|---|---|---|
| **Branch: DEPARTMENT OF CIVIL ENGINEERING** | | | | |
| **2019 SCHEME** | | | | |
| **After the completion of the course the students will be able to** | | | | |
| 1 | S1 | MAT101 LINEAR ALGEBRA AND CALCULUS | MAT101.1 | solve systems of linear equations, diagonalize matrices and characterise quadratic forms |
| | | | MAT101.2 | compute the partial and total derivatives and maxima and minima of multivariable functions |
| | | | MAT101.3 | compute multiple integrals and apply them to find areas and volumes of geometrical shapes, mass and centre of gravity of plane laminas |
| | | | MAT101.4 | perform various tests to determine whether a given series is convergent, absolutely convergent or conditionally convergent |
| | | | MAT101.5 | determine the Taylor and Fourier series expansion of functions and learn their applications. |
| 2 | S1 | CYT 100 ENGINEERING CHEMISTRY) | CYT100.1 | apply the basic concepts of electrochemistry and corrosion to explore its possible applications in various engineering fields. |
| | | | CYT100.2 | understand various spectroscopic techniques like UV-Visible, IR, NMR and its applications. |

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| | | | CYT100.3 | apply the knowledge of analytical method for characterizing a chemical mixture or a compound. Understand the basic concept of SEM for surface characterisation of nanomaterials. |
| | | | CYT100.4 | learn about the basics of stereochemistry and its application. Apply the knowledge of conducting polymers and advanced polymers in engineering. |
| | | | CYT100.5 | study various types of water treatment methods to develop skills for treating wastewater. |
| 3 | S1 | EST 110 ENGG.GRAPHICS | EST110.1 | draw the projection of points and lines located in different quadrants |
| | | | EST110.2 | prepare multiview orthographic projections of objects by visualizing them in different positions |
| | | | EST110.3 | draw sectional views and develop surfaces of a given object |
| | | | EST110.4 | prepare pictorial drawings using the principles of isometric and perspective projections to visualize objects in three dimensions. |
| | | | EST110.5 | convert 3D views to orthographic views and vice versa using CAD tools |
| 4 | S1 | HUN 101 LIFE SKILLS | HUN101.1 | define and Identify different life skills required in personal and professional life |
| | | | HUN101.2 | develop an awareness of the self and apply well-defined techniques to cope with emotions and stress. |
| | | | HUN101.3 | explain the basic mechanics of effective communication and demonstrate these through presentations. |
| | | | HUN101.4 | take part in group discussions |

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| | | | HUN101.5 | understand the basics of teamwork and leadership |
| 5 | S1 | EST 130 BASIC ELECTRONICS/ELECTRICAL | EST130.1 | apply fundamental concepts and circuit laws to solve simple DC electric circuits. |
| | | | EST130.2 | develop and solve models of magnetic circuits. |
| | | | EST130.3 | apply the fundamental laws of electrical engineering to solve simple ac circuits in steady state. |
| | | | EST130.4 | describe the working of a voltage amplifier and to outline the principle of an electronic instrumentation system. |
| | | | EST130.5 | explain the principle of radio and cellular communication. |
| 6 | S1 | CYL 120 ENGINEERING CHEMISTRY LAB | CYL120.1 | understand and practice different techniques of quantitative chemical analysis to generate experimental skills and apply these skills to various analyses |
| | | | CYL120.2 | develop skills relevant to synthesize organic polymers and acquire the practical skill to use TLC for the identification of drugs |
| | | | CYL120.3 | develop the ability to understand and explain the use of modern spectroscopic techniques for analysing and interpreting the IR spectra and NMR spectra of some organic compounds |
| | | | CYL120.4 | acquire the ability to understand, explain and use instrumental techniques for chemical analysis |
| | | | CYL120.5 | learn to design and carry out scientific experiments as well as accurately record and analyze the results of such experiments |

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| 7 | S1 | ESL 130 ELECTRICAL & ELECTRONICS WORKSHOP | ESL130.1 | demonstrate safety measures against electric shocks. |
| | | | ESL130.2 | identify the tools used for electrical wiring, electrical accessories, wires, cables, batteries and standard symbols. |
| | | | ESL130.3 | develop the connection diagram, identify the suitable accessories and materials necessary for wiring simple lighting circuits for domestic buildings |
| | | | ESL130.4 | identify and test various electronic components |
| | | | ESL130.5 | make use of BIS/IEEE symbols to draw circuit schematics and experiment with and test electronic circuits on board |
| 8 | S2 | MAT 102 VECTOR CALCULUS, DIFFERENTIAL EQUATIONS & TRANSFORMS | MAT102.1 | compute the derivatives and line integrals of vector functions and learn their applications |
| | | | MAT102.2 | evaluate surface and volume integrals and learn their inter-relations and applications. |
| | | | MAT102.3 | solve homogeneous and non-homogeneous linear differential equation with constant coefficients |
| | | | MAT102.4 | compute Laplace transform and apply them to solve ODEs arising in engineering |
| | | | MAT102.5 | determine the Fourier transforms of functions and apply them to solve problems arising in engineering |
| 9 | S2 | PHT 110 ENGINEERING PHYSICS | PHT110.1 | compute the quantitative aspects of waves and oscillations in engineering systems. |
| | | | PHT110.2 | apply the interaction of light with matter through interference, diffraction and identify<br>these phenomena in different natural optical processes and optical instruments. |

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| | | | PHT110.3 | analyze the behaviour of matter in the atomic and subatomic level through the principles of quantum mechanics to perceive the microscopic processes in electronic devices. |
| | | | PHT110.4 | classify the properties of magnetic materials and apply vector calculus to static magnetic fields and use Maxwell's equations to diverse engineering problem |
| | | | PHT110.5 | analyze the principles behind various superconducting applications, explain the working of solid state lighting devices and fibre optic communication system |
| 10 | S2 | EST 100 ENGINEERING MECHANICS | EST100.1 | recall principles and theorems related to rigid body mechanics |
| | | | EST100.2 | identify and describe the components of system of forces acting on the rigid body |
| | | | EST100.3 | apply the conditions of equilibrium to various practical problems involving different force system. |
| | | | EST100.4 | choose appropriate theorems, principles or formulae to solve problems of mechanics. |
| | | | EST100.5 | solve problems involving rigid bodies, applying the properties of distributed areas and masses |
| 11 | S2 | EST 102 BASICS OF COMPUTER PROGRAMMING | EST102.1 | analyze a computational problem and develop an algorithm/flowchart to find its solution. |
| | | | EST102.2 | develop readable C programs with branching and looping statements, which uses Arithmetic, Logical, Relational or Bitwise operators. |

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| | | | EST102.3 | write readable C programs with arrays,structure or union for storing the data to be processed. |
| | | | EST102.4 | divide a given computational problem into a number of modules and develop a readable multi-function C program by using recursion if required, to find the solution to the computational problem. |
| | | | EST102.5 | write readable C programs which use pointers for array processing and parameter passing. Develop readable C programs with files for reading input and storing output. |
| 12 | S2 | EST 120 BASICS OF CIVIL AND MECHANICAL ENGINEERING | EST120.1 | recall the role of civil engineer in society and to relate the various disciplines of Civil Engineering with special focus on Building construction and basics of Surveying |
| | | | EST120.2 | summarize the basic infrastructure services MEP, HVAC, elevators, escalators and ramps and discuss the Materials, energy systems, water management and environment for green buildings. |
| | | | EST120.3 | analyse thermodynamic cycles and their efficiency for illustrating working of IC Engines. |
| | | | EST120.4 | explain the basic principles of refrigeration, air conditioning, hydraulic turbines and power transmission elements. |
| | | | EST120.5 | describe the basic manufacturing, metal joining and machining processes. |
| 13 | S2 | | HUN102.1 | develop vocabulary and language skills relevant to engineering as a profession. |

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| | | HUN 102 PROFESSIONAL COMMUNICATION | HUN102.2 | get the capability to analyze, interpret and effectively summarize a variety of textual content. |
| | | | HUN102.3 | create effective technical presentations. |
| | | | HUN102.4 | discuss a topic in a group setting and arrive at generalizations/ conclusions. |
| | | | HUN102.5 | create professional and technical documents with required relevance and clarity. |
| 14 | S2 | PHL 120 ENGINEERING PHYSICS LAB | PHL120.1 | develop analytical/experimental skills and impart prerequisite hands on experience for engineering laboratories |
| | | | PHL120.2 | understand the need for precise measurement practices for data recording |
| | | | PHL120.3 | understand the principle, concept, working and applications of relevant technologies and comparison of results with theoretical calculations |
| | | | PHL120.4 | analyze the techniques and skills associated with modern scientific tools such as lasers and fiber optics |
| | | | PHL120.5 | develop basic communication skills through working in groups in performing the laboratory experiments and by interpreting the results |
| 15 | S2 | ESL 120 CIVIL & MECHANICAL WORKSHOP | ESL120.1 | name different devices and tools used for civil engineering measurements and Explain the use of various tools and devices for various field measurements |
| | | | ESL120.2 | demonstrate the steps involved in basic civil engineering activities like plot measurement, setting out operation, evaluating the natural profile of land, plumbing and undertaking simple construction work. |

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| | | | ESL120.3 | choose materials and methods required for basic civil engineering activities like field measurements, masonry work and plumbing and Compare different techniques and devices used in civil engineering measurements |
| | | | ESL120.4 | identify Basic Mechanical workshop operations with appropriate Tools and Instruments with respect to the mechanical workshop trades in accordance with the material and Objects. |
| | | | ESL120.5 | apply appropriate safety measures with respect to the mechanical workshop trades. |
| 16 | S3 | MAT201 PARTIAL DIFFERENTIAL EQUATION AND COMPLEX ANALYSIS | MAT201.1 | understand the concept and the solution of partial differential equation. |
| | | | MAT201.2 | analyse and solve one dimensional wave equation and heat equation. |
| | | | MAT201.3 | understand complex functions, its continuity differentiability with the use of Cauchy-Reimann equations |
| | | | MAT201.4 | evaluate complex integrals using Cauchy's integral theorem and Cauchy's integral formula,understand the series expansion of analytic function. |
| | | | MAT201.5 | understand the series expansion of complex function about a singularity and Apply residue theorem to compute several kinds of real integrals. |
| 17 | S3 | CET201 MECHANICS OF SOLIDS | CET201.1 | recall the fundamental terms and theorems associated with mechanics of linear elastic deformable bodies. |
| | | | CET201.2 | explain the behavior and response of various structural elements under various loading conditions. |

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| | | | CET201.3 | apply the principles of solid mechanics to calculate internal stresses/strains, stress resultants and strain energies in structural elements subjected to axial/transverse loads and bending/twisting moments. |
| | | | CET201.4 | choose appropriate principles or formula to find the elastic constants of materials making use of the information available. |
| | | | CET201.5 | perform stress transformations, identify principal planes/ stresses and maximum shear stress at a point in a structural member&Analyse the given structural member to calculate the safe load or proportion the cross section to carry the load safely. |
| 18 | S3 | CET203 FLUID MECHANICS & HYDRAULICS | CET203.1 | students are able to identify or describe the type, characteristics or properties of fluid flow |
| | | | CET203.2 | students are able to recall the relevant principles of hydrostatics and hydraulics of pipes and open channel |
| | | | CET203.3 | students are able to estimate the fluid pressure, perform the stability check of bodies under hydrostatic condition |
| | | | CET203.4 | students are able to compute discharge through pipes by applying hydraulic principles of continuity, energy and/or momentum |
| | | | CET203.5 | students are able to analyze or compute the flow through open channels, perform the design of prismatic channels |
| 19 | S3 | CET205 SURVEYING & GEOMATICS | CET205.1 | students will able to get a thorough knowledge about the various surveying techniques |

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| | | | CET205.2 | students will be able to understand the errors associated with survey measurements |
| | | | CET205.3 | students will be able to understand the technique of triangulation |
| | | | CET205.4 | students will gain basic knowledge of remote sensing |
| | | | CET205.5 | students are able to obtain a basic understanding of the GIS technology |
| 20 | S3 | MCN201 SUSTAINABLE ENGINEERING | MCN201.1 | understand the relevance and the concept of sustainability and the global initiatives in this direction |
| | | | MCN201.2 | explain the different types of environmental pollution problems and their sustainable solutions |
| | | | MCN201.3 | discuss the environmental regulations and standards |
| | | | MCN201.4 | outline the concepts related to conventional and non-conventional energy |
| | | | MCN201.5 | demonstrate the broad perspective of sustainable practices by utilizing engineering knowledge and principles |
| 21 | S3 | HUT200 PROFESSIONAL ETHICS | HUT200.1 | understand the core values that shape the ethical behaviour of a professional. |
| | | | HUT200.2 | adopt a good character and follow an ethical life. |
| | | | HUT200.3 | explain the role and responsibility in technological development by keeping personal ethics and legal ethics. |
| | | | HUT200.4 | solve moral and ethical problems through exploration and assessment by established experiments. |

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| | | | HUT200.5 | apply the knowledge of human values and social values to contemporary ethical values and global issues. |
| 26 | S3 | CEL201 CIVIL ENGINEERING PLANNING AND DRAFTING LAB | CEL201.1 | illustrate ability to organise civil engineering drawings systematically and professionally |
| | | | CEL201.2 | to understand the principles of planning |
| | | | CEL201.3 | prepare building drawings as per the specified guidelines. |
| | | | CEL201.4 | assess a complete building drawing to include all necessary information |
| | | | CEL201.5 | create a digital form of the building plan using any drafting software |
| 27 | S3 | CEL203 SURVEY LAB | CEL203.1 | students will be able to use conventional surveying tools such as chain/tape and compass for plotting and area determination. |
| | | | CEL203.2 | students will be able to apply levelling principles in field |
| | | | CEL203.3 | students will be able to solve triangulation problems using theodolite |
| | | | CEL203.4 | students will be able to employ total staion for field surveying. |
| | | | CEL203.5 | students will be able to demonstrate the use of distomat and handheld GPS |
| 28 | S4 | MAT202 PROBABILITY, STATISTICS AND NUMERICAL METHODS | MAT202.1 | understand the concept, properties and important models of discrete random variables and,using them, analyse suitable random phenomena. |
| | | | MAT202.2 | understand the concept, properties and important models of continuous random variables and,using them, analyse suitable random phenomena. |

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| | | | MAT202.3 | perform statistical inferences concerning characteristics of a population based on attributes of samples drawn from the population |
| | | | MAT202.4 | compute roots of equations, evaluate definite integrals and perform interpolation on given numerical data using standard numerical techniques |
| | | | MAT202.5 | apply standard numerical techniques for solving systems of equations, fitting curves on given numerical data and solving ordinary differential equations. |
| 29 | S4 | CET202 ENGINEERING GEOLOGY | CET202.1 | recall the fundamental concepts of surface processes, subsurface process, minerals, rocks, groundwater and geological factors in civil engineering constructions. |
| | | | CET202.2 | identify and describe the surface processes, subsurface process, earth materials, groundwater and geological factors in civil engineering constructions. |
| | | | CET202.3 | apply the basic concepts of surface and subsurface processes, minerals, rocks, groundwater and geological characteristics in civil engineering constructions. |
| | | | CET202.4 | analyze and classify geological processes, earth materials and groundwater |
| | | | CET202.5 | evaluation of geological factors in civil engineering constructions. |
| 30 | S4 | CET204 GEOTECHNICAL ENGINEERING I | CET204.1 | explain the fundamental concepts of basic and engineering properties of soil |
| | | | CET204.2 | describe the laboratory testing methods for determining soil parameters |

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| | | | CET204.3 | solve the basic properties of soil by applying functional relationships |
| | | | CET204.4 | calculate the engineering properties of soil by applying the laboratory test results and the fundamental concepts of soil mechanics |
| | | | CET204.5 | analyze the soil properties to identify and classify the soil |
| 31 | S4 | CET206 TRANSPORTATION ENGINEERING | CET206.1 | apply the basic principles of Highway planning and design highway geometric elements |
| | | | CET206.2 | apply standard code specifications in judging the quality of highway materials; designing mixes and pavements |
| | | | CET206.3 | explain phenomena in road traffic by collection, analysis and interpretation of traffic data through surveys; creative design of traffic control facilities |
| | | | CET206.4 | understand about railway systems, tunnel, harbour and docks |
| | | | CET206.5 | express basics of airport engineering and design airport elements |
| 32 | S4 | EST200 DESIGN AND ENGINEERING | EST200.1 | explain the different concepts and principles involved in design engineering. |
| | | | EST200.2 | apply design thinking while learning and practicing engineering. |
| | | | EST200.3 | develop innovative and reliable designs incorporating knowledge in engineering |
| | | | EST200.4 | apply design thinking techniques to develop sustainable designs |
| | | | EST200.5 | develop economically viable designs incorporating knowledge in engineering |
| 33 | S4 | | MCN202.1 | explain the background of the present constitution of India and features |

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| | | MCN202 CONSTITUTION OF INDIA | MCN202.2 | utilize the fundamental rights and duties. |
| | | | MCN202.3 | understand the working of the union executive, parliament, state executive, legislature and judiciary. |
| | | | MCN202.4 | utilize the special provisions and statutory institutions. |
| | | | MCN202.5 | show national and patriotic spirit as responsible citizens of the country |
| 34 | S4 | CEL 202 MATERIAL TESTING LAB I | CEL202.1 | understanding the behaviour of engineering materials under various forms and stages of loading. |
| | | | CEL202.2 | characterize the elastic properties of various materials. |
| | | | CEL202.3 | evaluate the strength and stiffness properties of engineering materials under various loading conditions. |
| | | | CEL202.4 | improve the future problem solving ability related to material engineering by working as a team and able to present it. |
| | | | CEL202.5 | reproduce the basic knowledge of mathematics, science and engineering in assessing the quality and suitability of construction materials, structural element, & preparation of test reports as per the IS specification, by inculcating professional and ethical responsibility in the areas of material testing & modern instrument usage |
| 35 | S4 | CEL204 FLUID MECHANICS LAB | CEL204.1 | students will be able to select an appropriate pump/turbine with reference to given application/situation |
| | | | CEL204.2 | students will be able to estimate the optimum efficiency |

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| | | | | of a given pump/turbine under different load and (or) speed conditions |
| | | | CEL204.3 | students will be able to apply the fundamental principles of fluid mechanics in calculations involving basic flow measuring devices in both closed and open channel flows |
| | | | CEL204.4 | students will be able toanalyse the trends depicted by characteristic curves obtained from the experiments |
| | | | CEL204.5 | students will be able to predict the stability of a floating vessel following the principles of metacentric height and radius of gyration |
| 36 | S5 | CET 301 STRUCTURAL ANALYSIS I | CET301.1 | apply energy principles to analyse statically determinate structures,beams trusses frames etc. |
| | | | CET301.2 | identify the problemswith static indeterminacy and understand the basic concepts of tackling such problems by means of the method of consistent deformations. |
| | | | CET301.3 | apply suitable methods of analysis for various types of structures including cables, suspension bridges and arches. |
| | | | CET301.4 | analyse the effects of moving loads on structures using influence lines. |
| | | | CET301.5 | apply specific methods such as slope deflection and moment distribution |

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| | | | | methods of structural analysis for typical structures with different characteristics. |
| 37 | S5 | CET 303 DESIGN OF CONGRETE STRUCTURES | CET303.1 | recall the fundamental concepts of limit state design and code provisions for design of concrete members under bending, shear, compression and torsion. |
| | | | CET303.2 | analyse reinforced concrete sections to determine the ultimate capacity in bending, shear and compression. |
| | | | CET303.3 | design and detailbeams, slab, stairs and footings using IS code provisions. |
| | | | CET303.4 | design and detail columns using IS code and SP 16 design charts. |
| | | | CET303.5 | explain the criteria for earthquake resistant design of structures andductile detailing of concrete structures subjected to seismic forces. |
| 38 | S5 | CET 305 GEOTECHNICAL ENGINEERING II | CET305.1 | understand soil exploration methods |
| | | | CET305.2 | explain the basic concepts, theories and methods of analysis in foundation engineering |
| | | | CET305.3 | calculate bearing capacity, pile capacity, foundation settlement and earth pressure |
| | | | CET305.4 | analyze shallow and deep foundations |
| | | | CET305.5 | solve the field problems related to geotechnical engineering |
| 39 | S5 | CET 307 HYDROLOGY AND WATER RESOURCES | C304.1 | students are able to describe the hydrologic cycle and estimate the different components |
| | | | C304.2 | students are able to determine crop water requirements for design of irrigation systems |
| | | | C304.3 | students are able to compute the yield of aquifers and wells. |

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| | | | C304.4 | students are aware of the features of various river training works and stream guaging |
| | | | C304.5 | students are able to estimate the storage capacity of reservoirs and their useful life. |
| 40 | S5 | CET 309 CONSTRUCTION TECHNOLOGY AND MANAGEMENT | CET309.1 | describe the properties of materials used in construction and various elements of building construction |
| | | | CET309.2 | explain the properties of concrete and its determination |
| | | | CET309.3 | explain the technologies for construction |
| | | | CET309.4 | describe the procedure for planning and executing public works |
| | | | CET309.5 | apply scheduling techniques in project planning and control |
| 41 | S5 | MCN 301 DISASTER MANAGEMENT | MCN301.1 | the students will be able to define disaster and will acquire knowledge on basic terms in disaster management such as Hazard, Risk, crisis, vulnerability, exposure etc. |
| | | | MCN301.2 | the students will get general ideas about the processes involved in natural and anthropogenic disasters |
| | | | MCN301.3 | the students will gain the skills and abilities to analyse potential effects of disasters and of the strategies and methods to deliver public health response to avert these effects. |
| | | | MCN301.4 | the students will understand the concepts of disaster management and measures to mitigate and contain common episodes of disasters. |
| | | | MCN301.5 | the students will be able to propose, implement and evaluate research on disasters. |

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| 42 | S5 | CEL 331 MATERIAL TESTING LAb II | CEL331.1 | at the end of the course the students will be able to acquire the knowledge on standard properties of costruction materials as per IS code |
| | | | CEL331.2 | to point out the type of failure by conducting the experiments |
| | | | CEL331.3 | to determine the load carrying capacity and classify whether these can be used for Engineering purposes |
| | | | CEL331.4 | to acquaint with the experimental methods to determine the properties of materials such as workability of concrete,particle size distribution of aggregate,bulking of aggregate,initial and final setting time of cement,fineness of cement etc. |
| | | | CEL331.5 | students will be able to do the concrete mix design. |
| 43 | S5 | CEL 333 GEOTECHINCAL LAB | CEL333.1 | the students will be able to determine engineering properties like shear strength, compressibility etc. |
| | | | CEL333.2 | the students will be able to determine the physical properties like liquid limit, plastic limit and shrinkage limit |
| | | | CEL333.3 | the students will be able to determine the coefficient of consolidation, coefficient of permeability of soils this is very much important in settlement and seepage analysis |
| | | | CEL333.4 | the students will be able to classify the soil according to the physical and engineering properties |
| | | | CEL333.5 | the students will be able to find out the in-situ moisture content and density of the soils |

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| 44 | S6 | CET 302 STRUCTURAL ANALYSIS II | CET301.1 | understand the principles of plastic theory and its applications in structural analysis. |
| | | | CET301.2 | examine the type of structure and decide on the method of analysis. |
| | | | CET301.3 | apply approximate methods of analysis for framed structures to ascertain stress resultants approximately but quickly |
| | | | CET301.4 | apply the force and displacement method to analyse framed structures |
| | | | CET301.5 | remember basic dynamics, understand the basic principles of structural dynamics and apply the same to simple structures. |
| 45 | S6 | CET 304 ENVIRONMENTAL ENGINEERING | CET304.1 | students are able to describe the usage of water for various purposes and compute future water demand by considering population. |
| | | | CET304.2 | students are able to identify different sources of drinking water and to adopt the appropriate source of supply for the town/city under consideration. |
| | | | CET304.3 | supply good quality water with required quality standards according to client need to rise up quality of life. |
| | | | CET304.4 | students are able to select water distribution layout depending on size and shape of area and understand the necessity of maintenance. |
| | | | CET304.5 | students are able to learn technical aspects of drinking water treatment and distribution in an integrated way, paying attention to the choice of technologies and tools. |

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| 46 | S6 | CET 306 DESIGN OF HYDRAULIC STRUCTURES | CET306.1 | students are able to understand the various components of diversion head works and are able to do design of irrigation canals |
| | | | CET306.2 | students are able to design various minor irrigation structures according to the field conditions effectively |
| | | | CET306.3 | students become capable of reading working drawings of minor irrigation structures |
| | | | CET306.4 | students are able to explain the causes of failure and design criteria of different types of dams and will understand about different components of dams like spillways, shafts, stilling basins and galleries |
| | | | CET306.5 | students are able to perform the stability analysis of gravity dams |
| 47 | S6 | HUT 300 INDUSTRIAL ECONOMICS & FOREIGN TRADE | HUT300.1 | explain the problem of scarcity of resources and consumer behaviour, and to evaluate the impact of government policies on the general economic welfare. (Cognitive knowledge level: Understand) |
| | | | HUT300.2 | take appropriate decisions regarding volume of output and to evaluate the social cost of production. (Cognitive knowledge level: Apply) |
| | | | HUT300.3 | determine the functional requirement of a firm under various competitive conditions. (Cognitive knowledge level: Analyse) |
| | | | HUT300.4 | examine the overall performance of the economy, and the regulation of economic fluctuations and its impact on various sections in the society. (Cognitive knowledge level: Analyse) |

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| | | | HUT300.5 | determine the impact of changes in global economic policies on the business opportunities of a firm. (Cognitive knowledge level: Analyse) |
| 48 | S6 | CET362 ENVIRONMENTAL IMPACT ASSESSMENT | CET362.1 | to Know the concept and steps involved in environmental impact assessment and government notifications related to EIA |
| | | | CET362.2 | to know the various types of environmental pollution. |
| | | | CET362.3 | to make aware the impact due to various types of pollutants and their assessment technique. |
| | | | CET362.4 | to get knowledge about various methods of impact assessment and its features |
| | | | CET362.5 | to understand the application of EIA in various projects and to prepare reports based on EIS. |
| 49 | S6 | CET 372 FUNCTIONAL DESIGN OF BUILDINGS | CET372.1 | to understand the acoustical design concepts and noise control techniques |
| | | | CET372.2 | to impart the fundamental concepts of natural and artificial lighting designs |
| | | | CET372.3 | to provide principles of climatic conscious design of buildings with special emphasis on tropical climates. |
| | | | CET372.4 | to understand the apparent position of sun with respect to earth during different periods of the year and apply it in computation of solar radiation and design of shading devices. |
| | | | CET372.5 | to understand the concept of passive solar design and apply it in different climatic zones |
| 50 | S6 | CEL 332 TRANSPORTATION ENGINEERING LAB | CEL332.1 | students will be able to assess the quality and properties of aggregates used for pavement construction. |

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| | | | CEL332.2 | students will be able to determine CBR value and penetration resistance of soil by laboratory and field tests on soils, which is required for the design of pavements. |
| | | | CEL332.3 | students will be able to assess the quality and properties of bitumen used for pavement construction. |
| | | | CEL332.4 | students will acquire knowledge on test procedure for assessment of Specific gravity and moisture sensitivity of bituminous mixes. |
| | | | CEL332.5 | students will get familiar with the functional evaluation of pavements by using MERLIN apparatus. |
| 51 | S6 | CEL334 CIVIL ENGINEERINGSOFTWARE LAB | CEL334.1 | the students will get introduced the fundamentals of Civil Engineering drafting and drawing. |
| | | | CEL334.2 | the students will be able to familiarize with the FEA software packages for analysis and Design of structures |
| | | | CEL334.3 | the students will be able to understand the Total Station data transfer and interpretation. |
| | | | CEL334.4 | student will get enable the usage of Project Management Software |
| | | | CEL334.5 | the students are expected to accomplish the abilities/skills for the use of Civil Engineering Software. |
| 52 | S6 | CET308 COMPREHENSIVE COURSE WORK | CET308.1 | the students will be able to comprehend the questions asked. |
| | | | CET308.2 | the students will be able to answer the questions with confidence |
| | | | CET308.3 | to assess the comprehensive knowledge |
| | | | CET308.4 | to assess the practical knowledge |

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| | | | CET308.5 | to assess the knowledge in civil engineering field |
| 52 | S7 | CET401 DESIGN OF STEEL STRUCTURES | CET401.1 | to explain the behavior and properties of structural steel members to resist various structural forces and actions and apply the relevant codes of practice |
| | | | CET401.2 | analyses the behavior of structural steel members and undertake design at both serviceability and ultimate limit states |
| | | | CET401.3 | explain the theoretical and practical aspects of Design of composite Steel Structure along with the planning and design aspects |
| | | | CET401.4 | apply a diverse knowledge of Design of Steel engineering practices applied to real life problems |
| | | | CET401.5 | demonstrate experience in the implementation of design of structures on engineering concepts which are applied in field Structural Engineering |
| 53 | S7 | CET463 ADVANCED ENVIRONMENT ENGINEERING | CET463.1 | students will be able to explain various secondary treatment technologies for waste water. |
| | | | CET463.2 | students will be able to explain various tertiary treatment technologies and their applications |
| | | | CET463.3 | students will be able to understand various advanced oxidation technologies and explain engineering principles to dimension various treatment units |
| | | | CET463.4 | students will be able to identify appropriate technology for controlling air pollution |
| | | | CET463.5 | students will be able to understand the fundamental equilibrium and transport |

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| | | | | properties in adsorption and solve membrane-based separation problems by acquiring in-depth knowledge in the area of membrane separation mechanisms. |
| 53 | S7 | CET423 GROUND IMPROVEMENT TECHNIQUES | CET423.1 | students will be able to classify different ground improvement methods based on the soil suitability |
| | | | CET423.2 | an outline of the basic concept/ design aspects of various ground improvement methods could be understood |
| | | | CET423.3 | students will be able to identify the construction procedure of different ground improvement methods |
| | | | CET423.4 | choose different application of geosynthetics and soil stabilisation in Ground improvement |
| | | | CET423.5 | students are able to describe the mechanism behind the ground modification techniques and expected changes in properties of soil due to modification. |
| 54 | S7 | MCN401 IINDUSTRIAL SAFETY ENGINEERING | MCN401.1 | students would be able to describe the theories of accident causation and preventive measures of industrial accidents. |
| | | | MCN401.2 | students would be able to explain about personal protective equipment, its selection, safety performance & indicators and importance of housekeeping |
| | | | MCN401.3 | students would be able to explain different issues in construction industrie |
| | | | MCN401.4 | students would be able to describe various hazards associated with different |

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| | | | | machines and mechanical material handling |
| | | | MCN401.5 | students would be able to utilize different hazard identification tools in different industries with the knowledge of different types of chemical hazards. |
| 54 | S7 | CEQ413 SEMINAR | CEQ413.1 | identify academic documents from the literature which are related to her/his areas of interest |
| | | | CEQ413.2 | read and apprehend an academic document from the literature which is related to her/ his areas of interest |
| | | | CEQ413.3 | prepare a presentation about an academic document |
| | | | CEQ413.4 | give a presentation about an academic document |
| | | | CEQ413.5 | prepare a technical report |
| 55 | S7 | CED415 PROJECT PHASE I | CED415.1 | model and solve real world problems by applying knowledge across domains |
| | | | CED415.2 | develop products, processes or technologies for sustainable and socially relevant applications |
| | | | CED415.3 | function effectively as an individual and as a leader in diverse teams and to comprehend and execute designated tasks |
| | | | CED415.4 | plan and execute tasks utilizing available resources within timelines and organize and communicate technical and scientific findings effectively in written and oral forms |
| | | | CED415.5 | identify technology/research gaps and propose innovative/creative solutions |

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| 55 | S7 | CEL 411 ENVIRONMENTAL ENGINEERING LAB | CET411.1 | students will be able to analyse various physico-chemical and biological parameters of water. |
| | | | CET411.2 | students will be able to compare the quality of water with drinking water standards and recommend its suitability for drinking purposes. |
| | | | CET411.3 | the students will be able to perform common environmental experiments relating to water and wastewater quality, and know which tests are appropriate for given environmental problems. |
| | | | CET411.4 | students will be able to demonstrate the ability to write clear technical laboratory reports and to work in groups |
| | | | CET411.5 | students will be able to understand the impact of water and wastewater treatment on people and the environment and apply ethical issues associated with decision making and professional conduct in the laboratory and field environment. |
| 56 | S8 | CET402 QUANTITY SURVEYING & VALUATION(QSV) | CET402.1 | students will be able to understand the basic terms related to estimation, quantity surveying and contract document |
| | | | CET402.2 | students will be able to interpret the item of work from drawings and explain its general specification and unit of measurement |
| | | | CET402.3 | students will be able to make use of given data from CPWD DAR/DSR for calculating the unit rate of different items of work associated with building construction |
| | | | CET402.4 | students will be able to develop detailed measurement (including BBS) and BoQ of |

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| | | | | various work like buildings, earthwork for road, sanitary and water supply work |
| | | | CET402.5 | students will be able to explain various basic terms related to valuation of land and building and develop valuation of buildings using different methods of valuation. |
| 56 | S8 | CET464 AIR QUALITY MANAGEMENT | CET464.1 | students will be able to understand the nature of environment & sources and key effects of air pollutants |
| | | | CET464.2 | students will have insight into fundamentals of meteorology and behavior of plumes . |
| | | | CET464.3 | students will be able to understand the dispersion of various air pollutants. |
| | | | CET464.4 | students will be able to use plume dispersion models, specifically gaussian dispersion model, explore Dispersion problems involving point source and line source, and estimate the plume rise. |
| | | | CET464.5 | students will be able to analyze the quality of air in a particular region and will be familiar with the various techniques that can be adopted for managing air pollution related problems. |
| 57 | S8 | CET 436 TRANSPORTATION PLANNING | CET436.1 | identify the need for transportation planning, the issues and challenges related to transportation and its interaction with urban structure and land use |
| | | | CET436.2 | apply the concept of travel demand and analyse its role in transportation planning and to apply the concept in systems approach to transportation planning process. |

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| | | | CET436.3 | apply the concept of delineation of study area, sampling of data, and data collection techniques for the four stage planning process and to analyse the techniques for predicting trip generation |
| | | | CET436.4 | apply and analyse the methods for predicting trip distribution, mode split and traffic assignment |
| | | | CET436.5 | apply the land use transport models and to analyse the sustainable approaches to transportation planning and preparation of comprehensive mobility plan with application of GIS |
| 57 | S8 | CET456 REPAIR & REHABILITATION OF STRUCTURES | CET456.1 | make the students recall the basics ideas and theories associated with Concrete technology and Masonry structures. |
| | | | CET456.2 | students will be able to understand the need and methodology of repair and rehabilitation of structures, the various mechanisms used, and tools for diagnosis of structures |
| | | | CET456.3 | students will be able to identify the criterions for repairing / maintenance and the types and properties of repair materials used in site and learn various techniques for repairing damaged and corroded structures |
| | | | CET456.4 | students will be able to propose whole sum solutions for maintenance/rehabilitation and applying methodologies for repairing structures or demolishing structures. |
| | | | CET456.5 | students will be able to analyze and assess the damage to structures using various test |

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| 58 | S8 | CET 458 SUSTAINABLE CONSTRUCTION | CET458.1 | to study about fundamental features of sustainability |
| | | | CET458.2 | to identify the properties and uses of sustainable building materials |
| | | | CET458.3 | to learn about cost effective technologies |
| | | | CET458.4 | to know about features of green building rating system |
| | | | CET458.5 | students will be able to study concepts of BIM |
| 58 | S8 | CED 416 PROJECT PHASE II | CED416.1 | model and solve real world problems by applying knowledge across domains |
| | | | CED416.2 | develop products, processes or technologies for sustainable and socially relevantapplications |
| | | | CED416.3 | functioneffectivelyasanindividualandasaleaderindiverseteamsandtocomprehendand execute designated tasks |
| | | | CED416.4 | planandexecutetasksutilizingavailableresourceswithintimelinesandorganizeandcommunicatetechnical and scientificfindings effectivelyin written andoral forms |
| | | | CED416.5 | identify technology/research gaps and propose innovative/creative solutions,Organize and communicate technical and scientific findings effectively in written and oral forms |

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**Vidya Academy of Science & Technology**
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**COURSE OUTCOMES**

**Branch: DEPARTMENT OF COMPUTER SCIENCE ENGINEERING**

**2019 SCHEME**

**After the completion of the course the students will be able to**

| S. No. | SEM | Subject | CO | CO statement |
|---|---|---|---|---|
| 1 | S1 | MAT 101 LINEAR ALGEBRA AND CALCULUS | MAT101.1 | solve systems of linear equations, diagonalize matrices and characterise quadratic forms |
| | | | MAT101.2 | compute the partial and total derivatives and maxima and minima of multivariable functions |
| | | | MAT101.3 | compute multiple integrals and apply them to find areas and volumes of geometrical shapes,mass and centre of gravity of plane laminas |
| | | | MAT101.4 | perform various tests to determine whether a given series is convergent, absolutely convergent or conditionally convergent |
| | | | MAT101.5 | determine the Taylor and Fourier series expansion of functions and learn their applications. |
| 2 | S1 | PHT 100 ENGINEERING PHYSICS | PHT100.1 | compute the quantitative aspects of waves and oscillations in engineering systems. |
| | | | PHT100.2 | apply the interaction of light with matter through interference, diffraction and identify these phenomena in different natural optical processes and optical instruments. |

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| | | | PHT100.3 | analyze the behaviour of matter in the atomic and subatomic level through the principles of quantum mechanics to perceive the microscopic processes in electronic devices. |
| | | | PHT100.4 | classify the properties of magnetic materials and apply vector calculus to static magnetic fields and use Maxwell's equations to diverse engineering problem |
| | | | PHT100.5 | analyze the principles behind various superconducting applications, explain the working of solid state lighting devices and fibre optic communication system |
| 3 | S1 | EST 100 ENGINEERING MECHANICS | EST100.1 | recall principles and theorems related to rigid body mechanics |
| | | | EST100.2 | identify and describe the components of system of forces acting on the rigid body |
| | | | EST100.3 | apply the conditions of equilibrium to various practical problems involving different force system. |
| | | | EST100.4 | choose appropriate theorems, principles or formulae to solve problems of mechanics. |
| | | | EST100.5 | solve problems involving rigid bodies, applying the properties of distributed areas and masses |
| 4 | S1 | EST 120 BASICS OF CIVIL AND MECHANICAL ENGINEERING | EST120.1 | recall the role of civil engineer in society and to relate the various disciplines of Civil Engineering with special focus on Building construction and basics of Surveying |

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| | | | EST120.2 | summarize the basic infrastructure services MEP, HVAC, elevators, escalators and ramps and discuss the Materials, energy systems, water management and environment for green buildings. |
| | | | EST120.3 | analyse thermodynamic cycles and their efficiency for illustrating working of IC Engines. |
| | | | EST120.4 | explain the basic principles of refrigeration, air conditioning, hydraulic turbines and power transmission elements. |
| | | | EST120.5 | describe the basic manufacturing, metal joining and machining processes. |
| 5 | S1 | HUN 101 LIFE SKILLS | HUN101.1 | define and identify different life skills required in personal and professional life |
| | | | HUN101.2 | develop an awareness of the self and apply well-defined techniques to cope with emotions and stress |
| | | | HUN101.3 | explain the basic mechanics of effective communication and demonstrate these through presentations and use appropriate thinking and problem solving techniques to solve new problems |
| | | | HUN101.4 | take part in group discussions |
| | | | HUN101.5 | understand the basics of teamwork and leadership |
| 6 | S1 | PHL 120 ENGINEERING PHYSICS LAB | PHL120.1 | develop analytical/experimental skills and impart prerequisite hands on experience for engineering laboratories |

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| | | | PHL120.2 | understand the need for precise measurement practices for data recording |
| | | | PHL120.3 | understand the principle, concept, working and applications of relevant technologies and comparison of results with theoretical calculations |
| | | | PHL120.4 | analyze the techniques and skills associated with modern scientific tools such as lasers and fiber optics |
| | | | PHL120.5 | develop basic communication skills through working in groups in performing the laboratory experiments and by interpreting the results |
| 7 | S1 | ESL 120 CIVIL AND MECHANICAL WORKSHOP | ESL120.1 | name different devices and tools used for civil engineering measurements and Explain the use of various tools and devices for various field measurements |
| | | | ESL120.2 | demonstrate the steps involved in basic civil engineering activities like plot measurement, setting out operation, evaluating the natural profile of land, plumbing and undertaking simple construction work. |
| | | | ESL120.3 | choose materials and methods required for basic civil engineering activities like field measurements, masonry work and plumbing and Compare different techniques and devices used in civil engineering measurements |
| | | | ESL120.4 | identify Basic Mechanical workshop operations with appropriate Tools and Instruments with respect to the mechanical workshop trades in |

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| | | | | accordance with the material and Objects. |
| | | | ESL120.5 | apply appropriate safety measures with respect to the mechanical workshop trades. |
| 8 | S2 | MAT 102 VECTOR CALCULUS, DIFFERENTAIL EQUATIONS AND TRASNFORM | MAT102.1 | compute the derivatives and line integrals of vector functions and learn their applications |
| | | | MAT102.2 | evaluate surface and volume integrals and learn their inter-relations and applications. |
| | | | MAT102.3 | solve homogeneous and non-homogeneous linear differential equation with constant coefficients |
| | | | MAT102.4 | compute Laplace transform and apply them to solve ODEs arising in engineering |
| | | | MAT102.5 | determine the Fourier transforms of functions and apply them to solve problems arising in engineering |
| 9 | S2 | CYT 100 ENGINEERING CHEMISTRY | CYT100.1 | apply the basic concepts of electrochemistry and corrosion to explore its possible applications in various engineering fields. |
| | | | CYT100.2 | understand various spectroscopic techniques like UV-Visible, IR, NMR and its applications. |
| | | | CYT100.3 | apply the knowledge of analytical method for characterizing a chemical mixture or a compound. Understand the basic concept of SEM for surface characterisation of nanomaterials. |
| | | | CYT100.4 | learn about the basics of stereochemistry and its application. Apply the |

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| | | | | knowledge of conducting polymers and advanced polymers in engineering. |
| | | | CYT100.5 | study various types of water treatment methods to develop skills for treating wastewater. |
| 10 | S2 | EST 110 ENGINEERING GRAPHICS | EST110.1 | draw the projection of points and lines located in different quadrants |
| | | | EST110.2 | prepare multi-view orthographic projections of objects by visualizing them in different positions |
| | | | EST110.3 | draw sectional views and develop surfaces of a given object |
| | | | EST110.4 | prepare pictorial drawings using the principles of isometric and perspective projections to visualize objects in three dimensions |
| | | | EST110.5 | convert 3D views to orthographic views and vice versa using CAD tools |
| 11 | S2 | EST 130 BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING | EST130.1 | apply fundamental concepts and circuit laws to solve simple DC electric circuits. |
| | | | EST130.2 | develop and solve models of magnetic circuits. |
| | | | EST130.3 | apply the fundamental laws of electrical engineering to solve simple ac circuits in steady state. |
| | | | EST130.4 | describe the working of a voltage amplifier and to outline the principle of an electronic instrumentation system. |
| | | | EST130.5 | explain the principle of radio and cellular communication. |
| 12 | S2 | | HUN102.1 | develop vocabulary and language skills relevant to engineering as a profession. |

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| | | HUN 102 PROFESSIONAL COMMUNICATION | HUN102.2 | get the capability to analyze, interpret and effectively summarize a variety of textual content. |
| | | | HUN102.3 | create effective technical presentations. |
| | | | HUN102.4 | discuss a topic in a group setting and arrive at generalizations/ conclusions. |
| | | | HUN102.5 | create professional and technical documents with required relevance and clarity. |
| 13 | S2 | EST 102 PROGRAMING IN C | EST102.1 | analyze a computational problem and develop an algorithm/flowchart to find its solution. |
| | | | EST102.2 | develop readable C programs with branching and looping statements, which uses Arithmetic, Logical, Relational or Bitwise operators. |
| | | | EST102.3 | write readable C programs with arrays,structure or union for storing the data to be processed. |
| | | | EST102.4 | divide a given computational problem into a number of modules and develop a readable multi-function C program by using recursion if required, to find the solution to the computational problem. |
| | | | EST102.5 | write readable C programs which use pointers for array processing and parameter passing. Develop readable C programs with files for reading input and storing output. |
| 14 | S2 | CYL 120 ENGINEERING CHEMISTRY LAB | CYL120.1 | understand and practice different techniques of quantitative chemical analysis to generate experimental skills and apply these skills to various analyses |

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| | | | CYL120.2 | develop skills relevant to synthesize organic polymers and acquire the practical skill to use TLC for the identification of drugs |
| | | | CYL120.3 | develop the ability to understand and explain the use of modern spectroscopic techniques for analysing and interpreting the IR spectra and NMR spectra of some organic compounds |
| | | | CYL120.4 | acquire the ability to understand, explain and use instrumental techniques for chemical analysis |
| | | | CYL120.5 | learn to design and carry out scientific experiments as well as accurately record and analyze the results of such experiments |
| 15 | S2 | ESL 130 ELECTRICAL AND ELECTRONICS WORKSHOP | ESL130.1 | demonstrate safety measures against electric shocks. |
| | | | ESL130.2 | identify the tools used for electrical wiring, electrical accessories, wires, cables, batteries and standard symbols. |
| | | | ESL130.3 | develop the connection diagram, identify the suitable accessories and materials necessary for wiring simple lighting circuits for domestic buildings |
| | | | ESL130.4 | identify and test various electronic components |
| | | | ESL130.5 | make use of BIS/IEEE symbols to draw circuit schematics and experiment with and test electronic circuits on board |
| 16 | S3 | MAT 203 DISCRETE MATHEMATICAL STRUCTURES | MAT203.1 | check the validity of predicates in Propositional and Quantified Propositional Logic using truth tables, deductive reasoning and inference theory on Propositional Logic |

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| | | | MAT203.2 | solve counting problems by applying the elementary counting techniques - Rule of Sum, Rule of Product, Permutation, Combination, Binomial Theorem, Pigeonhole Principle and Principle of Inclusion and Exclusion |
| | | | MAT203.3 | classify binary relations into various types and illustrate an application for each type of binary relation, in Computer Science Illustrate an application for Partially Ordered Sets and Complete Lattices, in Computer Science |
| | | | MAT203.4 | explain Generating Functions and solve First Order and Second Order Linear Recurrence Relations with Constant Coefficients |
| | | | MAT203.5 | illustrate the abstract algebraic systems – Semigroups , Monoids, Groups, Homomorphism and Isomorphism of Monoids and Groups |
| 17 | S3 | CST 201 DATA STRUCTURES | CST201.1 | design an algorithm for a computational task and calculate the time/space complexities of that algorithm |
| | | | CST201.2 | produce algorithms for given computational problems like searching, scheduling and expression conversions by understanding basic data structures such as array, stack and queue. |
| | | | CST201.3 | identify the suitable data structure (array or linked list) to represent a data item required to be processed and write an algorithm to solve a given computational problem by |

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| | | | | understanding the basic concepts of memory allocation and deallocation. |
| | | | CST201.4 | write an algorithm to find the solution of a computational problem by selecting an appropriate data structure (binary tree/graph) to represent a data item to be processed. |
| | | | CST201.5 | store a given dataset using an appropriate hash function to enable efficient access of data in the given set. Understand various sorting algorithms, select appropriate sorting algorithms to be used in specific circumstances |
| 18 | S3 | CST 203 LOGIC SYSTEM DESIGN | CST203.1 | illustrate decimal, binary, octal, hexadecimal and BCD number systems, perform conversions among them and do the operations - complementation, addition, subtraction, multiplication and division on binary numbers |
| | | | CST203.2 | simplify a given Boolean Function and design a combinational circuit to implement the simplified function using Digital Logic Gates |
| | | | CST203.3 | design combinational circuits - Adders, Code Convertors, Decoders, Magnitude Comparators, Parity Generator/Checker and design the Programmable Logic Devices - ROM and PLA. |
| | | | CST203.4 | design sequential circuits - Registers, Counters and Shift Registers |
| | | | CST203.5 | dse algorithms to perform addition and subtraction on binary, BCD and floating point numbers |
| 19 | S3 | CST 205 OBJECT ORIENTED | CST205.1 | write Java programs using the object oriented concepts - classes, objects, |

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| | | PROGRAMMING USING JAVA | | constructors, data hiding, inheritance and polymorphism |
| | | | CST205.2 | utilise datatypes, operators, control statements, built in packages & interfaces, Input/ Output Streams and Files in Java to develop programs |
| | | | CST205.3 | illustrate how robust programs can be written in Java using exception handling mechanism |
| | | | CST205.4 | write application programs in Java using multithreading and database connectivity |
| | | | CST205.5 | Write Graphical User Interface based application programs by utilising event handling features and Swing in Java |
| 20 | S3 | EST 200 DESIGN AND ENGINEERING | EST200.1 | explain different concepts and principles involved in design engineering. |
| | | | EST200.2 | discuss and demonstrate the workability of solutions for design problems and Apply design thinking while learning and practicing engineering. |
| | | | EST200.3 | compare designs covering function, cost, environmental sensitivity, safety factors along with engineering analysis. |
| | | | EST200.4 | develop innovative, reliable, sustainable and economically viable designs incorporating knowledge in engineering. |
| | | | EST200.5 | judge the optimal solution from the available choice. |
| 21 | S3 | MCN 201 SUSTAINABLE ENGINEERING | MCN201.1 | understand the relevance and the concept of sustainability and the global initiatives in this direction |
| | | | MCN201.2 | explain the different types of environmental pollution problems and their sustainable solutions |

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| | | | MCN201.3 | discuss the environmental regulations and standards |
| | | | MCN201.4 | outline the concepts related to conventional and non-conventional energy |
| | | | MCN201.5 | demonstrate the broad perspective of sustainable practices by utilizing engineering knowledge and principles |
| 22 | S3 | CSL 201 DATA STRUCTURES LAB | CSL201.1 | write a time/space efficient program using arrays to provide necessary functionalities meeting a given set of user requirements |
| | | | CSL201.2 | write a time/space efficient program using linked lists to provide necessary functionalities meeting a given set of user requirements |
| | | | CSL201.3 | write a time/space efficient program graphs to provide necessary functionalities meeting a given set of user requirements |
| | | | CSL201.4 | write a time/space efficient program to sort a list of records based on a given key in the record |
| | | | CSL201.5 | design and implement an efficient data structure to represent given data |
| 23 | S3 | CSL203 OBJECT ORIENTED PROGRAMMING LAB | CSL203.1 | implement the Object Oriented concepts - constructors, inheritance, method overloading & overriding and polymorphism in Java |
| | | | CSL203.2 | implement programs in Java which use datatypes, operators, control statements, built in packages & interfaces, Input/Output streams and Files |
| | | | CSL203.3 | implement robust application programs in Java using exception handling |

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| | | | CSL203.4 | implement application programs in Java using multithreading and database connectivity |
| | | | CSL203.5 | implement Graphical User Interface based application programs by utilizing event handling features and Swing in Java |
| 24 | S4 | MAT 206 GRAPH THEORY | MAT206.1 | explain vertices and their properties, types of paths, classification of graphs and trees & their properties. |
| | | | MAT206.2 | demonstrate the fundamental theorems on Eulerian and Hamiltonian graphs. |
| | | | MAT206.3 | illustrate the working of Prim's and Kruskal's algorithms for finding minimum cost spanning tree and Dijkstra's and Floyd-Warshall algorithms for finding shortest paths. |
| | | | MAT206.4 | explain planar graphs, their properties and an application for planar graphs and illustrate how one can represent a graph in a computer. |
| | | | MAT206.5 | explain the Vertex Color problem in graphs and illustrate an example application for vertex coloring. |
| 25 | S4 | CST 202 COMPUTER ORGANIZATION AND ARCHITECTURE | CST202.1 | identify the basic structure and roles of various functional units of a computer and analyze the effect of addressing modes during the execution time of a program. |
| | | | CST202.2 | explore the complete steps in an instruction execution and demonstrate computer arithmetic operations on integer and real numbers |
| | | | CST202.3 | select appropriate interfacing standards for I/O devices. |

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| | | | CST202.4 | understand memory hierarchy and its impact on computer cost/performance |
| | | | CST202.5 | build simple arithmetic and logical units.Identify and analyze pros and cons of different types of control logic design in processors. |
| 26 | S4 | CST 204 DATABASE MANAGEMENT SYSSTEMS | CST204.1 | summarize and exemplify fundamental nature and characteristics of database systems |
| | | | CST204.2 | model real word scenarios given as informal descriptions, using Entity Relationship diagrams. |
| | | | CST204.3 | model and design solutions for efficiently representing and querying data using relational model |
| | | | CST204.4 | demonstrate the features of indexing and hashing in database applications |
| | | | CST204.5 | discuss and compare the aspects of Concurrency Control and Recovery in Database Systems and Explain various types of NoSQL databases |
| 27 | S4 | CST 206 OPERATING SYSTEMS | CST206.1 | explain the relevance, structure and functions of Operating Systems in computing devices. |
| | | | CST206.2 | illustrate the concepts of process management and process scheduling mechanisms employed in Operating Systems. |
| | | | CST206.3 | explain process synchronization in Operating Systems and illustrate process synchronization mechanisms using Mutex Locks, Semaphores and Monitors |
| | | | CST206.4 | explain any one method for detection, prevention, avoidance and recovery for |

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| | | | | managing deadlocks in Operating Systems. |
| | | | CST206.5 | After the completion of the course the students will be able to Explain the memory management algorithms, security aspects and algorithms for file and storage management in Operating Systems. |
| 28 | S4 | HUT 200 PROFESSIONAL ETHICS | HUT200.1 | understand the core values that shape the ethical behaviour of a professional. |
| | | | HUT200.2 | adopt a good character and follow an ethical life. |
| | | | HUT200.3 | explain the role and responsibility in technological development by keeping personal ethics and legal ethics. |
| | | | HUT200.4 | solve moral and ethical problems through exploration and assessment by established experiments. |
| | | | HUT200.5 | apply the knowledge of human values and social values to contemporary ethical values and global issues. |
| 29 | S4 | MCN 202 CONSTITUTION OF INDIA | MCN202.1 | explain the background of the present constitution of India and features. |
| | | | MCN202.2 | utilize the fundamental rights and duties. |
| | | | MCN202.3 | understand the working of the union executive, parliament and judiciary. |
| | | | MCN202.4 | understand the working of the state executive, legislature and judiciary. |
| | | | MCN202.5 | utilize the special provisions and statutory institutions. |
| 30 | S4 | CSL 202 DIGITAL LAB | CSL202.1 | design and implement combinational logic circuits using Logic Gates |
| | | | CSL202.2 | design and implement sequential logic circuits using Integrated Circuits |

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| | | | CSL202.3 | simulate functioning of digital circuits using programs written in a Hardware Description Language |
| | | | CSL202.4 | function effectively as an individual and in a team to accomplish a given task of designing and implementing digital circuits. |
| | | | CSL202.5 | familiarize with different logic gates and IC's |
| 31 | S4 | CSL 204 OPERATING SYSTEMS LAB | CSL204.1 | illustrate the use of systems calls in Operating Systems |
| | | | CSL204.2 | implement Process Creation and Inter Process Communication in Operating Systems. |
| | | | CSL204.3 | implement Fist Come First Served, Shortest Job First, Round Robin and Priority- based CPU Scheduling Algorithms |
| | | | CSL204.4 | illustrate the performance of First In First Out, Least Recently Used and Least Frequently Used Page Replacement Algorithms |
| | | | CSL204.5 | implement modules for Deadlock Detection and Deadlock Avoidance in Operating Systems, implement storage management and disk scheduling algorithms |
| 32 | S5 | CST 301 FORMAL LANGUAGES AND AUTOMATA THEORY | CST301.1 | classify a given formal language into Regular, Context-Free, Context Sensitive, Recursive or Recursively Enumerable. |
| | | | CST301.2 | explain a formal representation of a given regular language as a finite state automaton, regular grammar, regular expression and Myhill-Nerode relation |

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| | | | CST301.3 | design a Pushdown Automaton and a Context-Free Grammar for a given context-free language |
| | | | CST301.4 | design Turing machines as language acceptors or transducers. |
| | | | CST301.5 | explain the notion of decidability. |
| 33 | S5 | CST 303 COMPUTER NETWORKS | CST303.1 | explain the features of computer networks, protocols, and network design models. |
| | | | CST303.2 | describe the fundamental characteristics of the physical layer and identify the usage in network communication |
| | | | CST303.3 | explain the design issues of data link layer, link layer protocols, bridges and switches. |
| | | | CST303.4 | select appropriate routing algorithms, congestion control techniques, and Quality of Service requirements for a network. |
| | | | CST303.5 | illustrate the functions and protocols of the network layer, transport layer, and application layer in inter-networking |
| 34 | S5 | CST 305 SYSTEM SOFTWARE | CST305.1 | distinguish softwares into system and application software categories. |
| | | | CST305.2 | identify standard and extended architectural features of machines. |
| | | | CST305.3 | identify machine dependent features of system software |
| | | | CST305.4 | identify machine independent features of system software. |
| | | | CST305.5 | design algorithms for system softwares and analyze the effect of data structures. |

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| 35 | S5 | CST 307 MICROPROCESSORS AND MICROCONTROLLERS | CST307.1 | illustrate the architecture, modes of operation and addressing modes of microprocessors |
| | | | CST307.2 | develop 8086 assembly language programs. |
| | | | CST307.3 | demonstrate interrupts, its handling and programming in 8086. |
| | | | CST307.4 | illustrate how different peripherals (8255,8254,8257) and memory are interfaced with microprocessors |
| | | | CST307.5 | outline features of microcontrollers and develop low level programs. |
| 36 | S5 | CST 309 MANAGEMENT OF SOFTWARE SYSTEMS | CST309.1 | demonstrate Traditional and Agile Software Development approaches |
| | | | CST309.2 | prepare Software Requirement Specification and Software Design for a given problem |
| | | | CST309.3 | justify the significance of design patterns and licensing terms in software development, prepare testing, maintenance and DevOps strategies for a project. |
| | | | CST309.4 | make use of software project management concepts while planning, estimation, scheduling, tracking and change management of a project, with a traditional/agile framework. |
| | | | CST309.5 | utilize SQA practices, Process Improvement techniques and Technology advancements in cloud based software models and containers & microservices. |
| 37 | S5 | MCN 301 DISASTER MANAGEMENT | MCN301.1 | define and use various terminologies in use in disaster management parlance and |

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| | | | | organise each of these terms in relation to the disaster management cycle |
| | | | MCN301.2 | distinguish between different hazard types and vulnerability types and do vulnerability assessment |
| | | | MCN301.3 | identify the components and describe the process of risk assessment, and apply appropriate methodologies to assess risk |
| | | | MCN301.4 | explain the core elements and phases of Disaster Risk Management and develop possible measures to reduce disaster risks across sector and community |
| | | | MCN301.5 | identify factors that determine the nature of disaster response and discuss the various disaster response actions along with the best practices for disaster management and risk reduction at national and international level |
| 38 | S5 | CSL 331 SYSTEM SOFTWARES AND MICROPROCESSORS LAB | CSL331.1 | develop 8086 programs and execute it using a microprocessor kit. |
| | | | CSL331.2 | develop 8086 programs and, debug and execute it using MASM assemblers |
| | | | CSL331.3 | develop and execute programs to interface stepper motor, 8255, 8279 and digital to analog converters with 8086 trainer kit |
| | | | CSL331.4 | design and implement assemblers, Loaders and macroprocessors. |
| | | | CSL331.5 | implement and execute different scheduling and paging algorithms in OS |
| 39 | S5 | CSL 333 DATABASE MANAGEMENT SYSTEMS LAB | CSL333.1 | design database schema for a given real world problem-domain using standard design and modeling approaches |

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| | | | CSL333.2 | construct queries using SQL for database creation, interaction, modification, and updation |
| | | | CSL333.3 | design and implement triggers and cursors |
| | | | CSL333.4 | implement procedures, functions, and control structures using PL/SQL |
| | | | CSL333.5 | develop database applications using front-end tools and back-end DBMS |
| 40 | S6 | CST 302, COMPILER DESIGN | CST302.1 | Identify the suitable design strategy to solve a given problem. |
| | | | CST302.2 | illustrate line drawing, circle drawing and polygon filling Algorithms. |
| | | | CST302.3 | demonstrate geometric representations, transformations on 2D & 3D objects, clipping algorithms and projection algorithms. |
| | | | CST302.4 | summarize visible surface detection methods, concepts of digital image representation, processing and demonstrate pixel relationships. |
| | | | CST302.5 | solve image enhancement and segmentation problems using spatial domain techniques |
| 41 | S6 | CST 304 COMPUTER GRAPHICS AND IMAGE PROCESSING | CST304.1 | describe the working principles of graphics devices and illustrate line drawing, circle drawing and polygon filling algorithms. |
| | | | CST304.2 | demonstrate geometric representations, transformations on 2D & 3D objects, clipping algorithms and projection algorithms |
| | | | CST304.3 | summarize visible surface detection methods |

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| | | | CST304.4 | Summarize the concepts of digital image representation, processing and demonstrate pixel relationships |
| | | | CST304.5 | Solve image enhancement and segmentation problems using spatial domain techniques |
| 42 | S6 | CST 306, ALGORITHM ANA LYSIS AND DESIGN | CST306.1 | analyze any given algorithm and express its time and space complexities in asymptotic notations |
| | | | CST306.2 | derive recurrence equations and solve it using Iteration, Recurrence Tree, Substitution and Master's Method to compute time complexity of algorithms |
| | | | CST306.3 | illustrate Graph traversal algorithms & applications and Advanced Data structures like AVL trees and Disjoint set operations. |
| | | | CST306.4 | demonstrate Divide-and-conquer, Greedy Strategy, Dynamic programming, Branch-and Bound and Backtracking algorithm design techniques |
| | | | CST306.5 | classify a problem as computationally tractable or intractable, and discuss strategies to address intractability |
| 43 | S6 | CST 362, PROGRAMMING IN PYTHON | CST362.1 | write, test and debug Python programs |
| | | | CST362.2 | illustrate uses of conditional (if, if-else and if-elif-else ) and iterative (while and for) statements in Python programs. |
| | | | CST362.3 | develop programs by utilizing the Python programming constructs such as Lists, Tuples, Sets and Dictionaries. |
| | | | CST362.4 | develop graphical user interface for solutions using Python libraries. |

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| | | | CST362.5 | implement Object Oriented programs with exception handling,NumPy,Matplotlib,pandas |
| 44 | S6 | HUT300, INDUSTRIAL ECONOMICS & FOREIGN TRADE | HUT300.1 | explain the problem of scarcity of resources and consumer behaviour, and to evaluate the impact of government policies on the general economic welfare |
| | | | HUT300.2 | take appropriate decisions regarding volume of output and to evaluate the social cost of production. |
| | | | HUT300.3 | determine the functional requirement of a firm under various competitive conditions. |
| | | | HUT300.4 | examine the overall performance of the economy, and the regulation of economic fluctuations and its impact on various sections in the society. |
| | | | HUT300.5 | determine the impact of changes in global economic policies on the business opportunities of a firm. |
| 45 | S6 | CST308, COMPREHENSIVE COURSE WORK | CST308.1 | comprehend the concepts of discrete mathematical structures |
| | | | CST308.2 | comprehend the concepts and applications of data structures |
| | | | CST308.3 | comprehend the concepts, functions and algorithms in Operating System |
| | | | CST308.4 | comprehend the organization and architecture of computer systems |
| | | | CST308.5 | comprehend the fundamental principles of database design and manipulation |
| 46 | S6 | CSL332 NETWORKING LAB | CSL332.1 | use network related commands and configuration files in Linux Operating System. |

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| | | | CSL332.2 | develop network application programs and protocols. |
| | | | CSL332.3 | analyze network traffic using network monitoring tools. |
| | | | CSL332.4 | design and setup a network and configure different network |
| | | | CSL332.5 | develop simulation of fundamental network concepts using a network simulator. |
| 47 | S6 | CSD334, MINIPROJECT | CSD334.1 | identify technically and economically feasible problems |
| | | | CSD334.2 | identify and survey the relevant literature for getting exposed to related solutions and get familiarized with software development processes |
| | | | CSD334.3 | perform requirement analysis, identify design methodologies and develop adaptable & reusable solutions of minimal complexity by using modern tools & advanced programming techniques |
| | | | CSD334.4 | prepare technical report and deliver presentation |
| | | | CSD334.5 | apply engineering and management principles to achieve the goal of the project |
| 48 | S7 | CST 401, ARTIFICIAL INTELLIGENCE | CST401.1 | explain the fundamental concepts of intelligent systems and their architecture. |
| | | | CST401.2 | illustrate uninformed and informed search techniques for problem solving in intelligent systems. |
| | | | CST401.3 | solve Constraint Satisfaction Problems using search techniques. |

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| | | | CST401.4 | represent AI domain knowledge using logic systems and use inference techniques for reasoning in intelligent systems. |
| | | | CST401.5 | illustrate different types of learning techniques used in intelligent systems |
| 49 | S7 | CST 463, WEB PROGRAMMING | CST463.1 | use HyperText Markup Language (HTML) for authoring web pages and understand the fundamentals of WWW |
| | | | CST463.2 | construct and visually format responsive, interactive web pages using CSS and JavaScript (JS) |
| | | | CST463.3 | construct websites using advanced sever side programming tool PHP |
| | | | CST463.4 | develop dynamic web applications using PHP and perform MySQL database operations |
| | | | CST463.5 | explain the importance of object exchange formats using JSON and the MVC based web application development frameworks (Laravel) |
| 50 | S7 | CST 423, CLOUD COMPUTING | CST423.1 | explain the various cloud computing models and services. |
| | | | CST423.2 | demonstrate the significance of implementing virtualization techniques. |
| | | | CST423.3 | explain different cloud enabling technologies and compare private cloud platforms |
| | | | CST423.4 | apply appropriate cloud programming methods to solve big data problems. |
| | | | CST423.5 | describe the need for security mechanisms in cloud |
| 51 | S7 | MCN401, INDUSTRIAL SAFETY ENGINEERING | MCN401.1 | describe the theories of accident causation and preventive measures of industrial accidents. |

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| | | | MCN401.2 | explain about personal protective equipment, its selection, safety performance &indicators and importance of housekeeping. |
| | | | MCN401.3 | explain different issues in construction industries. |
| | | | MCN401.4 | describe various hazards associated with different machines and mechanical material handling. |
| | | | MCN401.5 | utilise different hazard identification tools in different industries with the knowledge of different types of chemical hazards. |
| 52 | S7 | CSL411 COMPILER LAB | CSL411.1 | implement lexical analyzer using the tool LEX |
| | | | CSL411.2 | implement Syntax analyzer using the tool YACC. |
| | | | CSL411.3 | design NFA and DFA for a problem and write programs to perform operations on it |
| | | | CSL411.4 | design and Implement Bottom-Up parsers and Top-Down parsers. |
| | | | CSL411.5 | implement intermediate code for expressions |
| 53 | S7 | CSQ413 SEMINAR | CSQ413.1 | identify academic documents from the literature which are related to her/his areas of interest. |
| | | | CSQ413.2 | read and apprehend an academic document from the literature which is related to her/ his areas of interest. |
| | | | CSQ413.3 | prepare a presentation about an academic document. |
| | | | CSQ413.4 | give a presentation about an academic document. |

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| | | | CSQ413.5 | prepare a technical report. |
| 54 | S7 | CSD415 PROJECT PHASE I | CSD415.1 | model and solve real world problems by applying knowledge across domains. |
| | | | CSD415.2 | develop products, processes or technologies for sustainable and socially relevant applications. |
| | | | CSD415.3 | function effectively as an individual and as a leader in diverse teams and to comprehend and execute designated tasks. |
| | | | CSD415.4 | plan and execute tasks utilizing available resources within timelines, following ethical and professional norms. |
| | | | CSD415.5 | identify technology/research gaps and propose innovative/creative solutions and alco Organize and communicate technical and scientific findings effectively in written and oral forms. |
| 55 | S8 | CST 402 Distributed Computing | CST 402.1 | summarize various aspects of distributed computation model and logical time. |
| | | | CST 402.2 | illustrate election algorithm, global snapshot algorithm and termination detection algorithm |
| | | | CST 402.3 | compare token based, non-token based and quorum based mutual exclusion algorithms |
| | | | CST 402.4 | recognize the significance of deadlock detection and shared memory in distributed systems |
| | | | CST 402.5 | explain the concepts of failure recovery and consensus |
| 56 | S8 | CST 464 Embedded Systems | CST464.1 | describe the characteristics of different hardware/software components of an embedded system. |

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| | | | CST464.2 | map the design of an embedded system to an appropriate computational model. |
| | | | CST464.3 | recommend appropriate process synchronization / communication / scheduling mechanisms for specific system scenarios. |
| | | | CST464.4 | describe the role of real-time operating systems in embedded devices. |
| | | | CST464.5 | make use of design strategies for developing real-world embedded systems. |
| 57 | S8 | CST 474 Computer Vision | CST474.1 | summarize basic concepts, terminology, theories, models and methods in the field of computer vision |
| | | | CST474.2 | explain basic methods of computer vision related to multi scale representation, edge detection, detection of other primitives, stereo, motion and object recognition |
| | | | CST474.3 | describe principles of segmentation, motion segmentation and classification |
| | | | CST474.4 | select appropriate object tracking and detection methods for computer vision applications |
| | | | CST474.5 | implement a computer vision system for a specific problem |
| 58 | S8 | CST 424 Programming Paradigms | CST424.1 | explain the criteria for evaluating programming languages and compare Imperative, Functional and Logic programming languages |
| | | | CST424.2 | illustrate the characteristics of data types and variables |
| | | | CST424.3 | comprehend how control flow structures and subprograms help in developing the |

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| | | | | structure of a program to solve a computational problem |
| | | | CST424.4 | explain the characteristics of Object-Oriented Programming Languages |
| | | | CST424.5 | compare concurrency constructs in different programming languages |
| 59 | S8 | CST 476 Mobile Computing | CST476.1 | explain the various mobile computing applications, services, design considerations and architectures . |
| | | | CST476.2 | describe the various technology trends for next generation cellular wireless networks and use the spreading concept on data transmission |
| | | | CST476.3 | summarize the architecture of various wireless LAN technologies |
| | | | CST476.4 | identify the functionalities of mobile network layer and transport layer |
| | | | CST476.5 | explain the features of Wireless Application Protocol and Interpret the security issues in mobile computing and next generation technologies |
| 60 | S8 | CST 466 Data Mining | CST466.1 | employ the key process of data mining and data warehousing concepts in application domains |
| | | | CST466.2 | make use of appropriate preprocessing techniques to convert raw data into suitable format for practical data mining tasks |
| | | | CST466.3 | illustrate the use of classification and clustering algorithms in various application domains |
| | | | CST466.4 | comprehend the use of association rule mining techniques |

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| | | | CST466.5 | explain advanced data mining concepts and their applications in emerging domains |
| 61 | S8 | CST 446 Data Compression Techniques | CST446.1 | describe the fundamental principles of data compression |
| | | | CST446.2 | make use of statistical and dictionary based compression techniques for various application |
| | | | CST446.3 | illustrate various image compression standards |
| | | | CST446.4 | summarize video compression mechanisms to reduce the redundancy in video |
| | | | CST446.5 | use the fundamental properties of digital audio to compress audio data |
| 62 | S8 | CST 428 Block Chain Technologies | CST428.1 | illustrate the cryptographic building blocks of blockchain technology. |
| | | | CST428.2 | summarize the classification of consensus algorithms. |
| | | | CST428.3 | explain the concepts of first decentralized cryptocurrency bitcoin. |
| | | | CST428.4 | explain the use of smart contracts and its use cases. |
| | | | CST428.5 | develop simple applications using Solidity language on Ethereum platform. |
| 63 | S8 | CST 438 Image Processing Technique | CST438.1 | explain the concepts of image formation and the basis of digital image processing. |
| | | | CST438.2 | demonstrate the role of image transforms in representing, highlighting, and modifying image features. |
| | | | CST438.3 | solve image enhancement problems using spatial and frequency domain techniques. |

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| | | | CST438.4 | make use of the concept of image restoration and image segmentation techniques in real-world problems. |
| | | | CST438.5 | interpret morphological operations, image representation, and description techniques. |
| 64 | S8 | CST 418 High Performance Computing | CST418.1 | describe different types of modern processing environments and parallel computing hardware. |
| | | | CST418.2 | summarize the concepts of Instruction Level Parallelism |
| | | | CST418.3 | appreciate the idea of Data Level Parallelism |
| | | | CST418.4 | demonstrate the concept of Thread Level Parallelism |
| | | | CST418.5 | describe the basics of GPU architecture |
| 65 | S8 | CST404 Comprehensive Viva Voce | CST404.1 | comprehend the concepts of discrete mathematical structures |
| | | | CST404.2 | comprehend the concepts and applications of data structures |
| | | | CST404.3 | comprehend the concepts, functions and algorithms in Operating System |
| | | | CST404.4 | comprehend the organization and architecture of computer systems |
| | | | CST404.5 | comprehend the fundamental principles of database design and manipulation |
| 66 | S8 | CSD416 Project Phase II | CSD416.1 | model and solve real world problems by applying knowledge across domains. |
| | | | CSD416.2 | develop products, processes or technologies for sustainable and socially relevant applications. |
| | | | CSD416.3 | function effectively as an individual and as a leader in diverse teams and to |

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| | | | | comprehend and execute designated tasks. |
| | | | CSD416.4 | plan and execute tasks utilizing available resources within timelines, following ethical and professional norms. |
| | | | CSD416.5 | identify technology/research gaps and propose innovative/creative solutions and also Organize and communicate technical and scientific findings effectively in written and oral forms. |

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**COURSE OUTCOMES**

**Branch: DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**

**2019 SCHEME**

**After the completion of the course the students will be able to**

| Sl. No.. | SEM | Subject | CO | CO statement |
|---|---|---|---|---|
| 1 | S1 | MAT101 LINEAR ALGEBRA AND CALCULUS | MAT101.1 | solve systems of linear equations, diagonalize matrices and characterise quadratic forms |
| | | | MAT101.2 | compute the partial and total derivatives and maxima and minima of multivariable functions |
| | | | MAT101.3 | compute multiple integrals and apply them to find areas and volumes of geometrical shapes, mass and centre of gravity of plane laminas |
| | | | MAT101.4 | perform various tests to determine whether a given series is convergent, absolutely convergent or conditionally convergent |
| | | | MAT101.5 | determine the Taylor and Fourier series expansion of functions and learn their applications. |
| 2 | S1 | CYT 100 ENGINEERING CHEMISTRY) | CYT100.1 | apply the basic concepts of electrochemistry and corrosion to explore its possible applications in various engineering fields. |
| | | | CYT100.2 | understand various spectroscopic techniques like UV-Visible, IR, NMR and its applications. |
| | | | CYT100.3 | apply the knowledge of analytical method for characterizing a chemical mixture or a compound. Understand the basic concept of SEM for surface characterisation of nanomaterials. |
| | | | CYT100.4 | learn about the basics of stereochemistry and its application. Apply the knowledge of conducting polymers and advanced polymers in engineering. |

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| | | | CYT100.5 | study various types of water treatment methods to develop skills for treating wastewater. |
| 3 | S1 | EST 110 ENGG.GRAPHICS | EST110.1 | draw the projection of points and lines located in different quadrants |
| | | | EST110.2 | prepare multiview orthographic projections of objects by visualizing them in different positions |
| | | | EST110.3 | draw sectional views and develop surfaces of a given object |
| | | | EST110.4 | prepare pictorial drawings using the principles of isometric and perspective projections to visualize objects in three dimensions. |
| | | | EST110.5 | convert 3D views to orthographic views and vice versa using CAD tools |
| 4 | S1 | HUN 101 LIFE SKILLS | HUN101.1 | define and Identify different life skills required in personal and professional life |
| | | | HUN101.2 | develop an awareness of the self and apply well-defined techniques to cope with emotions and stress. |
| | | | HUN101.3 | explain the basic mechanics of effective communication and demonstrate these through presentations. |
| | | | HUN101.4 | take part in group discussions |
| | | | HUN101.5 | understand the basics of teamwork and leadership |
| 5 | S1 | EST 130 BASIC ELECTRONICS/ELECTRICAL | EST130.1 | apply fundamental concepts and circuit laws to solve simple DC electric circuits. |
| | | | EST130.2 | develop and solve models of magnetic circuits. |
| | | | EST130.3 | apply the fundamental laws of electrical engineering to solve simple ac circuits in steady state. |
| | | | EST130.4 | describe the working of a voltage amplifier and to outline the principle of an electronic instrumentation system. |

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| | | | EST130.5 | explain the principle of radio and cellular communication. |
| 6 | S1 | CYL 120 ENGINEERING CHEMISTRY LAB | CYL120.1 | understand and practice different techniques of quantitative chemical analysis to generate experimental skills and apply these skills to various analyses |
| | | | CYL120.2 | develop skills relevant to synthesize organic polymers and acquire the practical skill to use TLC for the identification of drugs |
| | | | CYL120.3 | develop the ability to understand and explain the use of modern spectroscopic techniques for analysing and interpreting the IR spectra and NMR spectra of some organic compounds |
| | | | CYL120.4 | acquire the ability to understand, explain and use instrumental techniques for chemical analysis |
| | | | CYL120.5 | learn to design and carry out scientific experiments as well as accurately record and analyze the results of such experiments |
| 7 | S1 | ESL 130 ELECTRICAL & ELECTRONICS WORKSHOP | ESL130.1 | demonstrate safety measures against electric shocks. |
| | | | ESL130.2 | identify the tools used for electrical wiring, electrical accessories, wires, cables, batteries and standard symbols. |
| | | | ESL130.3 | develop the connection diagram, identify the suitable accessories and materials necessary for wiring simple lighting circuits for domestic buildings |
| | | | ESL130.4 | identify and test various electronic components |

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| | | | ESL130.5 | make use of BIS/IEEE symbols to draw circuit schematics and experiment with and test electronic circuits on board |
| 8 | S2 | MAT 102 VECTOR CALCULUS, DIFFERENTIAL EQUATIONS & TRANSFORMS | MAT102.1 | compute the derivatives and line integrals of vector functions and learn their applications |
| | | | MAT102.2 | evaluate surface and volume integrals and learn their inter-relations and applications. |
| | | | MAT102.3 | solve homogeneous and non-homogeneous linear differential equation with constant coefficients |
| | | | MAT102.4 | compute Laplace transform and apply them to solve ODEs arising in engineering |
| | | | MAT102.5 | determine the Fourier transforms of functions and apply them to solve problems arising in engineering |
| 9 | S2 | PHT 110 ENGINEERING PHYSICS | PHT110.1 | compute the quantitative aspects of waves and oscillations in engineering systems. |
| | | | PHT110.2 | apply the interaction of light with matter through interference, diffraction and identify these phenomena in different natural optical processes and optical instruments. |
| | | | PHT110.3 | analyze the behaviour of matter in the atomic and subatomic level through the principles of quantum mechanics to perceive the microscopic processes in electronic devices. |
| | | | PHT110.4 | classify the properties of magnetic materials and apply vector calculus to static magnetic fields and use Maxwell's equations to diverse engineering problem |

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| | | | PHT110.5 | analyze the principles behind various superconducting applications, explain the working of solid state lighting devices and fibre optic communication system |
| 10 | S2 | EST 100 ENGINEERING MECHANICS | EST100.1 | recall principles and theorems related to rigid body mechanics |
| | | | EST100.2 | identify and describe the components of system of forces acting on the rigid body |
| | | | EST100.3 | apply the conditions of equilibrium to various practical problems involving different force system. |
| | | | EST100.4 | choose appropriate theorems, principles or formulae to solve problems of mechanics. |
| | | | EST100.5 | solve problems involving rigid bodies, applying the properties of distributed areas and masses |
| 11 | S2 | EST 102 BASICS OF COMPUTER PROGRAMMING | EST102.1 | analyze a computational problem and develop an algorithm/flowchart to find its solution. |
| | | | EST102.2 | develop readable C programs with branching and looping statements, which uses Arithmetic, Logical, Relational or Bitwise operators. |
| | | | EST102.3 | write readable C programs with arrays,structure or union for storing the data to be processed. |
| | | | EST102.4 | divide a given computational problem into a number of modules and develop a readable multi-function C program by using recursion if required, to find the solution to the computational problem. |
| | | | EST102.5 | write readable C programs which use pointers for array processing and parameter passing. Develop readable C |

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| | | | | programs with files for reading input and storing output. |
| 12 | S2 | EST 120 BASICS OF CIVIL AND MECHANICAL ENGINEERING | EST120.1 | recall the role of civil engineer in society and to relate the various disciplines of Civil Engineering with special focus on Building construction and basics of Surveying |
| | | | EST120.2 | summarize the basic infrastructure services MEP, HVAC, elevators, escalators and ramps and discuss the Materials, energy systems, water management and environment for green buildings. |
| | | | EST120.3 | analyse thermodynamic cycles and their efficiency for illustrating working of IC Engines. |
| | | | EST120.4 | explain the basic principles of refrigeration, air conditioning, hydraulic turbines and power transmission elements. |
| | | | EST120.5 | describe the basic manufacturing, metal joining and machining processes. |
| 13 | S2 | HUN 102 PROFESSIONAL COMMUNICATION | HUN102.1 | develop vocabulary and language skills relevant to engineering as a profession. |
| | | | HUN102.2 | get the capability to analyze, interpret and effectively summarize a variety of textual content. |
| | | | HUN102.3 | create effective technical presentations. |
| | | | HUN102.4 | discuss a topic in a group setting and arrive at generalizations/ conclusions. |
| | | | HUN102.5 | create professional and technical documents with required relevance and clarity. |
| 14 | S2 | PHL 120 ENGINEERING PHYSICS LAB | PHL120.1 | develop analytical/experimental skills and impart prerequisite hands on experience for engineering laboratories |

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| | | | PHL120.2 | understand the need for precise measurement practices for data recording |
| | | | PHL120.3 | understand the principle, concept, working and applications of relevant technologies and comparison of results with theoretical calculations |
| | | | PHL120.4 | analyze the techniques and skills associated with modern scientific tools such as lasers and fiber optics |
| | | | PHL120.5 | develop basic communication skills through working in groups in performing the laboratory experiments and by interpreting the results |
| 15 | S2 | ESL 120 CIVIL & MECHANICAL WORKSHOP | ESL120.1 | name different devices and tools used for civil engineering measurements and Explain the use of various tools and devices for various field measurements |
| | | | ESL120.2 | demonstrate the steps involved in basic civil engineering activities like plot measurement, setting out operation, evaluating the natural profile of land, plumbing and undertaking simple construction work. |
| | | | ESL120.3 | choose materials and methods required for basic civil engineering activities like field measurements, masonry work and plumbing and Compare different techniques and devices used in civil engineering measurements |
| | | | ESL120.4 | identify Basic Mechanical workshop operations with appropriate Tools and Instruments with respect to the mechanical workshop trades in accordance with the material and Objects. |

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| | | | ESL120.5 | apply appropriate safety measures with respect to the mechanical workshop trades. |
| 16 | S3 | MAT201 PARTIAL DIFFERENTIAL EQUATIONS AND COMPLEX ANALYSIS | MAT201.1 | understand the concept and the solution of partial differential equation. |
| | | | MAT201.2 | analyse and solve one dimensional wave equation and heat equation. |
| | | | MAT201.3 | understand complex functions, its continuity differentiability with the use of Cauchy-Riemann equations |
| | | | MAT201.4 | evaluate complex integrals using Cauchy's integral theorem and Cauchy's integral formula, understand the series expansion of analytic function |
| | | | MAT201.5 | understand the series expansion of complex function about a singularity and Apply residue theorem to compute several kinds of real integrals. |
| 17 | S3 | ECT201 SOLID STATE DEVICES | ECT201.1 | define and understand the concepts in semiconductor physics and to describe and apply the generation and recombination processes in semiconductors. |
| | | | ECT201.2 | explain drift and diffusion currents in extrinsic semiconductors and compute current density due to these effects. |
| | | | ECT201.3 | solve the differential equations & find the current components in a PN junction diode and bipolar junction transistor. |
| | | | ECT201.4 | analyze energy band diagrams of metal semiconductor junctions and MOS capacitors and derive the expressions for drain current in linear and saturation regions. |
| | | | ECT201.5 | discuss scaling of MOSFETs and short channel effects. |
| 18 | S3 | | ECT203.1 | explain the elements of digital system abstractions such as digital representations of information, digital logic and Boolean algebra |

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| | | ECT203 LOGIC CIRCUIT DESIGN | ECT203.2 | create an implementation of a combinational logic function described by a truth table using and/or/inv gates/ muxes |
| | | | ECT203.3 | compare different types of logic families with respect to performance and efficiency |
| | | | ECT203.4 | design a sequential logic circuit using the basic building blocks like flip-flops |
| | | | ECT203.5 | design and analyze combinational and sequential logic circuits through gate level Verilog models. |
| 19 | S3 | ECT205 NETWORK THEORY | ECT205.1 | recall Mesh / Node analysis to obtain steady state response of the linear time invariant networks. |
| | | | ECT205.2 | apply Network Theorems to obtain steady state response of the linear time invariant networks. |
| | | | ECT205.3 | apply Laplace Transforms to determine the transient behavior of RLC networks. |
| | | | ECT205.4 | apply Network functions and Network Parameters to analyse the single port networks using Laplace transform |
| | | | ECT205.5 | apply Network functions and Network Parameters to analyse two port networks. |
| 20 | S3 | EST200 DESIGN AND ENGINEERING | EST200.1 | students are able to Explain different concepts and principles involved in design engineering. |
| | | | EST200.2 | students are able to discuss and demonstrate the workability of solutions for design problems and Apply design thinking while learning and practicing engineering. |
| | | | EST200.3 | students are able to compare designs covering function, cost, environmental sensitivity, safety factors along with engineering analysis. |
| | | | EST200.4 | students are able to Develop innovative, reliable, sustainable and economically viable designs incorporating knowledge in engineering. |
| | | | EST200.5 | students can judge the optimal solution from the available choice. |

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| 21 | S3 | MCN201 SUSTAINABLE ENGINEERING | MCN201.1 | understand the relevance and the concept of sustainability and the global initiatives in this direction |
| | | | MCN201.2 | explain the different types of environmental pollution problems and their sustainable solutions |
| | | | MCN201.3 | discuss the environmental regulations and standards |
| | | | MCN201.4 | outline the concepts related to conventional and non-conventional energy |
| | | | MCN201.5 | demonstrate the broad perspective of sustainable practices by utilizing engineering knowledge and principles |
| 22 | S3 | ECL201 SCIENTIFIC COMPUTING LAB | ECL201.1 | describe the needs and requirements of scientific computing and to familiarize one programming language for scientific computing and data visualization. |
| | | | ECL201.2 | approximate an array/matrix with matrix decomposition. |
| | | | ECL201.3 | implement numerical integration and differentiation for solving ordinary differential equations for engineering applications. |
| | | | ECL201.4 | realize how periodic functions are constituted by sinusoids |
| | | | ECL201.5 | simulate random processes and understand their statistics. |
| 23 | S3 | ECL203 LOGIC DESIGN LAB | ECL203.1 | design and demonstrate the functioning of various combinational circuits using ICs |
| | | | ECL203.2 | design and demonstrate the functioning of various sequential circuits using ICs |
| | | | ECL203.3 | apply an industry compatible hardware description language to implement digital circuits |
| | | | ECL203.4 | implement digital circuits on FPGA boards and connect external hardware to the boards |
| | | | ECL203.5 | function effectively as an individual and in a team to accomplish the given task |

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| 24 | S4 | MAT204 PROBABILITY, RANDOM PROCESSES & NUMERICAL METHODS | MAT204.1 | understand the concept, properties and important models of discrete random variables and, using them, analyse suitable random phenomena. |
| | | | MAT204.2 | understand the concept, properties and important models of continuous random variables and, using them, analyse suitable random phenomena. |
| | | | MAT204.3 | analyse random processes using autocorrelation, power spectrum and Poisson process model as appropriate |
| | | | MAT204.4 | compute roots of equations, evaluate definite integrals and perform interpolation on given numerical data using standard numerical techniques |
| | | | MAT204.5 | apply standard numerical techniques for solving systems of equations, fitting curves on given numerical data and solving ordinary differential equations |
| 25 | S4 | ECT202 ANALOG CIRUITS | ECT202.1 | design analog signal processing circuits using diodes and first order RC circuits |
| | | | ECT202.2 | design basic amplifiers using BJT and its small signal analysis |
| | | | ECT202.3 | analyse the working of amplifiers using MOSFET |
| | | | ECT202.4 | analyse and design different feedback amplifiers & Oscillators |
| | | | ECT202.5 | apply the principles of power amplifiers and voltage regulators |
| 26 | S4 | ECT204 SIGNALS & SYSTEMS | EC T204.1 | apply properties of signals and systems to classify them |
| | | | EC T204.2 | represent signals with the help of series and transforms |
| | | | EC T204.3 | describe orthogonality of signals and convolution integral. |
| | | | EC T204.4 | apply transfer function to compute the LTI response to input signals. |

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| | | | EC T204.5 | apply sampling theorem to discretize continuous time signals |
| 27 | S4 | ECT206 COMPUTER ARCHITECTURE & MICROCONTROLLERS | ECT206.1 | explain the functional units, I/O and memory management w.r.t a typical computer architecture. |
| | | | ECT206.2 | distinguish between microprocessor and microcontroller |
| | | | ECT206.3 | develop simple programs using assembly language programming |
| | | | ECT206.4 | interface 8051 microcontroller with peripheral devices using ALP/Embedded C |
| | | | ECT206.5 | familiarize system software and Advanced RISC Machine Architecture. |
| 28 | S4 | HUT200 PROFESSIONAL ETHICS | HUT200.1 | understand the core values that shape the ethical behavior of a professional. |
| | | | HUT200.2 | adopt a good character and follow an ethical life. |
| | | | HUT200.3 | explain the role and responsibility in technical development by keeping personal ethics and legal ethics. |
| | | | HUT200.4 | solve moral and ethical problems through exploration and assessment by established experiments. |
| | | | HUT200.5 | apply the knowledge of human values and social values to contemporary ethical dilemmas and global issues. |
| 29 | S4 | MCN202 CONSTITUTION OF INDIA | MCN202.1 | explain the background of the present constitution of India and features. |
| | | | MCN202.2 | utilize the fundamental rights and duties. |
| | | | MCN202.3 | understand the working of the union executive, parliament and judiciary. |
| | | | MCN202.4 | understand the working of the state executive, legislature and judiciary. |
| | | | MCN202.5 | utilize the special provisions and statutory institutions and Show national and patriotic spirit as responsible citizens of the country |

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| 30 | S4 | ECL202 ANALOG CIRCUITS & SIMULATION LAB | ECL202.1 | understand the working of analog circuits like clippers, clampers ,RC circuits etc. |
| | | | ECL202.2 | design and demonstrate the functioning of MOSFET amplifier, Cascade and Cascode Amplifier |
| | | | ECL202.3 | design and demonstrate the functioning of regulators, oscillators and power amplifiers. |
| | | | ECL202.4 | design and simulate the functioning of basic analog circuits using simulation tools. |
| | | | ECL202.5 | function effectively as an individual and in a team to accomplish the given task. |
| 31 | S4 | ECL204 MICROCONTROLLER LAB | ECL204.1 | write an Assembly language program for performing data manipulation. |
| | | | ECL204.2 | students will be able to realize Assembly language program for performing data manipulation on 8051 trainer kit |
| | | | ECL204.3 | develop ALP/Embedded C Programs to interface microcontroller with peripherals |
| | | | ECL204.4 | perform programming/interfacing experiments with IDE for modern microcontrollers |
| | | | ECL204.5 | troubleshoot interactions between software and hardware. |
| 32 | S5 | ECT 301 LINAR INTEGRATED CIRCUITS | ECT301.1 | understand Op Amp fundamentals and differential amplifier configurations |
| | | | ECT301.2 | design operational amplifier circuits for various applications |
| | | | ECT301.3 | design Oscillators and active filters using op amps |
| | | | ECT301.4 | explain the working and applications of timer, VCO and PLL ICs |
| | | | ECT301.5 | outline the working of Voltage regulator IC's and Data converters |
| 33 | S5 | ECT 303 DIGITAL SIGNAL PROCESSING | ECT303.1 | state and prove the fundamental properties and relations relevant to DFT and solve basic problems involving DFT based filtering methods |
| | | | ECT303.2 | compute DFT and IDFT using DIT and DIF radix-2 FFT algorithms |

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| | | | ECT303.3 | design linear phase FIR filters and IIR filters for a given specification |
| | | | ECT303.4 | illustrate the various FIR and IIR filter structures for the realization of the given system function |
| | | | ECT303.5 | explain the basic multi-rate DSP operations decimation and interpolation in both time and frequency domains using supported mathematical equations. Explain the architecture of DSP processor (TMS320C67xx) and the finite word length effects |
| 34 | S5 | ECT 305 ANALOG AND DIITAL COMMUNICATION | ECT305.1 | explain the existent analog communication systems. |
| | | | ECT305.2 | apply the concepts of random processes to LTI systems |
| | | | ECT305.3 | apply waveform coding techniques in digital transmission. |
| | | | ECT305.4 | apply GS procedure to develop digital receivers and equalizer design to counteract ISI. |
| | | | ECT305.5 | apply digital modulation techniques in signal transmission. |
| 35 | S5 | ECT 307 CONTROL SYSTEMS | ECT307.1 | represent systems mathematically and derive the transfer function of the system |
| | | | ECT307.2 | employ time domain analysis to predict and diagnose transient and steady state performance parameters of the system for standard input functions. |
| | | | ECT307.3 | determine the stability of a system |
| | | | ECT307.4 | identify the needs of different types of controllers and compensators to ascertain the required dynamic response from the system. |
| | | | ECT307.5 | perform state variable analysis of control system and analyze a digital control system. |
| 36 | S5 | | MCN301.1 | define and use various terminologies in use in disaster management parlance and organise each of these terms in relation to the |

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| | | MCN301 DISADTER MANAGEMENT | | disaster management cycle (Cognitive knowledge level: Understand) |
| | | | MCN301.2 | deistinguish between different hazard types and vulnerability types and do vulnerability assessment (Cognitive knowledge level: Understand) |
| | | | MCN301.3 | identify the components and describe the process of risk assessment, and apply appropriate methodologies to assess risk (Cognitive knowledge level: Understand). |
| | | | MCN301.4 | explain the core elements and phases of Disaster Risk Management and develop possible measures to reduce disaster risks across sector and community (Cognitive knowledge level: Apply) |
| | | | MCN301.5 | identify factors that determine the nature of disaster response and discuss the various disaster response actions along with the best practices for disaster management and risk reduction at national and international level (Cognitive knowledge level: Understand). |
| 37 | S5 | HUT 300 INDUSTRIAL ECONOMICS AND FOREIGN TRADE | HUT300.1 | explain the problem of scarcity of resources and consumer behaviour, and to evaluate the impact of government policies on the general economic welfare. (Cognitive knowledge level: Understand) |
| | | | HUT300.2 | take appropriate decisions regarding volume of output and to evaluate the social cost of production. (Cognitive knowledge level: Apply) |
| | | | HUT300.3 | determine the functional requirement of a firm under various competitive conditions. (Cognitive knowledge level: Analyse) |
| | | | HUT300.4 | examine the overall performance of the economy, and the regulation of economic fluctuations and its impact on various sections in the society. (Cognitive knowledge level: Analyse) |

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| | | | HUT300.5 | determine the impact of changes in global economic policies on the business opportunities of a firm. (Cognitive knowledge level: Analyse) |
| 38 | S5 | ECL331 ANALOG INTEGRATED CIRCUITS AND SIMULATION LAB | ECL331.1 | use data sheets of basic Analog Integrated Circuits and design and implement application circuits using Analog ICs. |
| | | | ECL331.2 | design and simulate the application circuits with Analog Integrated Circuits using simulation tools. |
| | | | ECL331.3 | function effectively as an individual and in a team to accomplish the given task. |
| | | | ECL331.4 | work as team to design op-amp application circuits using 555 timer IC |
| | | | ECL331.5 | able to design and implement basic D/A and A/D converter circuits. |
| 39 | S5 | ECL333 DIGITAL SIGNAL PROCESSING LAB | ECL333.1 | simulate digital signals and verify the properties of DFT computationally |
| | | | ECL333.2 | familiarize the DSP hardware and interface with the computer. |
| | | | ECL333.3 | implement real time LTI systems with linear convolution and block convolution and FFT. |
| | | | ECL333.4 | implement FFT and IFFT and use it on real time signals. |
| | | | ECL333.5 | implement FIR low pass filter. |
| 40 | S6 | ECT302 ELECTROMAGNETICS | ECT302.1 | to summarize the basic mathematical concepts related to electromagnetic vector fields. |
| | | | ECT302.2 | analyse Maxwell's equation in different forms and apply them to diverse engineering problems. |
| | | | ECT302.3 | to analyse electromagnetic wave propagation and wave polarization |
| | | | ECT302.4 | to analyse the characteristics of transmission lines and solve the transmission line problems using Smith chart. |
| | | | ECT302.5 | to analyse and evaluate the propagation of EM waves in Wave guides. |

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| 41 | S6 | ECT304 VLSI CIRCUIT DESIGN | ECT304.1 | explain the various methodologies in ASIC and FPGA design.. |
| | | | ECT304.2 | design VLSI Logic circuits with various MOSFET logic families. |
| | | | ECT304.3 | compare different types of memory elements. |
| | | | ECT304.4 | design and analyse data path elements such as Adders and multipliers. |
| | | | ECT304.5 | explain MOSFET fabrication techniques and layout design rules. |
| 42 | S6 | ECT306 INFORMATION THEORY AND CODING | ECT306.1 | students will be able to understand the concept of information and entropy |
| | | | ECT306.2 | students will be able to design a lossless transmission system on the basis of channel capacity and source coding theorem |
| | | | ECT306.3 | students will be able understand the basics of Gaussian Channel & Shannon's Limit |
| | | | ECT306.4 | students will be able to analyze error correction and detection using linear block codes. |
| | | | ECT306.5 | students will be able to analyze error correction and detection using cyclic codes and convolutional code encoding and decoding |
| 43 | S6 | HUT310 MANAGEMENT FOR ENGINEERS | HUT310.1 | students would be able to critically analyse and evaluate a variety of management practices in the contemporary context |
| | | | HUT310.2 | students would be able to understand and apply a variety of management and organisational theories in practice |
| | | | HUT310.3 | students would be able to mirror existing practices or to generate their own innovative management competencies, required for today's complex and global workplace |
| | | | HUT310.4 | students would be able to critically reflect on ethical theories and social responsibility ideologies to create sustainable organizations |

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| | | | HUT310.5 | know about the role of managers in an organisation |
| 44 | S6 | ECT362 INTRODUCTION TO MEMS | ECT362.1 | describe the working principles of micro sensors and actuators |
| | | | ECT362.2 | identify commonly used mechanical structures in MEMS. |
| | | | ECT362.3 | explain the application of scaling laws in the design of micro systems. |
| | | | ECT362.4 | identify the typical materials used for fabrication of micro systems |
| | | | ECT362.5 | describe the challenges in the design and fabrication of Micro systems |
| 45 | S6 | ECT342 EMBEDDED SYSTEMS | ECT342.1 | ability to understand basics of embedded system fundamentals and system design. |
| | | | ECT342.2 | ability to understand the different standards and protocols used for communication with I/O devices and their interfacing with the processor. |
| | | | ECT342.3 | ability to gain ARM Processor architectural level and pipeline processor organization knowledge. |
| | | | ECT342.4 | ability to write programs in assembly and high level languages for ARM Processor. |
| | | | ECT342.5 | ability to understand real time operating systems and their use in embedded systems. |
| 46 | S6 | ECL332 COMMUNICATION LAB | ECL332.1 | apply the knowledge of circuit theorems and solid state physics to solve the problems in electronic Circuits |
| | | | ECL332.2 | design a logic circuit for a specific application |
| | | | ECL332.3 | design linear IC circuits for linear and non-linear circuit applications. |
| | | | ECL332.4 | explain basic signal processing operations and Filter designs |

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| | | | ECL332.5 | explain existent analog and digital communication systems |
| 47 | S6 | ECT308 COMPREHENSIVE COURSE WORK | ECT308.1 | setup simple prototype circuits for waveform coding working in a team. |
| | | | ECT308.2 | setup simple prototype circuits for digital modulation techniques. |
| | | | ECT308.3 | simulate the error performance of a digital communication system using standard binary. |
| | | | ECT308.4 | simulate the error performance of M-ary modulation schemes. |
| | | | ECT308.5 | develop hands-on skills to emulate a communication system with software-designed-radio working in a team. |
| 48 | S6 | ECD334 MINI PROJECT | ECD334.1 | students will be able to practice acquired knowledge within the selected area of technology for project development. |
| | | | ECD334.2 | students will be able to Identify, discuss and justify the technical aspects and design aspects of the project with a systematic approach. |
| | | | ECD334.3 | students will be able to Reproduce, improve and refine technical aspects for engineeringprojects. |
| | | | ECD334.4 | work as a team in development of technical projects. |
| | | | ECD334.5 | communicate and report effectively project related activities andfindings. |
| 48 | S7 | ECT 401 MICROWAVES AND ANTENNAS | ECD401.1 | understand the basic concept of antennas and its parameters |
| | | | ECD401.2 | analyze the far filed pattern of Short dipole and Half wave dipole antenna. |
| | | | ECD401.3 | design of various broad band antennas, arrays and its radiation patterns. |
| | | | ECD401.4 | illustrate the principle of operation of cavity resonators and various microwave sources |

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| | | | ECD401.5 | explain various microwave hybrid circuits and microwave semiconductor devices. |
| 49 | S7 | MCN401 INDUSTRIAL SAFETY E4NGINEERING | MCN401.1 | describe the theories of accident causation and preventive measures of industrial accidents. (Cognitive Knowledge level: Understand) |
| | | | MCN401.2 | explain about personal protective equipment, its selection, safety performance & indicators and importance of housekeeping. (Cognitive Knowledge level: Understand) |
| | | | MCN401.3 | explain different issues in construction industries. (Cognitive Knowledge level: Understand) |
| | | | MCN401.4 | describe various hazards associated with different machines and mechanical material handling. (Cognitive Knowledge level: Understand) |
| | | | MCN401.5 | dtilize different hazard identification tools in different industries with the knowledge of different types of chemical hazards. (Cognitive Knowledge level: Apply) |
| 49 | S7 | ECT423 COMPUTER NETWORKS | ECT423.1 | describe the protocols used in web and email applications. |
| | | | ECT423.2 | analyse problems pertaining to reliable data transfer, flow control and congestion over a TCP network. |
| | | | ECT423.3 | apply Dijkstra's algorithm and distance-vector algorithm in the context of routing over computer networks. |
| | | | ECT423.4 | analyze the performance of collision avoidance algorithms in random access protocols such as ALOHA. |
| | | | ECT423.5 | analyze the delay performance of an ARQ system using standard queueing models. |

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| 50 | S7 | ECQ413 SEMINAR | ECQ413.1 | identify academic documents from the literature which are related to her/his areas of interest |
| | | | ECQ413.2 | read and apprehend an academic document from the literature which is related to her/ his areas of interest |
| | | | ECQ413.3 | prepare a presentation about an academic document |
| | | | ECQ413.4 | give a presentation about an academic document |
| | | | ECQ413.5 | prepare a technical report |
| 50 | S7 | ECT413 OPTICAL FIBER COMMUNICATION | ECT413.1 | understand the working and classification of optical fibers in terms of propagation modes |
| | | | ECT413.2 | solve problems of transmission characteristics and losses in optical fiber |
| | | | ECT413.3 | explain the constructional features and the characteristics of optical sources and detectors |
| | | | ECT413.4 | describe the operations of optical amplifiers |
| | | | ECT413.5 | understand the concept of WDM, FSO and LiFi |
| 51 | S7 | ECD415 PROJECT PHASE I | ECD415.1 | model and solve real world problems by applying knowledge across domains |
| | | | ECD415.2 | develop products, processes or technologies for sustainable and socially relevant applications |
| | | | ECD415.3 | function effectively as an individual and as a leader in diverse teams and to comprehend and execute designated tasks |
| | | | ECD415.4 | plan and execute tasks utilizing available resources within timelines, following ethical and professional norms |
| | | | ECD415.5 | identify technology/research gaps and propose innovative/creative solutions |
| 51 | S7 | | ECL411.1 | organize and communicate technical and scientific findings effectively in written and oral forms |

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| | | ECL411 ELECTROMAGNETICS LAB | ECL411.2 | familiarize the basic Microwave components and to analyse few microwave measurements and its parameters. |
| | | | ECL411.3 | understand the principles of fiber-optic communications and the different kind of losses, signal distortion and other signal degradation factors. |
| | | | ECL411.4 | design and simulate basic antenna experiments with simulation tools |
| | | | ECL411.5 | summarize the wireless mobile technologies, basics of cellular system and cellular design fundamentals. |
| 52 | S8 | ECT 402 WIRELESS COMMUNICATION | ECT402.1 | describe the wireless channel models and discuss capacity of wireless channels. |
| | | | ECT402.2 | analyze the performance of the modulation techniques for flat-fading channels and multicarrier modulation. |
| | | | ECT402.3 | identify the various diversity techniques, equalization techniques and multiple-access techniques in wireless communication. |
| | | | ECT402.4 | calculate system parameters such antenna height, range, maximum usable frequency in different modes of radio wave propagation. |
| | | | ECT402.5 | explain OFDM, OFDMA and SC-FDMA techniques used in cellular communication |
| 52 | S8 | ECT416 MODERN | ECT416.1 | discuss the different wireless communication standards for short range communication |

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| | | COMMUNIACTION SYSTEMS | ECT416.2 | explain the IoT architecture and various connectivity technologies used in IoT Systems |
| | | | ECT416.3 | understand the various communication standards for connected autonomous vehicles |
| | | | ECT416.4 | explain the significance and architecture of software defined radio and cognitive radio |
| | | | ECT416.5 | understand the need, importance and scope of various Non-Conventional sources of energy |
| 53 | S8 | ECT468 RENEWABLE ENRGY SYSTEMS | ECT468.1 | outline the concepts and technologies related to renewable energy systems using wind and Solar-PV |
| | | | ECT468.2 | understand the integration of smart grid with renewable energy systems |
| | | | ECT468.3 | explain the concept of distribution management system. |
| | | | ECT468.4 | describe the fundamentals of Smart metering |
| | | | ECT468.5 | to understand the IoT fundamentals and architecture modelling |
| 53 | S8 | ECT 458 INTERNET OF THINGS | ECT458.1 | to describe the smart things in IoT and functional blocks. |
| | | | ECT458.2 | to describe the communication networks and protocols used in IoT. |
| | | | ECT458.3 | to apply the cloud resources, data analysis and applications. |
| | | | ECT458.4 | to apply the IoT processes in embedded applications. |
| | | | ECT458.5 | summarize the functions and structure of general-purpose operating systems. |
| 54 | S8 | ECT426 RTOS | ECT426.1 | use different scheduling algorithms on processes and threads. |
| | | | ECT426.2 | interpret a real time operating system along with its synchronization, communication and interrupt handling tools. |

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| | | | ECT426.3 | illustrate task constraints and analyze the different scheduling algorithms on tasks |
| | | | ECT426.4 | illustrate the applications of real time operating systems. |
| | | | ECT426.5 | explain network security services and mechanisms and the types of attacks they are designed for |
| 54 | S8 | ECT 434 SECURE COMMUNICATION | ECT434.1 | apply the concepts of group, ring, field,modular arithmetic, Euclidean algorithm,Finite fields and polynomial arithmetic |
| | | | ECT434.2 | analyze various symmetric encryption methods and their complexity levels |
| | | | ECT434.3 | outline the concepts of public key cryptography, RSA algorithm, key distribution and management for public key systems |
| | | | ECT434.4 | explain the requirements for authentication and the types of functions used to produce an authenticator |
| | | | ECT434.5 | model and solve real world problems by applying knowledge across domains |
| 55 | S8 | ECD416 PROJECT PHASE II | ECD416.1 | develop products, processes or technologies for sustainable and socially relevant applications |
| | | | ECD416.2 | function effectively as an individual and as a leader in diverse teams and to comprehend and execute designated tasks |
| | | | ECD416.3 | plan and execute tasks utilizing available resources within timelines, following ethical and professional norms |
| | | | ECD416.4 | identify technology/research gaps and propose innovative/creative solutions |
| | | | ECD416.5 | organize and communicate technical and scientific findings effectively in written and oral forms |

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| COURSE OUTCOMES | | | | |
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| **Branch: DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING** | | | | |
| **2019 SCHEME** | | | | |
| **After the completion of the course the Students will be able to** | | | | |
| **S. No.** | **SEM** | **Subject** | **CO Number** | **CO Statement** |
| 1 | S1 | MAT 101 LINEAR ALGEBRA AND CALCULUS | MAT101.1 | solve systems of linear equations, diagonalize matrices and characterise quadratic forms |
| | | | MAT101.2 | compute the partial and total derivatives and maxima and minima of multivariable functions |
| | | | MAT101.3 | compute multiple integrals and apply them to find areas and volumes of geometrical shapes,mass and centre of gravity of plane laminas |
| | | | MAT101.4 | perform various tests to determine whether a given series is convergent, absolutely convergent or conditionally convergent |
| | | | MAT101.5 | determine the Taylor and Fourier series expansion of functions and learn their applications. |
| 2 | S1 | PHT 100 ENGINEERING PHYSICS | PHT100.1 | compute the quantitative aspects of waves and oscillations in engineering systems. |
| | | | PHT100.2 | apply the interaction of light with matter through interference, diffraction and identify these phenomena in different natural optical processes and optical instruments. |
| | | | PHT100.3 | analyze the behaviour of matter in the atomic and subatomic level through the principles of quantum mechanics to perceive the microscopic processes in electronic devices. |

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| | | | PHT100.4 | classify the properties of magnetic materials and apply vector calculus to static magnetic fields and use Maxwell's equations to diverse engineering problem |
| | | | PHT100.5 | analyze the principles behind various superconducting applications, explain the working of solid state lighting devices and fibre optic communication system |
| 3 | S1 | EST 100 ENGINEERING MECHANICS | EST100.1 | recall principles and theorems related to rigid body mechanics |
| | | | EST100.2 | identify and describe the components of system of forces acting on the rigid body |
| | | | EST100.3 | apply the conditions of equilibrium to various practical problems involving different force system. |
| | | | EST100.4 | choose appropriate theorems, principles or formulae to solve problems of mechanics. |
| | | | EST100.5 | solve problems involving rigid bodies, applying the properties of distributed areas and masses |
| 4 | S1 | EST 120 BASICS OF CIVIL AND MECHANICAL ENGINEERING | EST120.1 | recall the role of civil engineer in society and to relate the various disciplines of Civil Engineering with special focus on Building construction and basics of Surveying |
| | | | EST120.2 | summarize the basic infrastructure services MEP, HVAC, elevators, escalators and ramps and discuss the Materials, energy systems, water management and environment for green buildings. |
| | | | EST120.3 | analyse thermodynamic cycles and their efficiency for illustrating working of IC Engines. |
| | | | EST120.4 | explain the basic principles of refrigeration, air conditioning, hydraulic turbines and power transmission elements. |

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| | | | EST120.5 | describe the basic manufacturing, metal joining and machining processes. |
| 5 | S1 | HUN 101 LIFE SKILLS | HUN101.1 | define and identify different life skills required in personal and professional life |
| | | | HUN101.2 | develop an awareness of the self and apply well-defined techniques to cope with emotions and stress |
| | | | HUN101.3 | explain the basic mechanics of effective communication and demonstrate these through presentations and use appropriate thinking and problem solving techniques to solve new problems |
| | | | HUN101.4 | take part in group discussions |
| | | | HUN101.5 | understand the basics of teamwork and leadership |
| 6 | S1 | PHL 120 ENGINEERING PHYSICS LAB | PHL120.1 | develop analytical/experimental skills and impart prerequisite hands on experience for engineering laboratories |
| | | | PHL120.2 | understand the need for precise measurement practices for data recording |
| | | | PHL120.3 | understand the principle, concept, working and applications of relevant technologies and comparison of results with theoretical calculations |
| | | | PHL120.4 | analyze the techniques and skills associated with modern scientific tools such as lasers and fiber optics |
| | | | PHL120.5 | develop basic communication skills through working in groups in performing the laboratory experiments and by interpreting the results |
| 7 | S1 | ESL 120 CIVIL AND MECHANICAL WORKSHOP | ESL120.1 | name different devices and tools used for civil engineering measurements and Explain the use of various tools and devices for various field measurements |

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| | | | ESL120.2 | demonstrate the steps involved in basic civil engineering activities like plot measurement, setting out operation, evaluating the natural profile of land, plumbing and undertaking simple construction work. |
| | | | ESL120.3 | choose materials and methods required for basic civil engineering activities like field measurements, masonry work and plumbing and Compare different techniques and devices used in civil engineering measurements |
| | | | ESL120.4 | identify Basic Mechanical workshop operations with appropriate Tools and Instruments with respect to the mechanical workshop trades in accordance with the material and Objects. |
| | | | ESL120.5 | apply appropriate safety measures with respect to the mechanical workshop trades. |
| 8 | S2 | MAT 102 VECTOR CALCULUS, DIFFERENTAIL EQUATIONS AND TRASNFORM | MAT102.1 | compute the derivatives and line integrals of vector functions and learn their applications |
| | | | MAT102.2 | evaluate surface and volume integrals and learn their inter-relations and applications. |
| | | | MAT102.3 | solve homogeneous and non-homogeneous linear differential equation with constant coefficients |
| | | | MAT102.4 | compute Laplace transform and apply them to solve ODEs arising in engineering |
| | | | MAT102.5 | determine the Fourier transforms of functions and apply them to solve problems arising in engineering |
| 9 | S2 | | CYT100.1 | apply the basic concepts of electrochemistry and corrosion to explore |

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| | | CYT 100 ENGINEERING CHEMISTRY | | its possible applications in various engineering fields. |
| | | | CYT100.2 | understand various spectroscopic techniques like UV-Visible, IR, NMR and its applications. |
| | | | CYT100.3 | apply the knowledge of analytical method for characterizing a chemical mixture or a compound. Understand the basic concept of SEM for surface characterisation of nanomaterials. |
| | | | CYT100.4 | learn about the basics of stereochemistry and its application. Apply the knowledge of conducting polymers and advanced polymers in engineering. |
| | | | CYT100.5 | study various types of water treatment methods to develop skills for treating wastewater. |
| 10 | S2 | EST 110 ENGINEERING GRAPHICS | EST110.1 | draw the projection of points and lines located in different quadrants |
| | | | EST110.2 | prepare multi-view orthographic projections of objects by visualizing them in different positions |
| | | | EST110.3 | draw sectional views and develop surfaces of a given object |
| | | | EST110.4 | prepare pictorial drawings using the principles of isometric and perspective projections to visualize objects in three dimensions |
| | | | EST110.5 | convert 3D views to orthographic views and vice versa using CAD tools |
| 11 | S2 | EST 130 BASICS OF ELECTRICAL AND | EST130.1 | apply fundamental concepts and circuit laws to solve simple DC electric circuits. |
| | | | EST130.2 | develop and solve models of magnetic circuits. |

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| | | ELECTRONICS ENGINEERING | EST130.3 | apply the fundamental laws of electrical engineering to solve simple ac circuits in steady state. |
| | | | EST130.4 | describe the working of a voltage amplifier and to outline the principle of an electronic instrumentation system. |
| | | | EST130.5 | explain the principle of radio and cellular communication. |
| 12 | S2 | HUN 102 PROFESSIONAL COMMUNICATION | HUN102.1 | develop vocabulary and language skills relevant to engineering as a profession. |
| | | | HUN102.2 | get the capability to analyze, interpret and effectively summarize a variety of textual content. |
| | | | HUN102.3 | create effective technical presentations. |
| | | | HUN102.4 | discuss a topic in a group setting and arrive at generalizations/ conclusions. |
| | | | HUN102.5 | create professional and technical documents with required relevance and clarity. |
| 13 | S2 | EST 102 PROGRAMING IN C | EST102.1 | analyze a computational problem and develop an algorithm/flowchart to find its solution. |
| | | | EST102.2 | develop readable C programs with branching and looping statements, which uses Arithmetic, Logical, Relational or Bitwise operators. |
| | | | EST102.3 | write readable C programs with arrays,structure or union for storing the data to be processed. |
| | | | EST102.4 | divide a given computational problem into a number of modules and develop a readable multi-function C program by using recursion if required, to find the solution to the computational problem. |

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| | | | EST102.5 | write readable C programs which use pointers for array processing and parameter passing. Develop readable C programs with files for reading input and storing output. |
| 14 | S2 | CYL 120 ENGINEERING CHEMISTRY LAB | CYL120.1 | understand and practice different techniques of quantitative chemical analysis to generate experimental skills and apply these skills to various analyses |
| | | | CYL120.2 | develop skills relevant to synthesize organic polymers and acquire the practical skill to use TLC for the identification of drugs |
| | | | CYL120.3 | develop the ability to understand and explain the use of modern spectroscopic techniques for analysing and interpreting the IR spectra and NMR spectra of some organic compounds |
| | | | CYL120.4 | acquire the ability to understand, explain and use instrumental techniques for chemical analysis |
| | | | CYL120.5 | learn to design and carry out scientific experiments as well as accurately record and analyze the results of such experiments |
| 15 | S2 | ESL 130 ELECTRICAL AND ELECTRONICS WORKSHOP | ESL130.1 | demonstrate safety measures against electric shocks. |
| | | | ESL130.2 | identify the tools used for electrical wiring, electrical accessories, wires, cables, batteries and standard symbols. |
| | | | ESL130.3 | develop the connection diagram, identify the suitable accessories and materials necessary for wiring simple lighting circuits for domestic buildings |
| | | | ESL130.4 | identify and test various electronic components |

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| | | | ESL130.5 | make use of BIS/IEEE symbols to draw circuit schematics and experiment with and test electronic circuits on board |
| 16 | S3 | MAT 201 PARTIAL DIFFERENTIAL EQUATIONS AND COMPLEX ANALYSIS | MAT201.1 | understand the concept and the solution of partial differential equation. |
| | | | MAT201.2 | analyse and solve one dimensional wave equation and heat equation. |
| | | | MAT201.3 | understand complex functions, its continuity differentiability with the use of Cauchy-Riemann equations. |
| | | | MAT201.4 | evaluate complex integrals using Cauchy's integral theorem and Cauchy's integralformula, understand the series expansion of analytic function |
| | | | MAT201.5 | understand the series expansion of complex functions about a singularity and apply residue theorem to compute several kinds of real integrals. |
| 17 | S3 | EET201 Circuits and Networks | EET201.1 | apply circuit theorems to simplify and solve complex DC and AC electric networks. |
| | | | EET201.2 | analyse dynamic DC and AC circuits and develop the complete response to excitation using Laplace transform. |
| | | | EET201.3 | analyse three-phase unbalanced networks |
| | | | EET201.4 | solve series /parallel resonant circuits. |
| | | | EET201.5 | develop the representation of two-port networks using network parameters and analyse. |
| 18 | S3 | EET203 MEASUREMENTS AND INSTRUMENTATION | EET203.1 | identify and analyze the factors affecting performance of measuring system. |
| | | | EET203.2 | choose appropriate instruments for the measurement of voltage, current in ac and dc measurements |

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| | | | EET203.3 | understand the operating principle of power and energy measurement & students can describe the operating principle of DC and AC bridges |
| | | | EET203.4 | understand the principles of operation of Magnetic measurement systems |
| | | | EET203.5 | Understand the operating principles of basic building blocks of digital systems, recording and display units |
| 19 | S3 | EET205 ANALOG ELECTRONICS | EET205.1 | design biasing scheme for transistor circuits. |
| | | | EET205.2 | model BJT and FET amplifier circuits. |
| | | | EET205.3 | identify a power amplifier with appropriate specifications for electronic circuit and applications. |
| | | | EET205.4 | describe the operation of oscillator circuits using BJT |
| | | | EET205.5 | explain the basic concepts of Operational amplifier(OPAMP) an its applications |
| 20 | S3 | EST 200 DESIGN AND ENGINEERING | EST200.1 | explain different concepts and principles involved in design engineering. |
| | | | EST200.2 | discuss and demonstrate the workability of solutions for design problems and Apply design thinking while learning and practicing engineering. |
| | | | EST200.3 | compare designs covering function, cost, environmental sensitivity, safety factors along with engineering analysis. |
| | | | EST200.4 | develop innovative, reliable, sustainable and economically viable designs incorporating knowledge in engineering. |
| | | | EST200.5 | judge the optimal solution from the available choice. |

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| 21 | S3 | MCN 201 SUSTAINABLE ENGINEERING | MCN201.1 | understand the relevance and the concept of sustainability and the global initiatives in this direction |
| | | | MCN201.2 | explain the different types of environmental pollution problems and their sustainable solutions |
| | | | MCN201.3 | discuss the environmental regulations and standards |
| | | | MCN201.4 | outline the concepts related to conventional and non-conventional energy |
| | | | MCN201.5 | demonstrate the broad perspective of sustainable practices by utilizing engineering knowledge and principles |
| 22 | S3 | EEL201 CIRCUITS AND MEASUREMENTS LAB | EEL201.1 | analyze and verify network theorems in various electric circuits . |
| | | | EEL201.2 | calibrate energy meters and measure three phase and single phase power . |
| | | | EEL201.3 | analyze and understand various transducer circuits and bridges |
| | | | EEL201.4 | understand the magnetic principles of working of various electrical and electronic devices |
| | | | EEL201.5 | analyse the performance of various electronic devices for an instrumentation systems and, to develop the team management and documentation capabilities. |
| 23 | S3 | EEL203 ANALOG ELECTRONICS LAB | EEL203.1 | use various electronic instruments for conducting experiments |
| | | | EEL203.2 | design and develop various circuits using diodes and Zener diodes |
| | | | EEL203.3 | design and implement amplifier and oscillator circuit using BJT and JFET |
| | | | EEL203.4 | design and implement various basic circuits using OPAMP. |

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| | | | EEL203.5 | design and implement various basic circuits using 555 Timer. |
| 24 | S4 | MAT204 PROBABILITY, RANDOM PROCESSES AND NUMERICAL METHODS | MAT204.1 | understand the concept, properties and important models of discrete random variables and, using them, analyse suitable random phenomena. |
| | | | MAT204.2 | understand the concept, properties and important models of continuous random variables and, using them, analyse suitable random phenomena. |
| | | | MAT204.3 | Analyse random processes using autocorrelation, power spectrum and Poisson process model as appropriate. |
| | | | MAT204.4 | Compute roots of equations, evaluate definite integrals and perform interpolation on |
| | | | MAT204.5 | Apply standard numerical techniques for solving systems of equations, fitting curves on given numerical data and solving ordinary differential equations. |
| 25 | S4 | EET202 DC MACHINES AND TRANSFORMERS | EET202.1 | acquire knowledge about constructional details of DC machines |
| | | | EET202.2 | describe the performance characteristics of DC generators |
| | | | EET202.3 | describe the principle of operation of DC motors and acquire knowledge in testing of DC machines to assess its performance |
| | | | EET202.4 | describe the constructional details and modes of operation of single phase and three phase transformers |
| | | | EET202.5 | analyse the performance of transformers under various conditions |
| 26 | S4 | EET204 ELECTROMAGNETIC THEORY | EET204.1 | apply vector analysis and coordinate systems to solve static electric and magneticfield problems. |

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| | | | EET204.2 | apply Gauss Law, Coulomb's law and Poisson's equation to determine electrostatic field parameters |
| | | | EET204.3 | Determine magnetic fields from current distributions by applying Biot-Savart's law and Amperes Circuital law. |
| | | | EET204.4 | Apply Maxwell Equations for the solution of timevarying fields |
| | | | EET204.5 | Analyse electromagnetic wave propagation in different media. |
| 27 | S4 | EET206 DIGITAL ELECTRONICS | EET206.1 | identify various number systems, binary codes and formulate digital functions using Boolean algebra. |
| | | | EET206.2 | design and implement combinational logiccircuits. |
| | | | EET206.3 | design and implement sequential logic circuits |
| | | | EET206.4 | compare the operation of various analog to digital and digital to analog conversion circuits. |
| | | | EET206.5 | explain the basic concepts of programmable logic devices and VHDL. |
| 28 | S4 | HUT200 PROFESSIONAL ETHICS | HUT200.1 | understand the core values that shape the ethical behaviour of a professional. |
| | | | HUT200.2 | adopt a good character and follow an ethical life. |
| | | | HUT200.3 | explain the role and responsibility in technological development by keeping personal ethics and legal ethics |
| | | | HUT200.4 | solve moral and ethical problems through exploration and assessment by established experiments. |
| | | | HUT200.5 | apply the knowledge of human values and social values to contemporary ethical values and global issues |

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| 29 | S4 | MCN202 CONSTITUTION OF INDIA | MCN202.1 | explain the background of the present constitution of India and features |
| | | | MCN202.2 | utilize the fundamental rights and duties. |
| | | | MCN202.3 | understand the working of the union executive, parliament, state executive, legislature and judiciary. |
| | | | MCN202.4 | utilize the special provisions and statutory institutions. |
| | | | MCN202.5 | show national and patriotic spirit as responsible citizens of the country |
| 30 | S4 | EEL202 ELECTRICAL MACHINES LAB I | EEL202.1 | Analyse the performance of DC motors and DC generators by performing load test. |
| | | | EEL202.2 | Sketch the Open Circuit Characteristics of a self excited DC shunt generator and check conditions of voltage build up by performing suitable experiment. |
| | | | EEL202.3 | Develop equivalent circuit and predetermine their regulation and efficiency by performing OC & SC tests on transformer. |
| | | | EEL202.4 | Analyse the efficiency and regulation of the transformer by performing load test and examine the efficiency by performing Sumpner's test on two similar transformers. |
| | | | EEL202.5 | Analyse the efficiency of a DC machine when working as motor and generator by conducting suitable test. |
| 31 | S4 | EEL204 DIGITAL ELECTRONICS LAB | EEL204.1 | formulate digital functions using boolean algebra and verify experimentally. |
| | | | EEL204.2 | design and implement combinational logic circuits. |
| | | | EEL204.3 | design and implement sequential logic circuits. |

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| | | | EEL204.4 | design and fabricate a digital circuit using the knowledge acquired from laboratory |
| | | | EEL204.5 | implement any given logic function using multiplexer. |
| 32 | S5 | EET301 POWER SYSTEMS I | EET301.1 | identify the power generating system appropriate for a given area. |
| | | | EET301.2 | evaluate the electrical performance of any transmission line |
| | | | EET301.3 | compute the various characteristics Underground cables and transmission systems |
| | | | EET301.4 | select appropriate switchgear for protection schemes. |
| | | | EET301.5 | design a simple electrical distribution system as per the standards |
| 33 | S5 | EET303 MICROPROCESSORS AND MICROCONTROLLERS | EET303.1 | describe the architecture and timing diagram of 8085 microprocessor |
| | | | EET303.2 | develop assembly language programs in 8085 microprocessor |
| | | | EET303.3 | identify the different ways of interfacing memory and I/O with 8085 microprocessor |
| | | | EET303.4 | understand the architecture of 8051 microcontroller and embedded systems |
| | | | EET303.5 | develop assembly level and embedded C programs in 8051 microcontroller |
| 34 | S5 | EET305 SIGNALS AND SYSTEMS | EET305.1 | explain the basic operations on signals and systems |
| | | | EET305.2 | apply Fourier Series and Fourier Transform concepts for continuous time signals |
| | | | EET305.3 | analyse the continuous time systems with Laplace Transform |
| | | | EET305.4 | analyse the discrete time system using Z Transform. |

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| | | | EET305.5 | apply Fourier Series and Fourier Transform concepts for Discrete time domain |
| 35 | S5 | EET307 SYNCHRONOUS AND INDUCTION MACHINES | EET307.1 | identify alternator types, and appreciate their performance |
| | | | EET307.2 | determine the voltage regulation and analyse the performance of alternators |
| | | | EET307.3 | describe the principle of operation of synchronous motor and different applications |
| | | | EET307.4 | describe the principle of operation of 3-phase induction motors and select appropriate motor types for different applications. |
| | | | EET307.5 | familiarize with principle of operation and application of 1 -phase induction motors |
| 36 | S5 | HUT310 MANAGEMENT FOR ENGINEERS | HUT310.1 | critically analyse and evaluate a variety of management practices in the contemporary context |
| | | | HUT310.2 | understand and apply a variety of management and organisational theories in practice |
| | | | HUT310.3 | mirror existing practices or to generate their own innovative management competencies, required for today's complex and global workplace |
| | | | HUT310.4 | critically reflect on ethical theories and social responsibility ideologies to create sustainable organizations |
| | | | HUT310.5 | know about the role of managers in an organisation |
| 37 | S5 | MCN301 DISASTER MANAGEMENT | MCN301.1 | define disaster and will acquire knowledge on basic terms in disaster management such as Hazard, Risk, crisis, vulnerability, exposure etc. |

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| | | | MCN301.2 | get general ideas about the processes involved in natural and anthropogenic disasters |
| | | | MCN301.3 | gain the skills and abilities to analyse potential effects of disasters and of the strategies and methods to deliver public health response to avert these effects. |
| | | | MCN301.4 | understand the concepts of disaster management and measures to mitigate and contain common episodes of disasters. |
| | | | MCN301.5 | propose, implement and evaluate research on disasters. |
| 38 | S5 | EEL331 MICROPROCESSORS AND MICROCONTROLLERS LAB | EEL331.1 | develop and execute assembly language programs for solving arithmetic and logical problems using 8085 |
| | | | EEL331.2 | develop and execute assembly language programs for solving arithmetic and logical problems using 8086 |
| | | | EEL331.3 | design and Implement systems with interfacing circuits for various applications |
| | | | EEL331.4 | acquire basic knowledge on Arduino |
| | | | EEL331.5 | execute projects as a team using Arduino for real life applications. |
| 39 | S5 | EEL333 ELECTRICAL MACHINES LAB II | EEL333.1 | analyse the performance of single phase induction motors by conducting suitable tests |
| | | | EEL333.2 | analyse the performance of three phase induction motors by conducting suitable tests |
| | | | EEL333.3 | analyse the performance of three phase synchronous machine from V |
| | | | EEL333.4 | analyse the performance of V from three phase synchronous machine |

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| | | | EEL333.5 | analyse the performance of a three phase alternator by conducting suitable tests. |
| 40 | S6 | EET302 LINEAR CONTROL SYSTEMS | EET302.1 | describe the role of various control blocks and components in feedback systems. |
| | | | EET302.2 | analyse the time domain responses of the linear systems. |
| | | | EET302.3 | apply Root locus technique to assess the performance of linear systems and analyse the stability of LTI systems |
| | | | EET302.4 | analyse the frequency domain response of the given LTI systems. |
| | | | EET302.5 | design compensators using time domain and frequency domain techniques |
| 41 | S6 | EET304 POWER SYSTEMS II | EET304.1 | analyze power systems using per unit analysis and single line diagrams. |
| | | | EET304.2 | have a thorough knowledge about the different fault conditions in the power systems. |
| | | | EET304.3 | carry out load flow studies under normal and abnormal conditions. |
| | | | EET304.4 | analyze the requirement of generation control and load frequency regulations in the system. |
| | | | EET304.5 | get an idea of the possible stability issues in the system. |
| 42 | S6 | EET306 POWER ELECTRONICS | EET306.1 | explain the operation of modern power semiconductor devices and its characteristics |
| | | | EET306.2 | analyze the working of controlled rectifiers |
| | | | EET306.3 | explain the working of AC voltage controllers, inverters and PWM techniques |
| | | | EET306.4 | compare the performance of different dc-dc converters |

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| | | | EET306.5 | describe basic drive schemes for ac and dc motors |
| 43 | S6 | HUT300, INDUSTRIAL ECONOMICS & FOREIGN TRADE | HUT300.1 | explain the problem of scarcity of resources and consumer behaviour, and to evaluate the impact of government policies on the general economic welfare |
| | | | HUT300.2 | take appropriate decisions regarding volume of output and to evaluate the social cost of production. |
| | | | HUT300.3 | determine the functional requirement of a firm under various competitive conditions. |
| | | | HUT300.4 | examine the overall performance of the economy, and the regulation of economic fluctuations and its impact on various sections in the society. |
| | | | HUT300.5 | determine the impact of changes in global economic policies on the business opportunities of a firm. |
| 45 | S6 | EET362 MATERIALS SCIENCE | EET362.1 | describe the characteristics of conducting and semiconducting materials |
| | | | EET362.2 | classify magnetic materials and describe different laws related to them |
| | | | EET362.3 | classify and describe different insulators and to explain the behavior of dielectrics in static and alternating fields |
| | | | EET362.4 | describe the mechanisms of breakdown in solids, liquids and gases |
| | | | EET362.5 | classify and describe Solar energy materials and superconducting materials and modern techniques for material studies. |
| 46 | S6 | EET322 RENEWABLE ENERGY SYSTEMS | EET322.1 | recognize and understand the world and Indian energy scenario and necessity of sustainable development utilising Renewable Energy recourses. |

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| | | | EET322.2 | analyse and infer the potentials and design systems based on solar thermal systems and solar electric systems |
| | | | EET322.3 | understand the fundamentals and interpret basic components of energy from the ocean |
| | | | EET322.4 | understand the fundamentals and interpret basic components of energy from the wind |
| | | | EET322.5 | understand the fundamentals and interpret basic components of energy from the biomass and emerging technologies |
| 47 | S6 | EET308 COMREHENSIVE COURSE WORK | EET308.1 | apply the knowledge of circuit theorems to solve the problems in electrical networks |
| | | | EET308.2 | evaluate the performance of DC machines and Transformers under different loading conditions |
| | | | EET308.3 | identify appropriate digital components to realise any combinational or sequential logic. |
| | | | EET308.4 | apply the knowledge of Power generation, transmission and distribution to select appropriate components for power system operation. |
| | | | EET308.5 | apply appropriate mathematical concepts to analyse continuous time and discrete time signals and systems |
| 48 | S6 | EEL332 POWER SYSTEMS LAB | EEL332.1 | develop mathematical models and conduct steady state and transient analysis of power |
| | | | EEL332.2 | system networks using standard software. |
| | | | EEL332.3 | develop a frequency domain model of power system networks and conduct the stability analysis |
| | | | EEL332.4 | conduct appropriate tests for any power system component as per standards. |

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| | | | EEL332.5 | conduct site inspection and evaluate performance ratio of solar power plant. |
| 49 | S6 | EEL334 POWER ELECTRONICS LAB | EEL334.1 | determine the characteristics of SCR and design triggering circuits for SCR based circuits. |
| | | | EEL334.2 | design, set up and analyse single phase AC voltage controllers. |
| | | | EEL334.3 | design, set up and test suitable gate drives for MOSFET/IGBT. |
| | | | EEL334.4 | design, set up and test basic inverter topologies & dc-dc converters. |
| | | | EEL334.5 | develop simulation models of dc-dc converters, rectifiers and inverters using modern simulation tools. |
| 50 | S7 | EET401 Advanced Control Systems | EET401.1 | develop the state variable representation of physical systems and to analyse the performance of linear and nonlinear systems using state variable approach |
| | | | EET401.2 | design state feedback controller for a given system |
| | | | EET401.3 | explain the characteristics of nonlinear systems |
| | | | EET401.4 | apply the tools like describing function approach or phase plane approach for assessing the performance of nonlinear systems |
| | | | EET401.5 | apply Lyapunov method for the stability analysis of physical systems |
| 51 | S7 | EET413 Electric Drives | EET413.1 | analyse a drive being applied in 4 different quadrants |
| | | | EET413.2 | apply drives being used in real applications |
| | | | EET413.3 | understand the various speed control techniques used in the control of the machine. |

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| | | | EET413.4 | understand the concept of speed control for DC drives |
| | | | EET413.5 | understand the concept of speed control for AC drives |
| 52 | S7 | EET463 Illumination Technology | EET463.1 | explain the fundamental concepts of natural and artificial lighting schemes |
| | | | EET463.2 | design efficient indoor lighting systems |
| | | | EET463.3 | design efficient outdoor lighting systems |
| | | | EET463.4 | describe aesthetic lighting systems |
| | | | EET463.5 | describe emergency lighting systems |
| 53 | S7 | MCN401, INDUSTRIAL SAFETY ENGINEERING | MCN401.1 | describe the theories of accident causation and preventive measures of industrial accidents. |
| | | | MCN401.2 | explain about personal protective equipment, its selection, safety performance &indicators and importance of housekeeping. |
| | | | MCN401.3 | explain different issues in construction industries. |
| | | | MCN401.4 | describe various hazards associated with different machines and mechanical material handling. |
| | | | MCN401.5 | utilise different hazard identification tools in different industries with the knowledge of different types of chemical hazards. |
| 54 | S7 | EEL411 Control Systems Lab | EEL411.1 | demonstrate the knowledge of simulation tools for control system design. |
| | | | EEL411.2 | develop the mathematical model of a given physical system by conducting appropriate experiments. |
| | | | EEL411.3 | analyse the performance and stability of physical systems using classical and advanced control approaches. |

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| | | | EEL411.4 | design controllers for physical systems to meet the desired specifications. |
| | | | EEL411.5 | understand the working of typical process station. |
| 55 | S7 | EEQ413 Seminar | EEQ413.1 | identify academic documents from the literature which are related to her/his areas of interest |
| | | | EEQ413.2 | read and apprehend an academic document from the literature which is related to her/ his areas of interest. |
| | | | EEQ413.3 | prepare a presentation about an academic document. |
| | | | EEQ413.4 | get an idea about the presentations and make an academic document |
| | | | EEQ413.5 | get an idea about how to prepare a technical report |
| 56 | S7 | EED415 Project Phase 1 | EED415.1 | model and solve real world problems by applying knowledge across domains. |
| | | | EED415.2 | develop products, processes or technologies for sustainable and socially relevant applications. |
| | | | EED415.3 | plan and execute tasks utilizing available resources within timelines, following ethical and professional norms. |
| | | | EED415.4 | identify technology/research gaps and propose innovative/creative solutions. |
| | | | EED415.5 | organize and communicate technical and scientific findings effectively in written and oral forms. |
| 57 | S8 | EET402 ELECTRICAL SYSTEM DESIGN AND ESTIMATION | EET402.1 | explain the rules and regulations in the design of components for medium and high voltage installations. |
| | | | EET402.2 | design lighting schemes for indoor and outdoor applications. |

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| | | | EET402.3 | design low/medium voltage domestic and industrial electrical installations. |
| | | | EET402.4 | design, testing and commissioning of 11 kV transformer substation. |
| | | | EET402.5 | design electrical installations in high rise buildings. |
| 58 | S8 | EET404 COMPREHENSIVE COURSE VIVA | EET404.1 | apply the knowledge of circuit theorems to solve the problems in electrical networks |
| | | | EET404.2 | evaluate the performance of DC machines and Transformers under different loading conditions |
| | | | EET404.3 | identify appropriate digital components to realise any combinational or sequential logic. |
| | | | EET404.4 | apply the knowledge of Power generation, transmission and distribution to select appropriate components for power system operation. |
| | | | EET404.5 | apply appropriate mathematical concepts to analyse continuous time and discrete time signals and systems |
| 59 | S8 | EED416 PROJECT PHASE II | EED416.1 | model and solve real world problems by applying knowledge across domains. |
| | | | EED416.2 | develop products, processes or technologies for sustainable and socially relevant. |
| | | | EED416.3 | function effectively as an individual and as a leader in diverse teams and to comprehend and execute designated tasks. |
| | | | EED416.4 | plan and execute tasks utilizing available resources within timelines, following ethical and professional norms. |
| | | | EED416.5 | identify technology/research gaps and propose innovative/creative solutions and communicate technical and scientific |

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| | | | | findings effectively in written and oral forms. |
| 60 | S8 | EET424 ENERGY MANAGEMENT | EET424.1 | analyse the significance of energy management and auditing. |
| | | | EET424.2 | discuss the energy efficiency and management of electrical loads. |
| | | | EET424.3 | apply demand side management techniques. |
| | | | EET424.4 | explain the energy management opportunities in industries. |
| | | | EET424.5 | compute the economic feasibility of the energy conservation measures. |
| 61 | S8 | EET434 SMART GRID TECHNOLOGIES | EET434.1 | explain the basic concept of distributed energy resources, micro-grid and smart grid |
| | | | EET434.2 | choose appropriate Information and Communication Technology (ICT) in smart grid |
| | | | EET434.3 | select infrastructure and technologies for consumer domain of smart grid |
| | | | EET434.4 | select infrastructure and technologies for smart substation and distribution automation |
| | | | EET434.5 | formulate cloud computing infrastructure for smart grid considering cyber security and categorize power quality issues and appraise it in smart grid context |
| 62 | S8 | EET426 SPECIAL ELECTRIC MACHINES | EET426.1 | analyse the performance of different types of permanent magnet motors. |
| | | | EET426.2 | analyse the performance of a stepper motor. |
| | | | EET426.3 | analyse the performance of different types of reluctance motors. |
| | | | EET426.4 | explain the construction and principle of operation of servo motors, single phase motors and linear motors. |

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| | | | EET426.5 | analyse the performance of linear induction motors. |
| 63 | S8 | EET468 INDUSTRIAL INSTRUMENTATION AND AUTOMATION | EET468.1 | identify the sensors/transducers suitable for industrial applications. |
| | | | EET468.2 | design the signal conditioning circuits for industrial instrumentation and automation. |
| | | | EET468.3 | analyze the concepts of data transmission and virtual instrumentation related to automation |
| | | | EET468.4 | develop the logic for the process control applications using PLC programming |
| | | | EET468.5 | describe the fundamental concepts of DCS and SCADA systems |

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**COURSE OUTCOMES**

**Branch: DEPARTMENT OF MECHANICAL ENGINEERING**

**2019 SCHEME**

**After the completion of the course the students will be able to**

| Sl. No. | SEM | Subject | CO | CO statement |
|---|---|---|---|---|
| 1 | S1 | MAT101 LINEAR ALGEBRA AND CALCULUS | MAT101.1 | solve systems of linear equations, diagonalize matrices and characterise quadratic forms |
| | | | MAT101.2 | compute the partial and total derivatives and maxima and minima of multivariable functions |
| | | | MAT101.3 | compute multiple integrals and apply them to find areas and volumes of geometrical shapes, mass and centre of gravity of plane laminas |
| | | | MAT101.4 | perform various tests to determine whether a given series is convergent, absolutely convergent or conditionally convergent |
| | | | MAT101.5 | determine the Taylor and Fourier series expansion of functions and learn their applications. |
| 2 | S1 | CYT 100 ENGINEERING CHEMISTRY) | CYT100.1 | apply the basic concepts of electrochemistry and corrosion to explore its possible applications in various engineering fields. |
| | | | CYT100.2 | understand various spectroscopic techniques like UV-Visible, IR, NMR and its applications. |
| | | | CYT100.3 | apply the knowledge of analytical method for characterizing a chemical mixture or a compound. Understand the basic concept of SEM for surface characterisation of nanomaterials. |

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| | | | CYT100.4 | learn about the basics of stereochemistry and its application. Apply the knowledge of conducting polymers and advanced polymers in engineering. |
| | | | CYT100.5 | study various types of water treatment methods to develop skills for treating wastewater. |
| 3 | S1 | EST 110 ENGG.GRAPHICS | EST110.1 | draw the projection of points and lines located in different quadrants |
| | | | EST110.2 | prepare multiview orthographic projections of objects by visualizing them in different positions |
| | | | EST110.3 | draw sectional views and develop surfaces of a given object |
| | | | EST110.4 | prepare pictorial drawings using the principles of isometric and perspective projections to visualize objects in three dimensions. |
| | | | EST110.5 | convert 3D views to orthographic views and vice versa using CAD tools |
| 4 | S1 | HUN 101 LIFE SKILLS | HUN101.1 | define and Identify different life skills required in personal and professional life |
| | | | HUN101.2 | develop an awareness of the self and apply well-defined techniques to cope with emotions and stress. |
| | | | HUN101.3 | explain the basic mechanics of effective communication and demonstrate these through presentations. |
| | | | HUN101.4 | take part in group discussions |
| | | | HUN101.5 | understand the basics of teamwork and leadership |
| 5 | S1 | EST 130 BASIC | EST130.1 | apply fundamental concepts and circuit laws to solve simple DC electric circuits. |

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| | | ELECTRONICS/ELECTRICAL | EST130.2 | develop and solve models of magnetic circuits. |
| | | | EST130.3 | apply the fundamental laws of electrical engineering to solve simple ac circuits in steady state. |
| | | | EST130.4 | describe the working of a voltage amplifier and to outline the principle of an electronic instrumentation system. |
| | | | EST130.5 | explain the principle of radio and cellular communication. |
| 6 | S1 | CYL 120 ENGINEERING CHEMISTRY LAB | CYL120.1 | understand and practice different techniques of quantitative chemical analysis to generate experimental skills and apply these skills to various analyses |
| | | | CYL120.2 | develop skills relevant to synthesize organic polymers and acquire the practical skill to use TLC for the identification of drugs |
| | | | CYL120.3 | develop the ability to understand and explain the use of modern spectroscopic techniques for analysing and interpreting the IR spectra and NMR spectra of some organic compounds |
| | | | CYL120.4 | acquire the ability to understand, explain and use instrumental techniques for chemical analysis |
| | | | CYL120.5 | learn to design and carry out scientific experiments as well as accurately record and analyze the results of such experiments |
| 7 | S1 | ESL 130 ELECTRICAL & ELECTRONICS WORKSHOP | ESL130.1 | demonstrate safety measures against electric shocks. |
| | | | ESL130.2 | identify the tools used for electrical wiring, electrical accessories, wires, cables, batteries and standard symbols. |
| | | | ESL130.3 | develop the connection diagram, identify the suitable accessories and materials necessary |

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| | | | | |
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| | | | | for wiring simple lighting circuits for domestic buildings |
| | | | ESL130.4 | identify and test various electronic components |
| | | | ESL130.5 | make use of BIS/IEEE symbols to draw circuit schematics and experiment with and test electronic circuits on board |
| 8 | S2 | MAT 102 VECTOR CALCULUS, DIFFERENTIAL EQUATIONS & TRANSFORMS | MAT102.1 | compute the derivatives and line integrals of vector functions and learn their applications |
| | | | MAT102.2 | evaluate surface and volume integrals and learn their inter-relations and applications. |
| | | | MAT102.3 | solve homogeneous and non-homogeneous linear differential equation with constant coefficients |
| | | | MAT102.4 | compute Laplace transform and apply them to solve ODEs arising in engineering |
| | | | MAT102.5 | determine the Fourier transforms of functions and apply them to solve problems arising in engineering |
| 9 | S2 | PHT 110 ENGINEERING PHYSICS | PHT110.1 | compute the quantitative aspects of waves and oscillations in engineering systems. |
| | | | PHT110.2 | apply the interaction of light with matter through interference, diffraction and identify these phenomena in different natural optical processes and optical instruments. |
| | | | PHT110.3 | analyze the behaviour of matter in the atomic and subatomic level through the principles of quantum mechanics to perceive the microscopic processes in electronic devices. |
| | | | PHT110.4 | classify the properties of magnetic materials and apply vector calculus to static magnetic fields and use Maxwell's equations to diverse engineering problem |
| | | | PHT110.5 | analyze the principles behind various superconducting applications, explain the |

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| | | | | |
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| | | | | working of<br>solid state lighting devices and fibre optic communication system |
| 10 | S2 | EST 100<br>ENGINEERING MECHANICS | EST100.1 | recall principles and theorems related to rigid body mechanics |
| | | | EST100.2 | identify and describe the components of system of forces acting on the rigid body |
| | | | EST100.3 | apply the conditions of equilibrium to various practical problems involving different force system. |
| | | | EST100.4 | choose appropriate theorems, principles or formulae to solve problems of mechanics. |
| | | | EST100.5 | solve problems involving rigid bodies, applying the properties of distributed areas and masses |
| 11 | S2 | EST 102<br>BASICS OF COMPUTER PROGRAMMING | EST102.1 | analyze a computational problem and develop an algorithm/flowchart to find its solution. |
| | | | EST102.2 | develop readable C programs with branching and looping statements, which uses Arithmetic, Logical, Relational or Bitwise operators. |
| | | | EST102.3 | write readable C programs with arrays,structure or union for storing the data to be processed. |
| | | | EST102.4 | divide a given computational problem into a number of modules and develop a readable multi-function C program by using recursion if required, to find the solution to the computational problem. |
| | | | EST102.5 | write readable C programs which use pointers for array processing and parameter passing. Develop readable C programs with files for reading input and storing output. |

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| 12 | S2 | EST 120 BASICS OF CIVIL AND MECHANICAL ENGINEERING | EST120.1 | recall the role of civil engineer in society and to relate the various disciplines of Civil Engineering with special focus on Building construction and basics of Surveying |
| | | | EST120.2 | summarize the basic infrastructure services MEP, HVAC, elevators, escalators and ramps and discuss the Materials, energy systems, water management and environment for green buildings. |
| | | | EST120.3 | analyse thermodynamic cycles and their efficiency for illustrating working of IC Engines. |
| | | | EST120.4 | explain the basic principles of refrigeration, air conditioning, hydraulic turbines and power transmission elements. |
| | | | EST120.5 | describe the basic manufacturing, metal joining and machining processes. |
| 13 | S2 | HUN 102 PROFESSIONAL COMMUNICATION | HUN102.1 | develop vocabulary and language skills relevant to engineering as a profession. |
| | | | HUN102.2 | get the capability to analyze, interpret and effectively summarize a variety of textual content. |
| | | | HUN102.3 | create effective technical presentations. |
| | | | HUN102.4 | discuss a topic in a group setting and arrive at generalizations/ conclusions. |
| | | | HUN102.5 | create professional and technical documents with required relevance and clarity. |
| 14 | S2 | PHL 120 ENGINEERING PHYSICS LAB | PHL120.1 | develop analytical/experimental skills and impart prerequisite hands on experience for engineering laboratories |
| | | | PHL120.2 | understand the need for precise measurement practices for data recording |
| | | | PHL120.3 | understand the principle, concept, working and applications of relevant technologies and |

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| | | | | comparison of results with theoretical calculations |
| | | | PHL120.4 | analyze the techniques and skills associated with modern scientific tools such as lasers and fiber optics |
| | | | PHL120.5 | develop basic communication skills through working in groups in performing the laboratory experiments and by interpreting the results |
| 15 | S2 | ESL 120 CIVIL & MECHANICAL WORKSHOP | ESL120.1 | name different devices and tools used for civil engineering measurements and Explain the use of various tools and devices for various field measurements |
| | | | ESL120.2 | demonstrate the steps involved in basic civil engineering activities like plot measurement, setting out operation, evaluating the natural profile of land, plumbing and undertaking simple construction work. |
| | | | ESL120.3 | choose materials and methods required for basic civil engineering activities like field measurements, masonry work and plumbing and Compare different techniques and devices used in civil engineering measurements |
| | | | ESL120.4 | identify Basic Mechanical workshop operations with appropriate Tools and Instruments with respect to the mechanical workshop trades in accordance with the material and Objects. |
| | | | ESL120.5 | apply appropriate safety measures with respect to the mechanical workshop trades. |
| 16 | S3 | MAT201 PARTIAL DIFFERENTIAL EQUATION AND | MAT201.1 | understand the concept and the solution of the partial differential equation. |
| | | | MAT201.2 | analyse and solve one dimensional wave equation and heat equation. |

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| | | COMPLEX ANALYSIS | MAT201.3 | understand complex functions, its continuity differentiability with the use of Cauchy-Riemann equations |
| | | | MAT201.4 | evaluate complex integrals using Cauchy's integral theorem and Cauchy's integral formula, understand the series expansion of analytic function |
| | | | MAT201.5 | understand the series expansion of complex function about a singularity and Apply residue theorem to compute several kinds of real integrals |
| 17 | S3 | MET201 MECHANICS OF SOLIDS | MET201.1 | determine the stresses, strains and displacements of structures by tensorial and graphical (Mohr's circle) approaches |
| | | | MET201.2 | analyse the strength of materials using stress-strain relationships for structural and thermal loading |
| | | | MET201.3 | perform basic design of shafts subjected to torsional loading and analyse beams subjected to bending moments |
| | | | MET201.4 | determine the deformation of structures subjected to various loading conditions using strain energy methods |
| | | | MET201.5 | estimate the strength of thin cylinders, spherical vessels and columns, and appreciate the theories of failures and its relevance in mechanical design |
| 18 | S3 | MET203 MECHANICS OF FLUIDS | MET203.1 | define Properties of Fluids and Solve hydrostatic problems |
| | | | MET203.2 | explain fluid kinematics and Classify fluid flows |
| | | | MET203.3 | interpret Euler and Navier-Stokes equations and Solve problems using Bernoulli's equation |

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| | | | MET203.4 | evaluate energy loses in pipes and sketch energy gradient lines |
| | | | MET203.5 | explain the concept of boundary layer and its applications and use dimensional Analysis for model studies |
| 19 | S3 | MET205 METALLURGY & MATERIAL SCIENCE | MET205.1 | understand the basic chemical bonds, crystal structures (BCC, FCC, and HCP), and their relationship with the properties. |
| | | | MET205.2 | analyze the microstructure of metallic materials using phase diagrams and modify the microstructure and properties using different heat treatments. |
| | | | MET205.3 | how to quantify mechanical integrity and failure in materials. |
| | | | MET205.4 | apply the basic principles of ferrous and non-ferrous metallurgy for selecting materials for specific applications. |
| | | | MET205.5 | define and differentiate engineering materials on the basis of structure and properties for engineering applications. |
| 20 | S3 | HUT200 PROFESSIONAL ETHICS | HUT200.1 | understand the core values that shape the ethical behaviour of a professional. |
| | | | HUT200.2 | adopt a good character and follow an ethical life. |
| | | | HUT200.3 | explain the role and responsibility in technological development by keeping personal ethics and legal ethics. |
| | | | HUT200.4 | solve moral and ethical problems through exploration and assessment by established experiments. |
| | | | HUT200.5 | apply the knowledge of human values and social values to contemporary ethical values and global issues. |

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| 21 | S3 | MCN201 SUSTAINABLE ENGINEERING | MCN201.1 | understand the relevance and the concept of sustainability and the global initiatives in this direction |
| | | | MCN201.2 | explain the different types of environmental pollution problems and their sustainable solutions |
| | | | MCN201.3 | discuss the environmental regulations and standards |
| | | | MCN201.4 | outline the concepts related to conventional and non-conventional energy |
| | | | MCN201.5 | demonstrate the broad perspective of sustainable practices by utilizing engineering knowledge and principles |
| 22 | S3 | MEL201 COMPUTER AIDED MACHINE DRAWING (CAMD) | MEL201.1 | apply the knowledge of engineering drawings and standards to prepare standard dimensioned drawings of machine parts and other engineering components. |
| | | | MEL201.2 | prepare standard assembly drawings of machine components and valves using part drawings and bill of materials. |
| | | | MEL201.3 | apply limits and tolerances to components and choose appropriate fits for given assemblies. |
| | | | MEL201.4 | interpret the symbols of welded, machining and surface roughness on the component |
| | | | MEL201.5 | prepare part and assembly drawings and Bill of Materials of machine components and valves using CAD software. |
| 23 | S3 | MEL203 MATERIALS TESTING LAB (MT LAB) | MEL203.1 | to determine the Modulus of Elasticity of steel and wood using UTM |
| | | | MEL203.2 | to verify Clerk- Maxwell's Reciprocal Theorem and hence determine the Modulus of elasticity of steel. |

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| | | | MEL203.3 | to determine the Modulus of rigidity of steel using torsion test, spring test and torsion pendulum |
| | | | MEL203.4 | to analyse the toughness of a specimen using Impact testing machine |
| | | | MEL203.5 | to test the hardness of a material by Rockwell, Brinell and Vicker Hardness test. |
| 24 | S4 | MAT202 PROBABILITY, STATISTICS AND NUMERICAL METHODS | MAT202.1 | understand the concept, properties and important models of discrete random variables and, using them, analyse suitable random phenomena. |
| | | | MAT202.2 | understand the concept, properties and important models of continuous random variables and, using them, analyse suitable random phenomena |
| | | | MAT202.3 | perform statistical inferences concerning characteristics of a population based on attributes of samples drawn from the population |
| | | | MAT202.4 | compute roots of equations, evaluate definite integrals and perform interpolation on given numerical data using standard numerical techniques |
| | | | MAT202.5 | apply standard numerical techniques for solving systems of equations, fitting curves on given numerical data and solving ordinary differential equations |
| 25 | S4 | MET202 ENGINEERING THERMODYNAMICS | MET202.1 | understand basic concepts and laws of thermodynamics |
| | | | MET202.2 | conduct first law analysis of open and closed systems |
| | | | MET202.3 | determine entropy and availability changes associated with different processes |
| | | | MET202.4 | understand the application and limitations of different equations of state |

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| | | | MET202.5 | determine change in properties of pure substances during phase change processes and Properties of ideal gas |
| 26 | S4 | MET204 MANUFACTURING PROCESS | MET204.1 | illustrate the basic principles of foundry practices and special casting processes, their advantages, limitations and applications. |
| | | | MET204.2 | categorize welding processes according to welding principle and material |
| | | | MET204.3 | understand requirements to achieve sound welded joint while welding different similar and dissimilar engineering materials. |
| | | | MET204.4 | student will estimate the working loads for pressing, forging, wire drawing etc. processes |
| | | | MET204.5 | recommend appropriate part manufacturing processes when provided a set of functional requirements and product development constraints. |
| 27 | S4 | MET206 FLUID MACHINERY | MET206.1 | explain the characteristics of centrifugal and reciprocating pumps |
| | | | MET206.2 | calculate forces and work done by a jet on fixed or moving plate and curved plates |
| | | | MET206.3 | explain the working of turbines and Select a turbine for specific application. |
| | | | MET206.4 | analyse the working of air compressors and Select the suitable one based on application. |
| | | | MET206.5 | analyse gas turbines and Identify the improvements in basic gas turbine cycles |
| 28 | S4 | EST200 DESIGN AND ENGINEERING | EST200.1 | explain the different concepts and principles involved in design engineering |
| | | | EST200.2 | apply design thinking while learning and practicing engineering |
| | | | EST200.3 | develop innovative, reliable designs incorporating knowledge in engineering. |

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| | | | EST200.4 | ability to work within multidisciplinary teams. |
| | | | EST200.5 | develop sustainable and economically viable designs incorporating knowledge in engineering. |
| 29 | S4 | MEL202 FM & HM LAB | MEL202.1 | determine coefficient of discharge of flow measuring devices (notches, orifice meter and venturimeter) |
| | | | MEL202.2 | calibrate flow measuring devices (notches, orifice meter and venturimeter) |
| | | | MEL202.3 | evaluate losses in pipes |
| | | | MEL202.4 | determine the metacentric height and stability of floating bodies |
| | | | MEL202.5 | determine the efficiency and plot the characteristic curves of different types of pumps and turbines |
| 30 | S4 | MEL204 MACHINE TOOLS LAB-I | MEL204.1 | operate different machine tools with understanding of work holders |
| | | | MEL204.2 | apply cutting mechanics to metal machining based on cutting force and power consumption. |
| | | | MEL204.3 | select appropriate machining processes and process parameters for different metals. |
| | | | MEL204.4 | fabricate and assemble various metal components by welding and students will be able to visually examine their work and that of others for discontinuities and defects. |
| | | | MEL204.5 | infer the changes in properties of steel on annealing, normalizing, hardening and tempering. |
| 31 | S4 | MCN202 CONSTITUTION OF INDIA | MCN202.1 | explain the background of the present constitution of India and features |
| | | | MCN202.2 | utilize the fundamental rights and duties. |

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| | | | MCN202.3 | understand the working of the union executive, parliament, state executive, legislature and judiciary. |
| | | | MCN202.4 | utilize the special provisions and statutory institutions. |
| | | | MCN202.5 | show national and patriotic spirit as responsible citizens of the country |
| 32 | S5 | MET 307 MACHINE TOOLS AND METROLOGY | MET 307.1 | analyze various machining process and calculate relevant quantities such us velocities, forces and powers. |
| | | | MET 307.2 | analyze of the tool nomenclature with surface roughness obtainable in each machining processes. |
| | | | MET 307.3 | understand the limitations of various machining process with regard to shape formation and surface texture |
| | | | MET 307.4 | demonstrate knowledge of the underlying principles of measurement, as they relate to mechanical measurement, electronic instrumentation, and thermal effects. |
| | | | MET 307.5 | get an exposure to advanced measuring devices and machine tool metrology |
| 33 | S5 | MEL331 MACHINE TOOL LAB II | MEL331.1 | to learn the measurement of bores by internal micrometers, bore indicators, indirect methods etc. |
| | | | MEL331.2 | to learn the measurement of the Angle and taper by Bevel protractor, Sine bars, indirect methods etc. |
| | | | MEL331.3 | allow to study the various limits, fits and tolerances adopted in the production drawings. |
| | | | MEL331.4 | to learn to measure straightness, flatness, roundness, profile, screw threads and gear teeth. |

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| | | | MEL331.5 | to learn, to prepare programs for CNC machines and measurements in CMM. |
| 34 | S5 | MEL333 THERMAL ENGINEERING LAB I | MEL333.1 | Measure thermo-physical properties of solid, liquid and gaseous fuels |
| | | | MEL333.2 | Identify various systems and subsystems of Diesel and petrol engines |
| | | | MEL333.3 | Analyze the performance characteristics of internal combustion engines |
| | | | MEL333.4 | Investigate the emission characteristics of exhaust gasses from IC Engines |
| | | | MEL333.5 | Interpret the performance characteristics of air compressors / blowers |
| 35 | S5 | MET 303 THERMAL ENGINEERING | MET303.1 | explain the working of steam power cycle and related components |
| | | | MET303.2 | discuss the working of steam turbines and methods for evaluating the performance |
| | | | MET303.3 | illustrate the performance testing and evaluation of IC engines |
| | | | MET303.4 | explain the combustion phenomenon and pollution in IC engines |
| | | | MET303.5 | discuss the principles of refrigeration and air-conditioning and basic design considerations |
| 36 | S5 | MET305 INDUSTRIAL & SYSTEMS ENGINEERING | MET305.1 | implement various tools and techniques in industrial engineering |
| | | | MET305.2 | calculate the inventory system for a given requirement |
| | | | MET305.3 | explain the importance of industrial relations |
| | | | MET305.4 | select the lean manufacturing tools to find and eliminate wastes and Identify the framework of agile manufacturing |
| | | | MET305.5 | identify core and extended modules of enterprise resource planning. |
| 37 | S5 | | MCN 301.1 | define and use various terminologies in use in disaster management parlance and |

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| | | MCN 301 DISASTER MANAGEMENT | | organise each of these terms in relation to the disaster management |
| | | | MCN 301.2 | distinguish between hazard tpes and vulnerability types and do vulnerability assessment |
| | | | MCN 301.3 | identify the components and describe the process of risk assessment and apply appropriate methodologies to assess risk |
| | | | MCN 301.4 | explain the core elements and phases of disaster risk management and develop possible measures to reduce disaster risks across sector and community. |
| | | | MCN 301.5 | identify factors that determine the nature of disaster response and explain the various legislations and best practices for disaster management and risk reduction at national and international level. |
| 38 | S5 | MET301 MECHANICS OF MACHINERY | MET301.1 | explain the fundamentals of kinematics, various planar mechanisms and interpret the basic principles of mechanisms and machines |
| | | | MET301.2 | perform analysis and synthesis of mechanisms |
| | | | MET301.3 | solve the problem on cams and gear drives, including selection depending on requirement |
| | | | MET301.4 | calculate the gyroscopic effect in various situations |
| | | | MET301.5 | analyse rotating and reciprocating masses for its unbalance |
| 39 | S5 | HUT 300 INDUSTRIAL ECONOMICS AND FOREIGN TRADE | HUT300.1 | explain the problem of scarcity of resources and consumer behaviour, and to evaluate the impact of government policies on the general economic welfare. (Cognitive knowledge level: Understand) |

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| | | | HUT300.2 | take appropriate decisions regarding volume of output and to evaluate the social cost of production. (Cognitive knowledge level: Apply) |
| | | | HUT300.3 | determine the functional requirement of a firm under various competitive conditions. (Cognitive knowledge level: Analyse) |
| | | | HUT300.4 | examine the overall performance of the economy, and the regulation of economic fluctuations and its impact on various sections in the society. (Cognitive knowledge level: Analyse) |
| | | | HUT300.5 | determine the impact of changes in global economic policies on the business opportunities of a firm. (Cognitive knowledge level: Analyse) |
| 40 | S6 | HUT310 MANAGEMENT FOR ENGINEERS | HUT310.1 | explain the characteristics of management in the contemporary context (Cognitive Knowledge level: Understand). |
| | | | HUT310.2 | describe the functions of management (Cognitive Knowledge level: Understand). |
| | | | HUT310.3 | demonstrate ability in decision making process and productivity analysis (Cognitive Knowledge level: Understand). |
| | | | HUT310.4 | illustrate project management technique and develop a project schedule (Cognitive Knowledge level: Apply). |
| | | | HUT310.5 | summarize the functional areas of management and comprehend the concept of entrepreneurship and create business plans (Cognitive Knowledge level: Understand). |
| 41 | S6 | MEL332 COMPUTERAID | MEL332.1 | gain working knowledge in Computer Aided Design and modelling procedures. |

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| | | EDDESIGNAND ANALYSISLAB | MEL332.2 | gain knowledge in creating solid machinery parts. |
| | | | MEL332.3 | gain knowledge in assembling machine elements. |
| | | | MEL332.4 | gain working knowledge in Finite Element Analysis. |
| | | | MEL332.5 | solve simple structural, heat and fluid flow problems using standard software |
| 42 | S6 | MEL 334 THERMAL ENGINEERING LAB II | MEL334.1 | evaluate thermal properties of materials in conduction, convection and radiation. |
| | | | MEL334.2 | evaluate thermal properties of materials in convection. |
| | | | MEL334.3 | evaluate thermal properties of materials in radiation. |
| | | | MEL334.4 | analyse the performance of heat exchangers. |
| | | | MEL334.5 | perform calibration of thermocouples and pressure gauges. |
| 43 | S6 | MET 302 HEAT AND MASS TRANSFER | MET302.1 | apply principles of conduction heat transfer and obtain solutions to problems involving conduction heat transfer |
| | | | MET302.2 | analyze and obtain solutions to problems involving convection heat transfer |
| | | | MET302.3 | design heat transfer systems such as heat exchangers, fins etc. |
| | | | MET302.4 | apply radiation heat transfer principles and design heat transfer systems such as radiation shields. |
| | | | MET302.5 | apply principles of mass transfer to engineering problems |
| 44 | S6 | MET304 DYNAMICS AND DESIGN OF MACHINERY | MET304.1 | do engine force analysis and to draw turning moment diagrams. |
| | | | MET304.2 | analyse free and forced vibrations of single degree of freedom systems. |

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| | | | MET304.3 | determine the natural frequencies of a two degree of freedom vibrating system and to calculate the stresses in a structural member due to combined loading. |
| | | | MET304.4 | design machine elements subjected to fatigue loading and riveted joints. |
| | | | MET304.5 | design welded joint and close coiled helical compression spring. |
| 45 | S6 | MET306 ADVANCED MANUFACTURING ENGINEERING | MET306.1 | to introduce machining principles and processes in the manufacturing of precision components and products that use conventional and nonconventional technologies |
| | | | MET306.2 | to give basic understanding of the machining capabilities, limitations, and productivity of advanced manufacturing processes |
| | | | MET306.3 | to describe how PLC's operate and how they control automated equipment and systems |
| | | | MET306.4 | to demonstrate tool path simulations with CNC powered equipment |
| | | | MET306.5 | to introduce CNC programming |
| 46 | S6 | MET352 AUTOMOBILE ENGINEERING | MET352.1 | explain different automotive systems and subsystems |
| | | | MET352.2 | illustrate the principles of transmission and suspension systems of an automobile |
| | | | MET352.3 | illustrate the principles of braking systems of an automobile |
| | | | MET352.4 | build a basic knowledge about the technology in electric vehicles |
| | | | MET352.5 | summarize the concept of aerodynamics in automobiles. |
| 47 | S6 | MET312 NON | MET312.1 | have a basic knowledge of surface NDT which enables to carry out various |

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| | | DESTRUCTIVE TESTING | | inspections in accordance with the established procedures. |
| | | | MET312.2 | the students will be able to differentiate various defect types and select the appropriate NDT methods for the specimen. |
| | | | MET312.3 | calibrate the instrument and evaluate the component for imperfections. |
| | | | MET312.4 | have a basic knowledge of ultrasonic testing which enables them to perform inspection of samples |
| | | | MET312.5 | have a complete theoretical and practical understanding of the radiographic testing, interpretation and evaluation. |
| 48 | S6 | MET 308 COMREHENSIVE COURSE WORK | MET308.1 | learn to prepare for a competitive examination |
| | | | MET308.2 | comprehend the questions in Mechanical Engineering field |
| | | | MET308.3 | answer the questions in Mechanical Engineering field with confidence |
| | | | MET308.4 | communicate effectively with faculty in scholarly environments |
| | | | MET308.5 | analyze the comprehensive knowledge gained in basic courses in the field of Mechanical Engineering |
| 49 | S7 | MET401 DESIGN OF MACHINE ELEMENTS | MET401.1 | design shafts based on strength, rigidity and design for static and fatigue loads, design flat belts and connecting rod of IC engines |
| | | | MET401.2 | design clutches and brakes |
| | | | MET401.3 | analyse sliding contact bearings and understand design procedure of journal, ball and roller bearings. |
| | | | MET401.4 | design Spur gear and helical gear |
| | | | MET401.5 | design Bevel gears and worm gears |

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| 50 | S7 | MET463 OPERATIONS MANAGEMENT | MET463.1 | understand operations, production system and perform facility location analysis. |
| | | | MET463.2 | impart knowledge of facility layout,layout planning and perform linebalancing. |
| | | | MET463.3 | compute demand forecast and forecast accuracy. |
| | | | MET463.4 | perform aggregate planning and materials requirement planning. |
| | | | MET463.5 | apply various algorithms for production scheduling |
| 50 | S7 | MET473 AIR CONDITIONING AND REFRIGERATIO N | MET473.1 | explain the basics of refrigeration process. |
| | | | MET473.2 | analyse the vapour compression refrigeration system and to improve the performance |
| | | | MET473.3 | describe vapour absorption and steam refrigeration system. |
| | | | MET473.4 | design refrigeration system by selecting suitable components and environmentally refrigerant |
| | | | MET473.5 | evaluate the cooling load and capacity requirement of ac machine |
| 51 | S7 | MCN401 INDUSTRIAL SAFETY ENGINEERING | MCN401.1 | describe the theories of accident causation and preventive measures of industrial accidents. (Cognitive Knowledge level: Understand) |
| | | | MCN401.2 | explain about personal protective equipment, its selection, safety performance & indicators and importance of housekeeping. (Cognitive Knowledge level: Understand) |
| | | | MCN401.3 | explain different issues in construction industries. (Cognitive Knowledge level: Understand) |
| | | | MCN401.4 | describe various hazards associated with different machines and mechanical material |

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| | | | | handling. (Cognitive Knowledge level: Understand) |
| | | | MCN401.5 | utilise different hazard identification tools in different industries with the knowledge of different types of chemical hazards. (Cognitive Knowledge level: Apply) |
| 51 | S7 | MEL411 MECHANICAL ENGINEERING LAB | MEL411.1 | get practical knowledge on design and analysis of mechanisms in the machines. |
| | | | MEL411.2 | measure the cutting forces associated with milling machining operations. |
| | | | MEL411.3 | apply the basic concepts of hydraulic and pneumatic actuators and their applications in product and processes |
| | | | MEL411.4 | use appropriate systems for data acquisition and control of product and processes |
| | | | MEL411.5 | apply the basic concepts of 3D printing and their applications in product and processes |
| 52 | S7 | MEQ413 SEMINAR | MEQ413.1 | identify academic documents from the literature which are related to her/his areas of interest (Cognitive knowledge level: Apply). |
| | | | MEQ413.2 | read and apprehend an academic document from the literature which is related to her/ his areas of interest (Cognitive knowledge level: Analyze). |
| | | | MEQ413.3 | prepare a presentation about an academic document (Cognitive knowledge level: Create). |
| | | | MEQ413.4 | give a presentation about an academic document (Cognitive knowledge level: Apply). |
| | | | MEQ413.5 | prepare a technical report (Cognitive knowledge level: Create). |
| 52 | S7 | MED415 PROJECT PHASE I | MED415.1 | model and solve real world problems by applying knowledge across domains (Cognitive knowledge level: Apply). |

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| | | | MED415.2 | develop products, processes or technologies for sustainable and socially relevant applications (Cognitive knowledge level: Apply). |
| | | | MED415.3 | function effectively as an individual and as a leader in diverse teams and to comprehend and execute designated tasks.Organize and communicate technical and scientific findings effectively in written and oral forms (Cognitive knowledge level: Apply). |
| | | | MED415.4 | plan and execute tasks utilizing available resources within timelines, following ethical and professional norms (Cognitive knowledge level: Apply). |
| | | | MED415.5 | identify technology/research gaps and propose innovative/creative solutions (Cognitive knowledge level: Analyze). |
| 53 | S8 | MET402 MECHATRONICS | MET402.1 | explain the sensors and actuators used in mechatronics |
| | | | MET402.2 | design hydraulic and pneumatic circuits for automation. |
| | | | MET402.3 | explain the manufacturing processes used in MEMS |
| | | | MET402.4 | demonstrate the various components of a CNC machine |
| | | | MET402.5 | create a PLC program |
| 53 | S8 | MET414 QUALITY MANAGEMENT | MET414.1 | to be conversant with important terms for quality management in organisations |
| | | | MET414.2 | have a complete theoretical and practical understanding of the contributions of Quality Gurus |
| | | | MET414.3 | demonstrate knowledge of the underlying principles of strategic quality management |

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| | | | MET414.4 | identify various human dimensions of TQM |
| | | | MET414.5 | implement different tools and techniques in TQM |
| 54 | S8 | MET 466 TECHNOLOGY MANAGEMENT | MET466.1 | be conversant with important terms for technology management in organisations |
| | | | MET466.2 | explain the need of technology forecasting |
| | | | MET466.3 | understand the essence of technology acquisition |
| | | | MET466.4 | describe the elements of technology strategy |
| | | | MET466.5 | outline the basics of innovation |
| 54 | S8 | MET 458 ADVANCED ENERGY ENGINEERING | MET458.1 | explain the concept of various types of power generation |
| | | | MET458.2 | explain solar and wind power generation and its economics |
| | | | MET458.3 | explain biomass energy sources and its economics |
| | | | MET458.4 | explain various renewable energy sources |
| | | | MET458.5 | explain environmental impacts of various energy generation |
| 55 | S8 | MET 468 ADDITIVE MANUFACTURING | MET468.1 | discuss various additive manufacturing processes |
| | | | MET468.2 | explain slicing operations in additive manufacturing |
| | | | MET468.3 | use liquid and solid based additive manufacturing system |
| | | | MET468.4 | select powder based and use of pre requirement of AM |
| | | | MET468.5 | apply rapid prototyping techniques for obtaining solutions |
| 55 | S8 | MED416 PROJECT PHASE II | MED416.1 | model and solve real world problems by applying knowledge across domains |
| | | | MED416.2 | develop products, processes or technologies for sustainable and socially relevant applications |

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| | | | MED416.3 | function effectively as an individual and as a leader in diverse teams and to comprehend and execute designated tasks |
| | | | MED416.4 | plan and execute tasks utilizing available resources within timelines, following ethical and professional norms |
| | | | MED416.5 | identify technology/research gaps and propose innovative/creative solutions |

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**COURSE OUTCOMES**

**Branch: DEPARTMENT OF MASTER OF COMPUTER APPLICATIONS**

**2019 SCHEME**

**After the completion of the course the Students will be able to**

| S. No. | SEM | Subject | CO | CO Statement |
|---|---|---|---|---|
| 1 | S1 | MATHEMATICAL FOUNDATIONS FOR COMPUTING 20MCA101 | MCA101.1 | understand mathematical reasoning in order to read, comprehend and construct mathematical arguments |
| | | | MCA101.2 | count or enumerate objects and solve counting problems and analyze algorithms |
| | | | MCA101.3 | solve problems in almost every conceivable discipline using graph models |
| | | | MCA101.4 | solve the linear system of equations and Calculate the eigen values and eigen vectors of matrices. |
| | | | MCA101.5 | apply the principles of correlation and regression in practical problems. |
| 2 | S1 | DIGITAL FUNDAMENTALS & COMPUTER ARCHITECTURE 20MCA103 | MCA103.1 | apply the basics of digital electronics to design and realize simple combinational logic circuits |
| | | | MCA103.2 | apply the digital electronics principles to design sequential logic circuits. |
| | | | MCA103.3 | understand the different design features of computer architecture, Five key components of a computer, processor and memory making technologies, addressing modes & instruction formats. |
| | | | MCA103.4 | understand Processor logic design conventions and data path, pipelining and hazards, I/O organization, Interrupts and direct memory access |
| | | | MCA103.5 | understand and different types of memories - RAM, ROM, Cache memory, virtual memory |

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| | | | | etc. Apply the different memory design techniques. |
| 3 | S1 | ADVANCED DATA STRUCTURES 20MCA105 | MCA105.1 | remember the Basic Data Structures and understand the Set Data Structure and its implementation. |
| | | | MCA105.2 | understand Advanced Tree Structures for the design of efficient algorithms |
| | | | MCA105.3 | understand Advanced Heap Structures suitable for solving Computational problems involving Optimisation and analysing these data structures using amortised analysis. |
| | | | MCA105.4 | understand Advanced Graph algorithms suitable for solving advanced computational problems |
| | | | MCA105.5 | understand the basic operation of Blockchaining along with the data structures used in it and the challenges in Blockchain data |
| 5 | S1 | ADVANCED SOFTWARE ENGINEERING 20MCA107 | MCA107.1 | get a full view of the Software life cycle |
| | | | MCA107.2 | gain a deep knowledge of Software Planning, Analysis and Design and SoftwareEngineering Models |
| | | | MCA107.3 | gave a great comprehension of Coding Practices, Version Control using ‘git’ and Software Quality |
| | | | MCA107.4 | acquire ample grasp of Design Patterns |
| | | | MCA107.5 | get deeply familiarised with Software Testing and its automation |
| 6 | S1 | PROGRAMMING LAB 20MCA131 | MCA131.1 | understands basics of Python Programming language including input/output functions, operators, basic and collection data types |
| | | | MCA131.2 | implement decision making, looping constructs and functions |

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| | | | MCA131.3 | design modules and packages - built in and user defined packages |
| | | | MCA131.4 | implement object-oriented programming and exception handling |
| | | | MCA131.5 | create files and form regular expressions for effective search operations on strings and files. |
| 7 | S1 | WEB PROGRAMMING LAB 20MCA133 | MCA133.1 | explore markup languages features and create interactive web pages using them. |
| | | | MCA133.2 | learn and design client-side validation using scripting languages. |
| | | | MCA133.3 | design front end web page and connect to the back-end databases. |
| | | | MCA133.4 | do Client-side & Server-side scripting |
| | | | MCA133.5 | do Client-side & Server-side scripting |
| 8 | S1 | DATA STRUCTURES LAB 20MCA135 | MCA135.1 | use Debuggers, Profilers and advanced Compiler options. |
| | | | MCA135.2 | implement the Set and Disjoint Set Data Structures. |
| | | | MCA135.3 | understand the practical aspects of Advanced Tree Structures. |
| | | | MCA135.4 | realise Modern Heap Structures for effectively solving advanced Computational problems |
| | | | MCA135.5 | implement Advanced Graph algorithms suitable for solving advanced computational problems. |
| 9 | S2 | ADVANCED DATABASE MANAGEMENT SYSTEMS 20MCA102 | MCA102.1 | understand the fundamentals of relational database systems including: data models, database architectures and ER features. |
| | | | MCA102.2 | analyze and apply the different normalization techniques. |
| | | | MCA102.3 | assess the basic issues of transaction processing and concurrency control. |

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| | | | MCA102.4 | understand the roles that databases play in organizations and familiarize with basic database storage, file organization, database accessing techniques |
| | | | MCA102.5 | understand the basics of query processing, object-oriented, distributed databases. |
| 10 | S2 | ADVANCED COMPUTER NETWORKS 20MCA104 | MCA104.1 | comprehend the terminology and concepts of basic communication model, analyse the protocol layers and design application layer protocols |
| | | | MCA104.2 | understand and analyse the various transport layer protocols |
| | | | MCA104.3 | compare and contrast various routing algorithms in the network layer. |
| | | | MCA104.4 | understand and analyse the concepts of link layer and physical layer. |
| | | | MCA104.5 | understand how modern cellular and wireless networks work |
| 11 | S2 | VIRTUALISATION AND CONTAINERS 20MCA168 | MCA168.1 | understand the basics of virtualization technology, architecture, limitations and applications. |
| | | | MCA168.2 | apply Networking Principles to setup virtual machines and connect to the network |
| | | | MCA168.3 | understand the basics of VM life cycle, VM migrations, VM scheduling and load balancing |
| | | | MCA168.4 | understand Container fundamentals including how to configure and set up a container |
| | | | MCA168.5 | understand the basics of security, troubleshooting and monitoring aspects in container technology |
| 12 | S2 | ADVANCED OPERATING | MCA172.1 | identify synchronization problems in operating systems and issues in distributed systems |

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| | | SYSTEMS 20MCA172 | MCA172.2 | explain classification of mutual exclusion algorithms and security violations. |
| | | | MCA172.3 | explain the design of distributed shared memory and issues in load distribution. |
| | | | MCA172.4 | explain design issues and synchronization in multiprocessor systems. |
| | | | MCA172.5 | explain synchronization and concurrency control in database systems. |
| 13 | S2 | EMBEDDED SYSTEMS 20MCA184 | MCA184.1 | understand the basic concepts of Embedded Systems and its Applications. |
| | | | MCA184.2 | demonstrate the role of individual components involved in a typical embedded system |
| | | | MCA184.3 | learn about the co-design approach for embedded hardware and firmware development. |
| | | | MCA184.4 | understand the concepts involved in Embedded System Design and development Process. |
| | | | MCA184.5 | learn about techniques used in the Integration and Testing of Embedded Hardware and Firmware |
| 14 | S2 | ARTIFICIAL INTELLIGENCE 20MCA188 | MCA188.1 | apply the steps needed to provide a formal specification for solving the problem. |
| | | | MCA188.2 | apply and analyze the different types of control and heuristic search methods to solve problems |
| | | | MCA188.3 | understand various Game theory problems& Knowledge structures |
| | | | MCA188.4 | formulate knowledge representation and examine resolution in predicate and propositional logic |
| | | | MCA188.5 | apply feasible planning and learning techniques to solve non-trial problems |

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| 15 | S2 | OBJECT ORIENTED PROGRAMMING LAB 20MCA132 | MCA132.1 | understand object-oriented concepts and design classes and objects to solve problems |
| | | | MCA132.2 | implement arrays and strings. |
| | | | MCA132.3 | implement object-oriented concepts like inheritance, overloading and interfaces |
| | | | MCA132.4 | implement packages, exception handling, multithreading and generic programming. Use java.util package and Collection framework |
| | | | MCA132.5 | develop applications to handle events using applets |
| 16 | S2 | ADVANCED DBMS LAB 20MCA134 | MCA134.1 | design and build a simple relational database system and demonstrate competence with the fundamentals tasks involved with modelling, designing and implementing a database. |
| | | | MCA134.2 | apply PL/SQL for processing databases |
| | | | MCA134.3 | comparison between relational and non-relational (NoSQL) databases and the configuration of NoSQL Databases. |
| | | | MCA134.4 | apply CRUD operations and retrieve data in a NoSQL environment. |
| | | | MCA134.5 | understand the basic storage architecture of distributed file systems |
| 17 | S2 | NETWORKING & SYSTEM ADMINISTRATION LAB | MCA136.1 | install and configure common operating systems. |
| | | | MCA136.2 | perform system administration tasks. |
| | | | MCA136.3 | install and manage servers for web applications |
| | | | MCA136.4 | write shell scripts required for system administration. |
| | | | MCA136.5 | acquire skill sets required for a DevOps. |
| 18 | S3 | | MCA201.1 | |

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| | | DATA SCIENCE & MACHINE LEARNING 20MCA201 | | discuss the fundamental concepts of data science and data visualization techniques. |
| | | | MCA201.2 | Explain the basics of machine learning and use lazy learning and probabilistic learning algorithms to solve data science problems. |
| | | | MCA201.3 | Explain the basics of machine learning and use lazy learning and probabilistic learning algorithms to solve data science problems. |
| | | | MCA201.4 | Solve data science problems using neural networks and support vector machines. |
| | | | MCA201.5 | Discuss clustering using k-means algorithm and evaluate & improve the performance of machine learning classification models. |
| 19 | S3 | DESIGN & ANALYSIS OF ALGORITHMS 20MCA203 | MCA203.1 | discuss the basic concepts in computer algorithms and their analysis & design using Divide and Conquer. |
| | | | MCA203.2 | explain the concepts of Greedy Strategy and Dynamic Programming to use it in solving real world problems. |
| | | | MCA203.3 | explain the Branch & Bound technique, Backtracking technique and Lower bounds. |
| | | | MCA203.4 | explain the Branch & Bound technique, Backtracking technique and Lower bounds. |
| | | | MCA203.5 | |

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| | | | | discuss the concepts of Approximation and Randomised Algorithms. |
| 20 | S3 | CYBER SECURITY AND CRYPTOGRAPHY 20MCA263 | MCA263.1 | Explain various types of security attacks, security mechanisms, security services and classical encryption techniques |
| | | | MCA263.2 | make use of Symmetric and Asymmetric encryption techniques to solve cryptographic problems. |
| | | | MCA263.3 | Describe the concepts of message authentication codes, hash functions and digital signing techniques for ensuring secure transactions. |
| | | | MCA263.4 | discuss security services in Application, Transport and Network layers. |
| | | | MCA263.5 | explain common web application security vulnerabilities and various prevention mechanisms. |
| 21 | S3 | COMPILER DESIGN 20MCA269 | MCA269.1 | explain different phases of compiler and perform lexical analysis using the concepts of regular expressions and finite automata. |
| | | | MCA269.2 | develop top down and bottom-up parsers to perform syntax analysis using context free grammar. |
| | | | MCA269.3 | explain syntax directed translation schemes and type checking for a given grammar. |
| | | | MCA269.4 | distinguish different intermediate code representations and |

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| | | | | generate intermediate code for statements in high level languages. |
| | | | MCA269.5 | describe various code optimization techniques and generate machine dependent code. |
| 22 | S3 | INTERNET OF THINGS 20MCA 281 | MCA281.1 | describe the main concepts and features of the IOT paradigm. |
| | | | MCA281.2 | discuss Fog computing, TinyOS - nesC and programming frameworks for IOT |
| | | | MCA281.3 | describe the data management techniques applied to the IOT environment. |
| | | | MCA281.4 | explain security, and privacy in IOT environments |
| | | | MCA281.5 | discuss key enablers and solutions to enable practical IoT systems |
| 23 | S3 | SOCIAL NETWORK ANALYSIS- 20MCA289 | MCA289.1 | explain the basic concepts of semantic web and social network analysis. |
| | | | MCA289.2 | describe the ontology-based knowledge representation techniques in social network. |
| | | | MCA289.3 | discuss aggregation of social network information and representation of social individuals and social relationships. |
| | | | MCA289.4 | describe the structure of the Web and Facebook as a graph and the algorithms for searching and community discovery |
| | | | MCA289.5 | explain the general architecture of a search engine and |

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| | | | | specifically the Google search engine architecture. |
| 24 | S3 | MOBILE APPLICATION DEVELOPMENT LAB 20MCA243 | MCA243.1 | Design and develop user interfaces for mobile apps using basic building blocks, UI components and application structure using Emulator |
| | | | MCA243.2 | write simple programs and develop small applications using the concepts of UI design, layouts and preferences |
| | | | MCA243.3 | develop applications with multiple activities using intents, array adapter, exceptions and options menu. |
| | | | MCA243.4 | implement activities with dialogs, spinner, fragments and navigation drawer by applying themes |
| | | | MCA243.5 | develop mobile applications using SQLite. |
| 25 | S3 | DATA SCIENCE LAB 20MCA241 | MCA241.1 | use different python packages to perform numerical calculations, statistical computations and data visualization |
| | | | MCA241.2 | use different packages and frameworks to implement regression and classification algorithms |
| | | | MCA241.3 | use different packages and frameworks to implement text classification using SVM and clustering using k-means |
| | | | MCA241.4 | use different packages and frameworks to implement text classification using SVM and clustering using k-means |

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| | | | MCA241.5 | implement programs for web data mining and natural language processing using NLTK |
| 26 | S3 | MINI PROJECT 20MCA245 | MCA245.1 | identify a real-life project which is useful to society / industry |
| | | | MCA245.2 | interact with people to identify the project requirements |
| | | | MCA245.3 | apply suitable development methodology for the development of the product / project |
| | | | MCA245.4 | analyse and design a software product / project Level 4: |
| | | | MCA245.5 | test the modules at various stages of project development |
| 27 | S4 | SEMINAR 20MCA244 | MCA244.1 | annotate the ideas presented in technical papers |
| | | | MCA244.2 | comprehend a concept by referring different technicaLdocuments |
| | | | MCA244.3 | prepare technical documents |
| | | | MCA244.4 | resent a topic before an audience |
| | | | MCA244.5 | interact with the audience |
| 28 | S4 | MAIN PROJECT 20MCA246 | MCA246.1 | identify a real-life project which is useful to society / industry |
| | | | MCA246.2 | interact with people to identify the project requirements |
| | | | MCA246.3 | apply suitable development methodology for the development of the product / project |
| | | | MCA246.4 | analyse and design a software product / project Level 4: |

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| | | | MCA246.5 | test the modules at various stages of project development |
| 29 | S4 | COMPREHENSIVE VIVA 20MCA242 | MCA242.1 | articulate the concepts in the core courses learned through this programme. |
| | | | MCA242.2 | attend technical interviews with confidence. |
| | | | MCA242.3 | interpret questions and answer them with clarity |
| | | | MCA242.4 | make use of the concepts learned through this programme in future |
| | | | MCA242.5 | apply the technologies and coding knowledge used in the project work in future. |

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**b) DISSEMINATION OF COs AND POs**

**Induction programs for new cohorts include explanations of POs and PSOs.**

**Link of Induction programme report from website**

https://news.vidyaacademy.ac.in/2023/09/14/vidya-welcomes-all-first-year-b-tech-2023-27-batch-students-aicte-vidya-induction-training-programme-started-with-great-vigor/

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**SCREENSHOT OF INDUCTION PROGRAMME REPORT IN COLLEGE WEBSITE**

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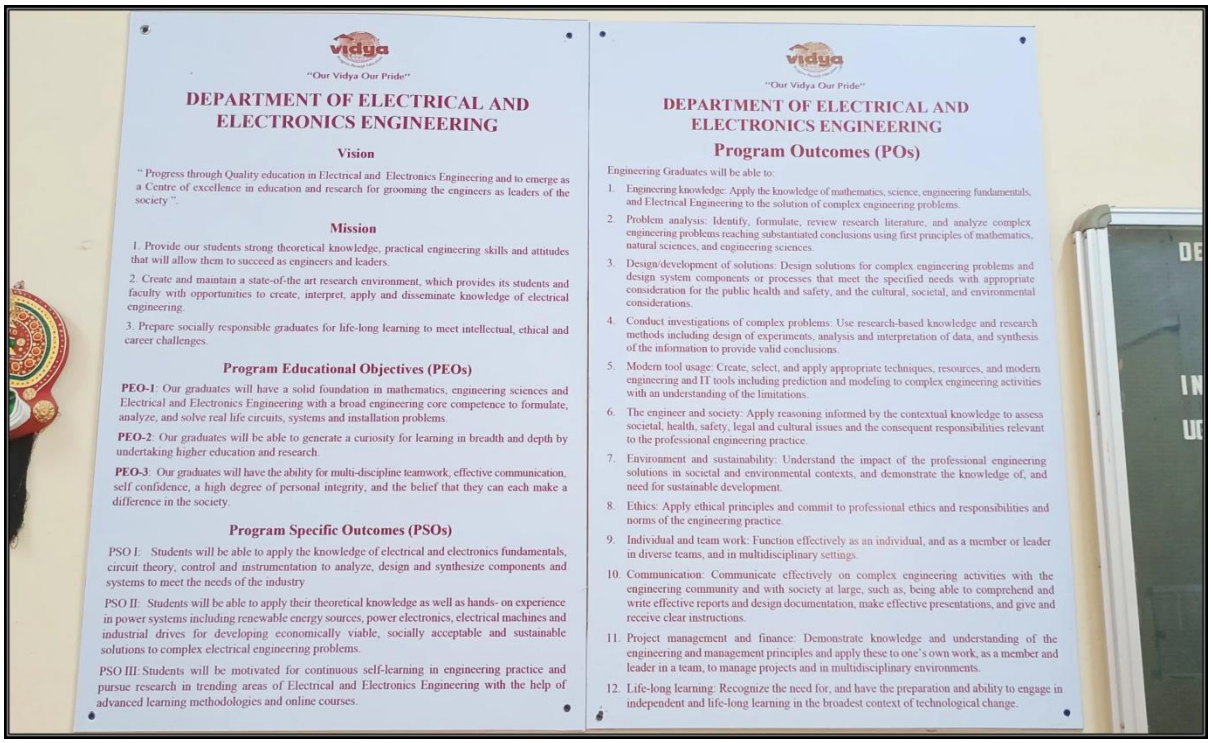
## c) PHOTOS OF POs AND PSOs DISPLAYED IN LAB AND COLLEGE PREMISES

### HOD ROOM



"Our Vidya Our Pride"

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**Vision**

" Progress through Quality education in Electrical and Electronics Engineering and to emerge as a Centre of excellence in education and research for grooming the engineers as leaders of the society ".

**Mission**

1. Provide our students strong theoretical knowledge, practical engineering skills and attitudes that will allow them to succeed as engineers and leaders.
2. Create and maintain a state-of-the art research environment, which provides its students and faculty with opportunities to create, interpret, apply and disseminate knowledge of electrical engineering.
3. Prepare socially responsible graduates for life-long learning to meet intellectual, ethical and career challenges.

**Program Educational Objectives (PEOs)**

**PEO-1**: Our graduates will have a solid foundation in mathematics, engineering sciences and Electrical and Electronics Engineering with a broad engineering core competence to formulate, analyze, and solve real life circuits, systems and installation problems.

**PEO-2**: Our graduates will be able to generate a curiosity for learning in breadth and depth by undertaking higher education and research.

**PEO-3**: Our graduates will have the ability for multi-discipline teamwork, effective communication, self confidence, a high degree of personal integrity, and the belief that they can each make a difference in the society.

**Program Specific Outcomes (PSOs)**

PSO I: Students will be able to apply the knowledge of electrical and electronics fundamentals, circuit theory, control and instrumentation to analyze, design and synthesize components and systems to meet the needs of the industry

PSO II: Students will be able to apply their theoretical knowledge as well as hands- on experience in power systems including renewable energy sources, power electronics, electrical machines and industrial drives for developing economically viable, socially acceptable and sustainable solutions to complex electrical engineering problems.

PSO III: Students will be motivated for continuous self-learning in engineering practice and pursue research in trending areas of Electrical and Electronics Engineering with the help of advanced learning methodologies and online courses.

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**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**Program Outcomes (POs)**

Engineering Graduates will be able to:

1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and Electrical Engineering to the solution of complex engineering problems.
2. 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.
3. 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.
4. 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.
5. 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.
6. 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.
7. 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.
8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. 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.
11. 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.
12. 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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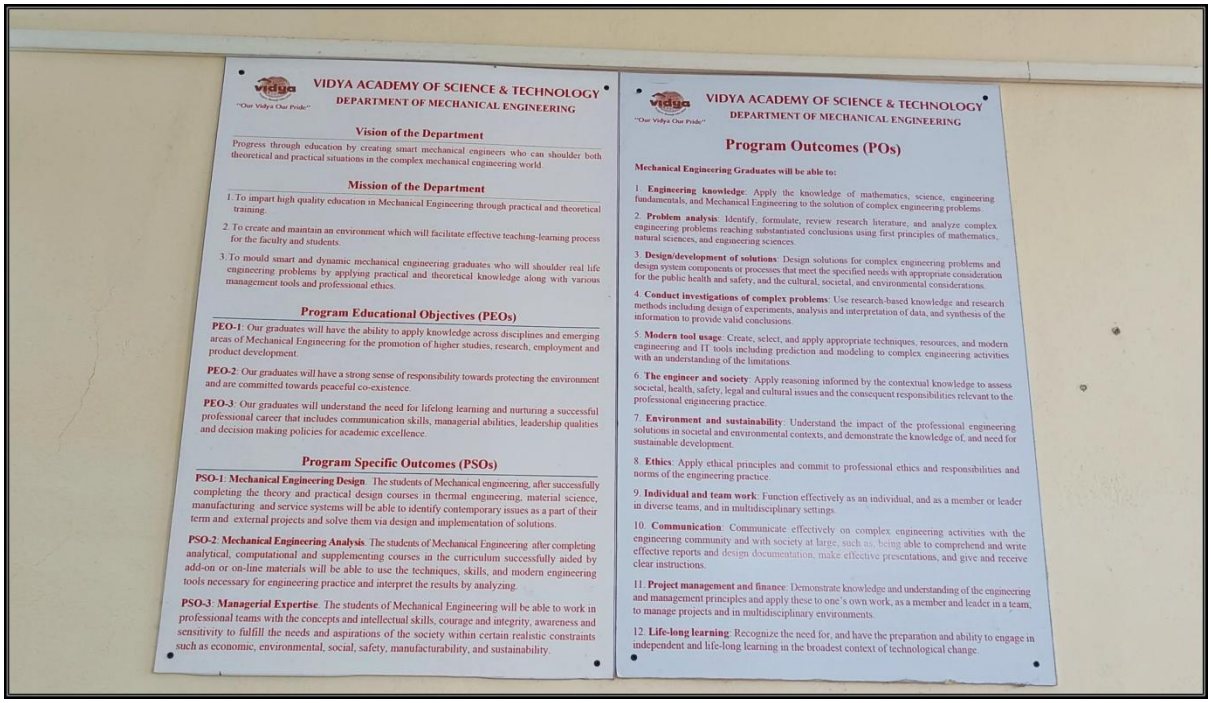
## FACULTY ROOM



VIDYA ACADEMY OF SCIENCE & TECHNOLOGY
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DEPARTMENT OF MECHANICAL ENGINEERING

**Vision of the Department**

Progress through education by creating smart mechanical engineers who can shoulder both theoretical and practical situations in the complex mechanical engineering world.

**Mission of the Department**

1. To impart high quality education in Mechanical Engineering through practical and theoretical training.
2. To create and maintain an environment which will facilitate effective teaching-learning process for the faculty and students.
3. To mould smart and dynamic mechanical engineering graduates who will shoulder real life engineering problems by applying practical and theoretical knowledge along with various management tools and professional ethics.

**Program Educational Objectives (PEOs)**

**PEO-1**: Our graduates will have the ability to apply knowledge across disciplines and emerging areas of Mechanical Engineering for the promotion of higher studies, research, employment and product development.

**PEO-2**: Our graduates will have a strong sense of responsibility towards protecting the environment and are committed towards peaceful co-existence.

**PEO-3**: Our graduates will understand the need for lifelong learning and nurturing a successful professional career that includes communication skills, managerial abilities, leadership qualities and decision making policies for academic excellence.

**Program Specific Outcomes (PSOs)**

**PSO-1**: **Mechanical Engineering Design**. The students of Mechanical engineering, after successfully completing the theory and practical design courses in thermal engineering, material science, manufacturing and service systems will be able to identify contemporary issues as a part of their term and external projects and solve them via design and implementation of solutions.

**PSO-2**: **Mechanical Engineering Analysis**. The students of Mechanical Engineering after completing analytical, computational and supplementing courses in the curriculum successfully aided by add-on or on-line materials will be able to use the techniques, skills, and modern engineering tools necessary for engineering practice and interpret the results by analyzing.

**PSO-3**: **Managerial Expertise**. The students of Mechanical Engineering will be able to work in professional teams with the concepts and intellectual skills, courage and integrity, awareness and sensitivity to fulfill the needs and aspirations of the society within certain realistic constraints such as economic, environmental, social, safety, manufacturability, and sustainability.

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DEPARTMENT OF MECHANICAL ENGINEERING

**Program Outcomes (POs)**

**Mechanical Engineering Graduates will be able to:**

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and Mechanical Engineering to the solution of complex engineering problems.
2. **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.
3. **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.
4. **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.
5. **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.
6. **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.
7. **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.
8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **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.
11. **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.
12. **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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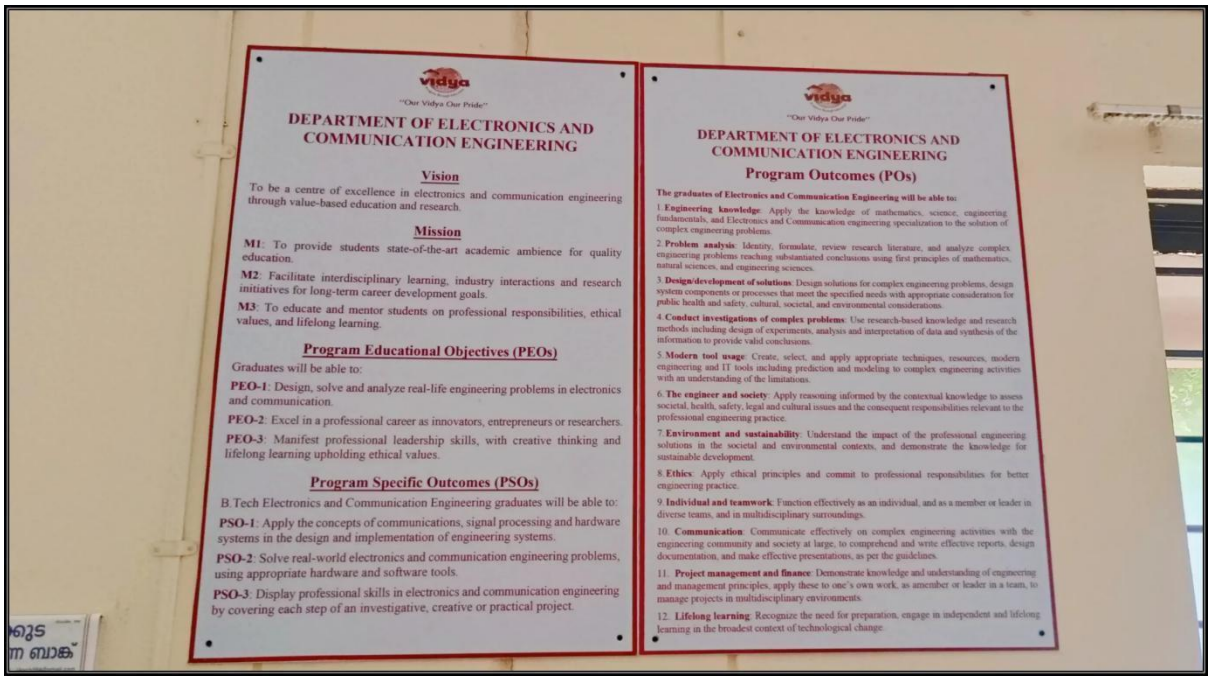
## LABORATORY



"Our Vidya Our Pride"

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**

**Vision**

To be a centre of excellence in electronics and communication engineering through value-based education and research.

**Mission**

**M1**: To provide students state-of-the-art academic ambience for quality education.

**M2**: Facilitate interdisciplinary learning, industry interactions and research initiatives for long-term career development goals.

**M3**: To educate and mentor students on professional responsibilities, ethical values, and lifelong learning.

**Program Educational Objectives (PEOs)**

Graduates will be able to:

**PEO-1**: Design, solve and analyze real-life engineering problems in electronics and communication.

**PEO-2**: Excel in a professional career as innovators, entrepreneurs or researchers.

**PEO-3**: Manifest professional leadership skills, with creative thinking and lifelong learning upholding ethical values.

**Program Specific Outcomes (PSOs)**

B.Tech Electronics and Communication Engineering graduates will be able to:

**PSO-1**: Apply the concepts of communications, signal processing and hardware systems in the design and implementation of engineering systems.

**PSO-2**: Solve real-world electronics and communication engineering problems, using appropriate hardware and software tools.

**PSO-3**: Display professional skills in electronics and communication engineering by covering each step of an investigative, creative or practical project.

"Our Vidya Our Pride"

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**

**Program Outcomes (POs)**

**The graduates of Electronics and Communication Engineering will be able to:**

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and Electronics and Communication engineering specialization to the solution of complex engineering problems.
2. **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.
3. **Design/development of solutions**: Design solutions for complex engineering problems, design system components or processes that meet the specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
4. **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.
5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **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.
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8. **Ethics**: Apply ethical principles and commit to professional responsibilities for better engineering practice.
9. **Individual and teamwork**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary surroundings.
10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and society at large, to comprehend and write effective reports, design documentation, and make effective presentations, as per the guidelines.
11. **Project management and finance**: Demonstrate knowledge and understanding of engineering and management principles, apply these to one's own work, as amember or leader in a team, to manage projects in multidisciplinary environments.
12. **Lifelong learning**: Recognize the need for preparation, engage in independent and lifelong learning in the broadest context of technological change.

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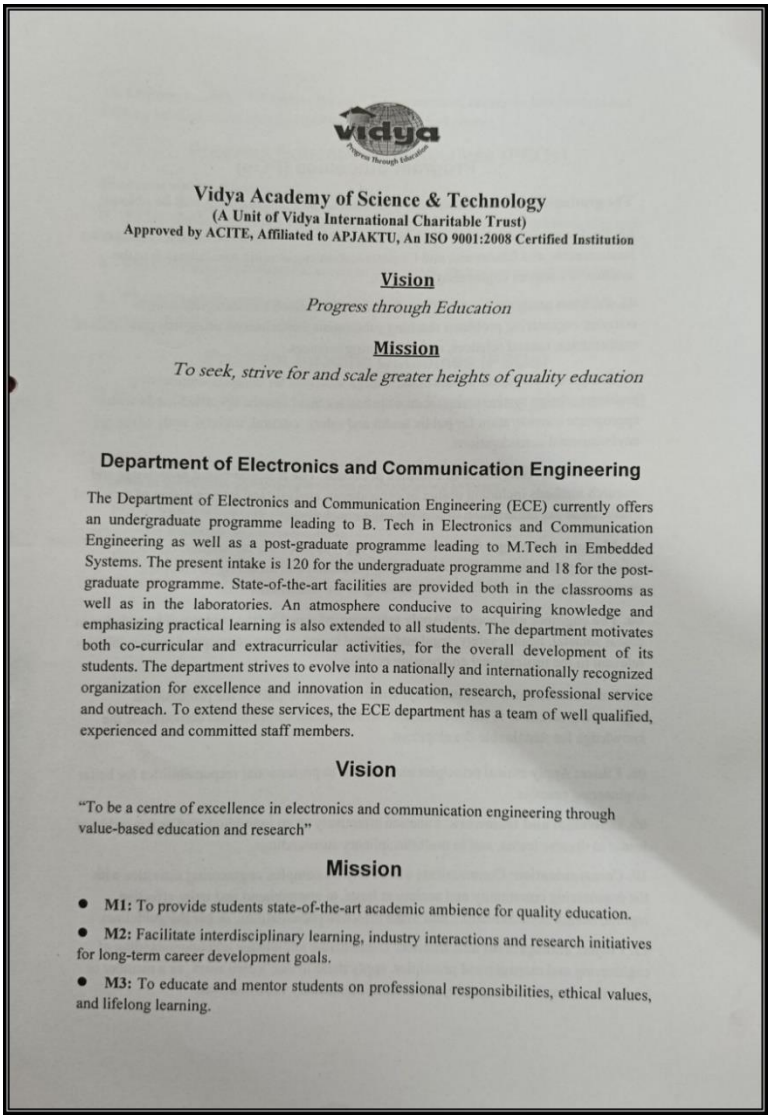
**CRITERIA 2.6.1 : Programme and course outcomes for all Programmes offered by the institution are stated and displayed on website and communicated to teachers and students.**

**d) <u>COs AND POS IN COURSE DIARY</u>**



Vidya Academy of Science & Technology
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Approved by ACITE, Affiliated to APJAKTU, An ISO 9001:2008 Certified Institution

**Vision**

*Progress through Education*

**Mission**

*To seek, strive for and scale greater heights of quality education*

**Department of Electronics and Communication Engineering**

The Department of Electronics and Communication Engineering (ECE) currently offers an undergraduate programme leading to B. Tech in Electronics and Communication Engineering as well as a post-graduate programme leading to M.Tech in Embedded Systems. The present intake is 120 for the undergraduate programme and 18 for the post-graduate programme. State-of-the-art facilities are provided both in the classrooms as well as in the laboratories. An atmosphere conducive to acquiring knowledge and emphasizing practical learning is also extended to all students. The department motivates both co-curricular and extracurricular activities, for the overall development of its students. The department strives to evolve into a nationally and internationally recognized organization for excellence and innovation in education, research, professional service and outreach. To extend these services, the ECE department has a team of well qualified, experienced and committed staff members.

**Vision**

"To be a centre of excellence in electronics and communication engineering through value-based education and research"

**Mission**

- **M1:** To provide students state-of-the-art academic ambience for quality education.
- **M2:** Facilitate interdisciplinary learning, industry interactions and research initiatives for long-term career development goals.
- **M3:** To educate and mentor students on professional responsibilities, ethical values, and lifelong learning.

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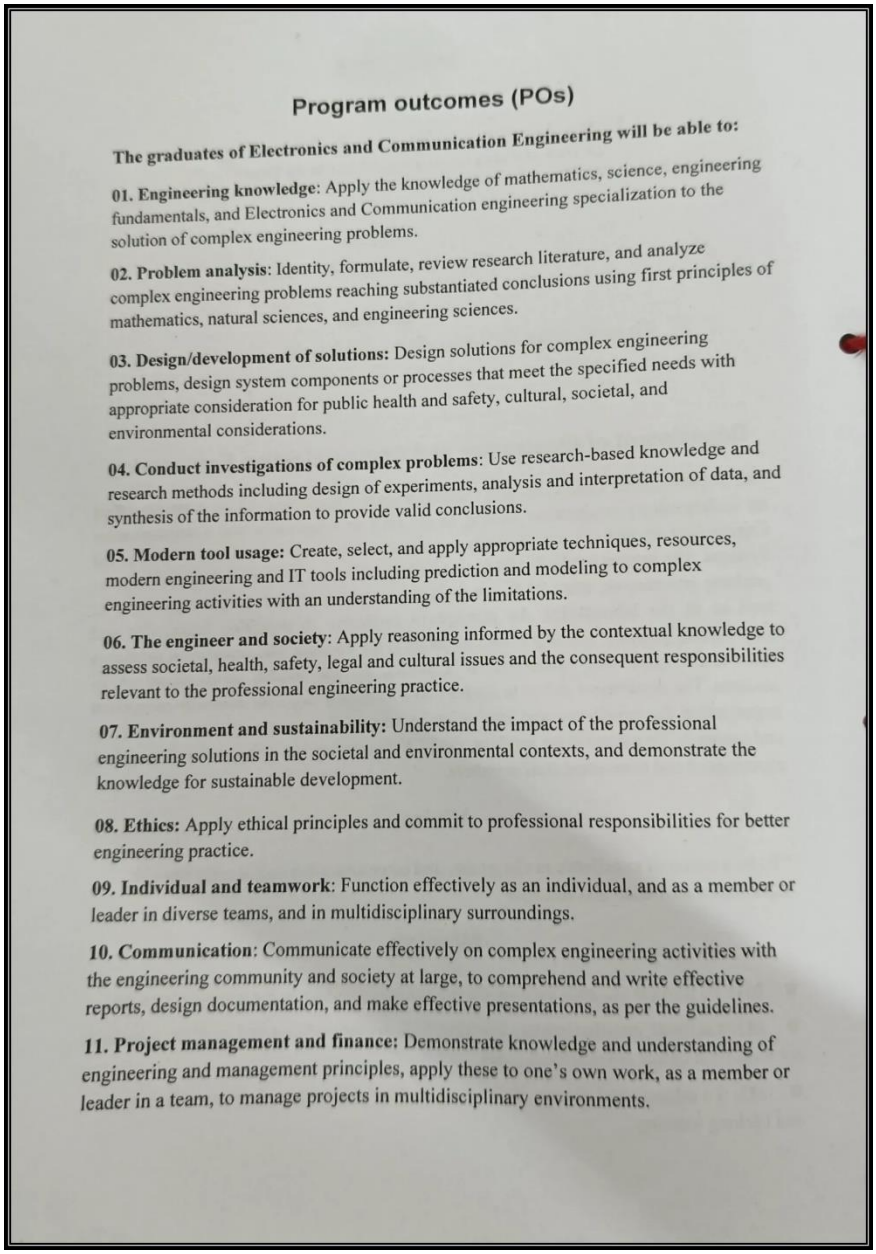
Phone: +91-4885-287751, 287752, Fax: 288366



## Program outcomes (POs)

**The graduates of Electronics and Communication Engineering will be able to:**

**01. Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and Electronics and Communication engineering specialization to the solution of complex engineering problems.

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

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

**04. 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.

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

**06. 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.

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

**08. Ethics:** Apply ethical principles and commit to professional responsibilities for better engineering practice.

**09. Individual and teamwork**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary surroundings.

**10. Communication**: Communicate effectively on complex engineering activities with the engineering community and society at large, to comprehend and write effective reports, design documentation, and make effective presentations, as per the guidelines.

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

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**12. Lifelong learning:** Recognize the need for preparation, engage in independent and lifelong learning in the broadest context of technological change.

## Program Educational Objectives (PEOs)

**Graduates will be able to:**

- **PEO1**: Design, solve and analyze real-life engineering problems in electronics and communication.
- **PEO2**:Excel in a professional career as innovators, entrepreneurs or researchers.
- **PEO3**: Manifest professional leadership skills, with creative thinking and lifelong learning upholding ethical values.

## Program Specific Outcomes (PSOs)

B.Tech Electronics and Communication Engineering graduates will be able to:

**PSO1**. Apply the concepts of communications, signal processing and hardware systems in the design and implementation of engineering systems.

**PSO2**. Solve real-world electronics and communication engineering problems, using appropriate hardware and software tools.

**PSO3**. Display professional skills in electronics and communication engineering by covering each step of an investigative, creative or practical project.

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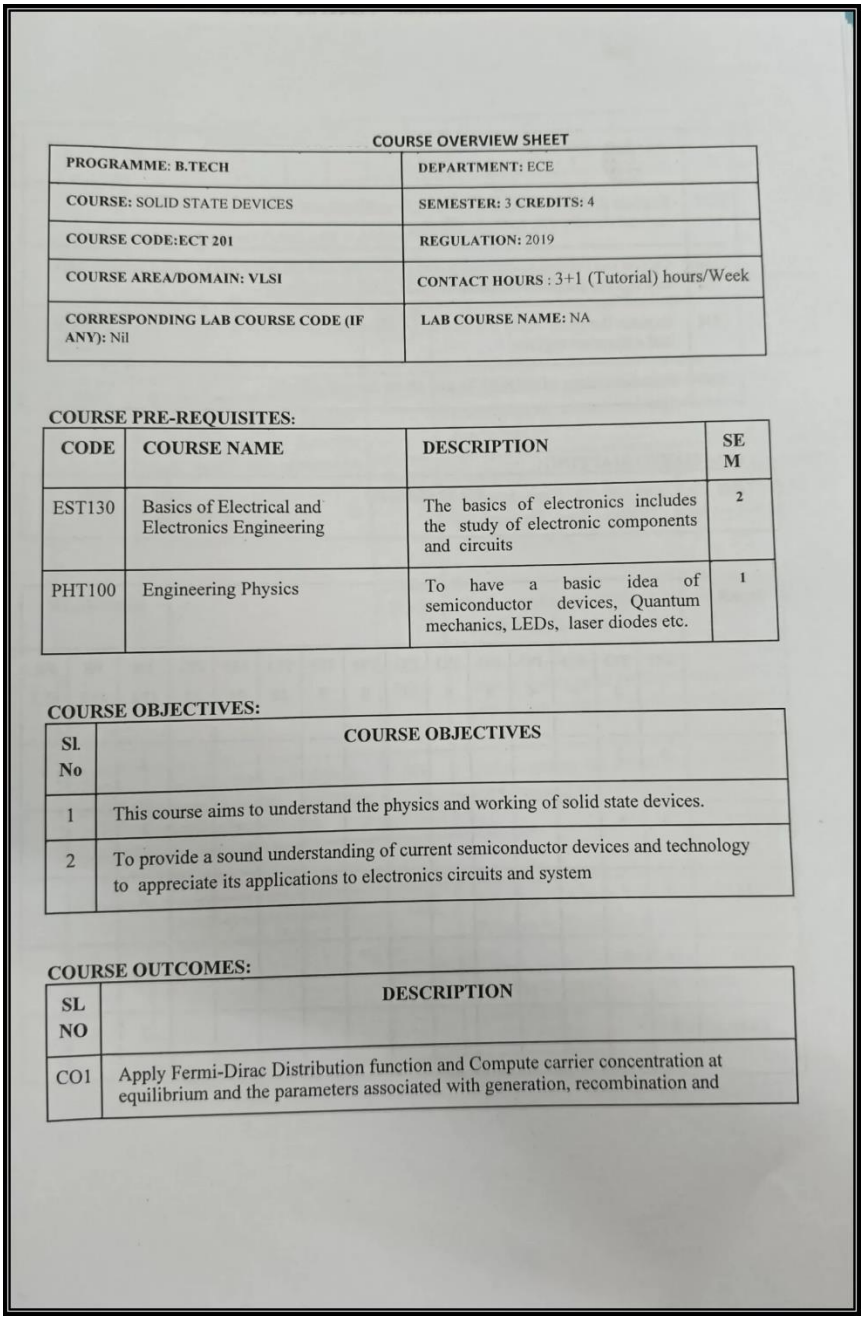
## COURSE OVERVIEW SHEET



COURSE OVERVIEW SHEET

| | |
|---|---|
| **PROGRAMME:** B.TECH | **DEPARTMENT:** ECE |
| **COURSE:** SOLID STATE DEVICES | **SEMESTER:** 3 **CREDITS:** 4 |
| **COURSE CODE:** ECT 201 | **REGULATION:** 2019 |
| **COURSE AREA/DOMAIN:** VLSI | **CONTACT HOURS** : 3+1 (Tutorial) hours/Week |
| **CORRESPONDING LAB COURSE CODE (IF ANY):** Nil | **LAB COURSE NAME:** NA |

**COURSE PRE-REQUISITES:**

| CODE | COURSE NAME | DESCRIPTION | SEM |
|---|---|---|---|
| EST130 | Basics of Electrical and Electronics Engineering | The basics of electronics includes the study of electronic components and circuits | 2 |
| PHT100 | Engineering Physics | To have a basic idea of semiconductor devices, Quantum mechanics, LEDs, laser diodes etc. | 1 |

**COURSE OBJECTIVES:**

| Sl. No | COURSE OBJECTIVES |
|---|---|
| 1 | This course aims to understand the physics and working of solid state devices. |
| 2 | To provide a sound understanding of current semiconductor devices and technology to appreciate its applications to electronics circuits and system |

**COURSE OUTCOMES:**

| SL NO | DESCRIPTION |
|---|---|
| CO1 | Apply Fermi-Dirac Distribution function and Compute carrier concentration at equilibrium and the parameters associated with generation, recombination and |

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| | |
|---|---|
| | transport mechanism |
| CO2 | Explain drift and diffusion currents in extrinsic semiconductors and Compute current density due to these effects. |
| CO3 | Define the current components and derive the current equation in a pn junction diode and bipolar junction transistor. |
| CO4 | Explain the basic MOS physics and derive the expressions for drain current in linear and saturation regions. |
| CO5 | Discuss scaling of MOSFETs and short channel effects. |

**CO - PO/PSO MAPPING:**

| CO | PO STRENGTH | PSO |
|---|---|---|

| Number | | | | | | | | | | | | | STRENGTH | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PS O 1 | PS O 2 | PS O 3 |
| CO1 | 3 | 3 | | | | | | | | | | | 1 | | |
| CO2 | 3 | 3 | | | | | | | | | | | 1 | | |
| CO3 | 3 | 3 | | | | | | | | | | | 2 | 2 | |
| CO4 | 3 | 3 | | | | | | | | | | | 2 | 2 | |
| CO5 | 3 | | | | | | | | | | | | 2 | 2 | |

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| Total | 3 | 3 | | | | | | | | | | 1.6 | 2. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

**Justification for CO-PO/PSO mapping**

| CO Number | COs | POs / PSOs | Justification |
|---|---|---|---|
| CO1 | Define and understand the concepts in semiconductor physics and to describe and apply the generation and recombination processes in semiconductors. | PO1 | Introduction to semiconductors involves the knowledge of science and engineering fundamentals |
| | | PO2 | Fundamentals of mathematics and engineering sciences need to be used for the analysis of equilibrium and steady state conditions of semiconductors. |
| | | PO12 | Understanding of semiconductor physics will help in life long learning |
| | | PSO1 | Basic knowledge of semiconductor devices will help in the design of engineering systems. |
| CO2 | Explain drift and diffusion currents in extrinsic semiconductors and | PO1 | Understanding the concept of diffusion requires knowledge of science fundamentals |
| | Compute current density due to these effects. | PO2 | Solution of drift & diffusion current densities, Poisson & Einstein's Relations |
| | | PO3 | Doping & temperature dependence on carrier concentration |

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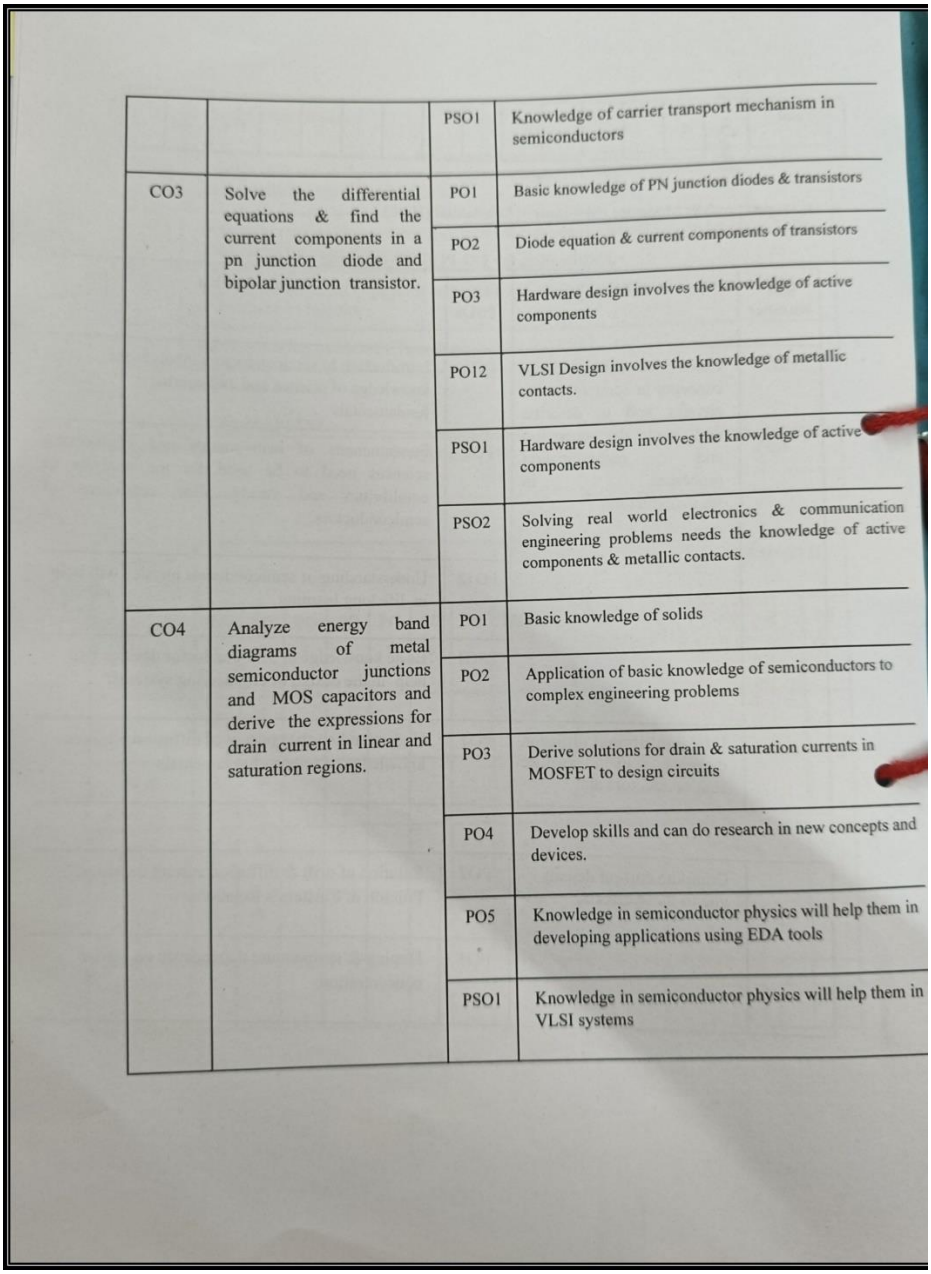

| | | | |
|---|---|---|---|
| | | PSO1 | Knowledge of carrier transport mechanism in semiconductors |
| CO3 | Solve the differential equations & find the current components in a pn junction diode and bipolar junction transistor. | PO1 | Basic knowledge of PN junction diodes & transistors |
| | | PO2 | Diode equation & current components of transistors |
| | | PO3 | Hardware design involves the knowledge of active components |
| | | PO12 | VLSI Design involves the knowledge of metallic contacts. |
| | | PSO1 | Hardware design involves the knowledge of active components |
| | | PSO2 | Solving real world electronics & communication engineering problems needs the knowledge of active components & metallic contacts. |
| CO4 | Analyze energy band diagrams of metal semiconductor junctions and MOS capacitors and derive the expressions for drain current in linear and saturation regions. | PO1 | Basic knowledge of solids |
| | | PO2 | Application of basic knowledge of semiconductors to complex engineering problems |
| | | PO3 | Derive solutions for drain & saturation currents in MOSFET to design circuits |
| | | PO4 | Develop skills and can do research in new concepts and devices. |
| | | PO5 | Knowledge in semiconductor physics will help them in developing applications using EDA tools |
| | | PSO1 | Knowledge in semiconductor physics will help them in VLSI systems |

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| | | | |
|---|---|---|---|
| | | PSO2 | Identification and analysis of complex engineering problems |
| CO5 | Discuss scaling of MOSFETs and short channel effects. | PO1 | To derive the short channel effects |
| | | PO2 | To derive the short channel effects and scaling of MOS devices |
| | | PO7 | Knowledge in semiconductor physics will help them in sustainable VLSI systems |
| | | PO12 | Research in new concepts helps them in independent learning |
| | | PSO1 | Design of real world VLSI system requirements |
| | | PSO2 | Develop new skills and to produce valid conclusions |

**GAPS IN THE SYLLABUS - TO MEET INDUSTRY/PROFESSION REQUIREMENTS:**

| SL NO | DESCRIPTION | PROPOSED ACTIONS |
|---|---|---|
| | | |

**TOPICS BEYOND SYLLABUS/ADVANCED TOPICS/DESIGN:**

| SL NO | DESCRIPTION | COs Met | POs Met | PSOs Met |
|---|---|---|---|---|
| | | | | |

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**WEB SOURCE REFERENCES:**

| SL NO | REFERENCES |
|---|---|
| 1 | https://nptel.ac.in/courses/117/106/117106091/ |
| 2 | https://education.jlab.org/itselemental/ele014.html |
| 3 | http://nptel.iitm.ac.in/courses/Webcourse-contents/IIT Delhi/Semiconductor%25252520%252520Devices/index.htm |

**DELIVERY/INSTRUCTIONAL METHODOLOGIES:**

| | | | |
|---|---|---|---|
| ☐CHALK & TALK | ☐LCD/SMART BOARDS | ☐STUD. ASSIGNMENT | ☐WEB RESOURCES |
| ☐STUD. SEMINARS | ☐ ADD-ON COURSES | ☐OTHERS | |

**ASSESSMENT METHODOLOGIES-DIRECT**

| | | | |
|---|---|---|---|
| ☐ASSIGNMENTS | ☐STUD. SEMINARS | ☐ TESTS/MODEL EXAMS | ☐UNIV. EXAMINATION |
| ☐STUD. LAB PRACTICES | ☐STUD. VIVA | ☐MINI/MAJOR PROJECTS | ☐ CERTIFICATIONS |
| ☐ADD-ON COURSES | ☐OTHERS | | |

**ASSESSMENT METHODOLOGIES-INDIRECT**

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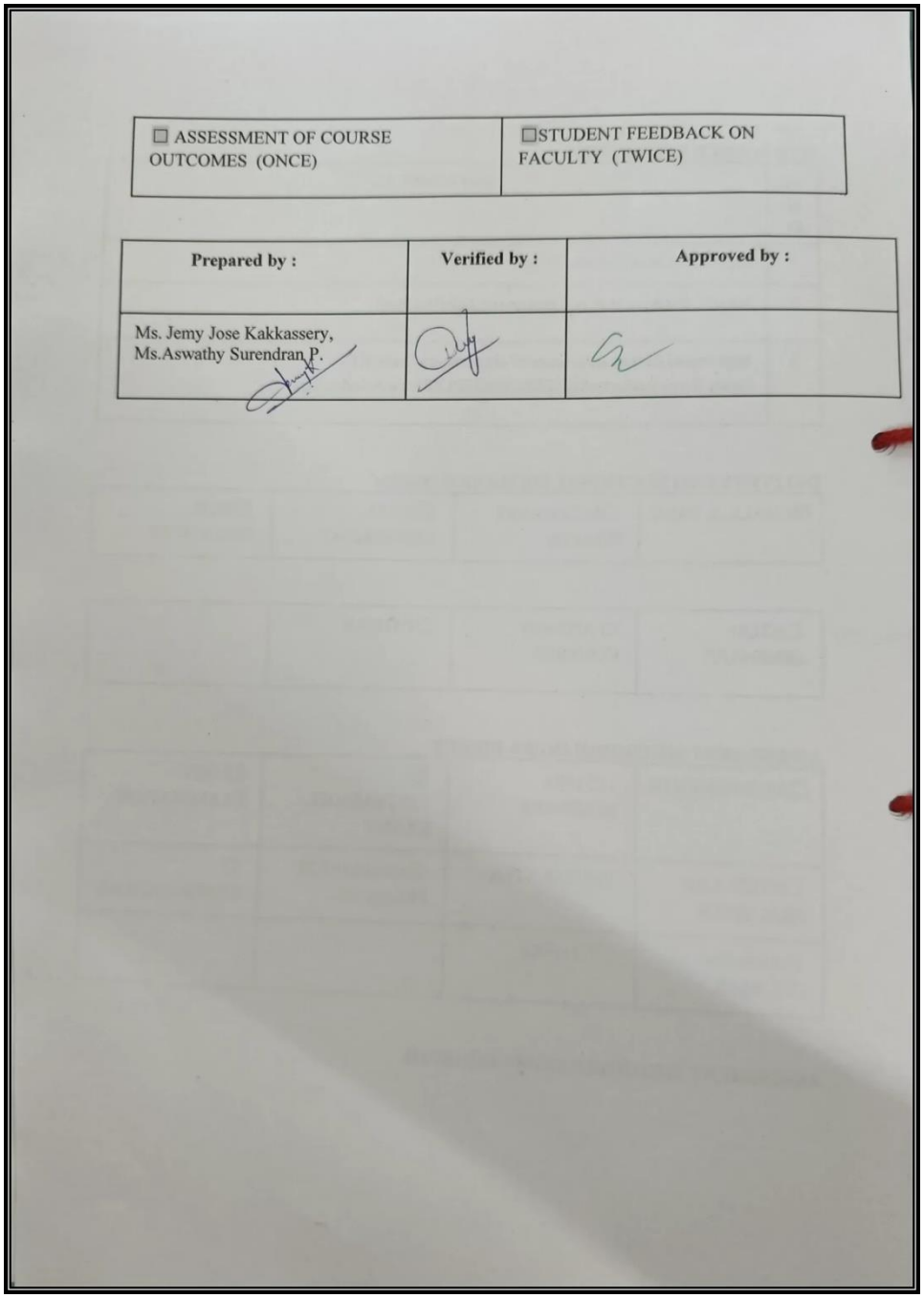

| ☐ ASSESSMENT OF COURSE OUTCOMES (ONCE) | ☐STUDENT FEEDBACK ON FACULTY (TWICE) |
|---|---|

| Prepared by : | Verified by : | Approved by : |
|---|---|---|
| Ms. Jemy Jose Kakkassery,<br>Ms.Aswathy Surendran P. | | |

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**CRITERIA 2.6.1 : Programme and course outcomes for all Programmes offered by the institution are stated and displayed on website and communicated to teachers and students**

## e) QUESTION PAPER WITH COs

Reg No.:_____ Name:_____

**VIDYA ACADEMY OF SCIENCE AND TECHNOLOGY**
**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**
**SIXTH SEMESTER SECOND SERIES EXAMINATION, JUNE 2023**
**Course Code: ECT 304**
**Course Name: VLSI CIRCUIT DESIGN**

**Max. Marks: 50** **Duration: 2 Hours**

**Common to S6 ECE A & B Batch**

**PART A**

***Answer all questions, each carries 5 marks.***

| | | Marks | COs |
|---|---|---|---|
| 1 | Explain Memory architecture & distinguish between volatile and non-volatile memory. | 5 | CO3 |
| 2 | Design a 4x4 NOR based ROM Cell array so as to obtain the following output.<br>C1 C2 C3 C4<br>0 0 1 1<br>0 1 1 0<br>1 0 0 1<br>0 1 0 1 | 5 | CO3. |
| 3 | Compare DRAM and SRAM cells. | 5 | CO3 |
| 4 | Draw the truth table and write the expressions of sum and carry of a full adder . Represent the generate, propagate and delete signals in the truth table. | 5 | CO4 |
| 5 | Briefly explain the significance of a carry bypass adder. | 5 | CO4 |
| 6 | Write the worst-case delay expressions associated with Carry-Bypass adder, Linear Carry-Select adder and Square- root carry select adder. | 5 | CO4 |

**PART B**

***Answer any two full questions, each carries 10 marks.***

| | | | |
|---|---|---|---|
| 7 | Design three transistor and one transistor DRAM cells and explain the working of each types. | 10 | CO3 |
| | OR | | |
| 8 | With a neat diagram explain the working of a 6T DRAM cell. Explain the read and write operations. | 10 | CO3 |
| 9 | Design a 16-bit square-root carry select adder and indicate the worst-case delay | 10 | CO4 |
| | OR | | |
| 10 | Design a 4X4 array multiplier. Show the critical path and also estimate the delay of the multiplier. | 10 | CO4 |

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**Annexure 1**
**Table of Specification**
*(To be filled by faculty member)*

| Questions | Q1 | Q2 | Q3 | Q4 | Q5 | Q6 | Q7 | Q8 | Q9 | Q10 |
|---|---|---|---|---|---|---|---|---|---|---|
| BTL* | 2 | 3 | 1 | 3 | 2 | 1 | 2 | 2 | 3 | 3 |
| Marks | 5 | 5 | 5 | 5 | 5 | 5 | 10 | 10 | 10 | 10 |

| Prepared by (Faculty Member) | Verified by (DQAC/Stream /Course Coordinator) | Approved by (HoD) |
|---|---|---|
| | | |

***BTL – Bloom's Taxonomy Levels:**

1. Remembering
2. Understanding
3. Applying
4. Analysing
5. Evaluating
6. Creating

| Overall Difficulty level & Approximate Distribution (%) | Remembering | Understanding | Applying | Analysing | Evaluating | Creating |
|---|---|---|---|---|---|---|
| As per Syllabus | 10 | 20 | 20 | ___ | ___ | ___ |
| As per QP** | 10 | 20 | 20 | | | |

** $\left(\frac{\text{Total marks awarded for respective BTL}}{\text{Maximum Marks (50)}}\right) \times 100$

1. Name of the faculty Member : Ms. JEMY JOSE KAKKASSERY
2. Department : ECE
3. Course code & Name : ECT304 - VLSI CIRCUIT DESIGN
4. No. of students in the class : 128
5. No. of copies required : 130
6. Whether graph/semi-log, etc needed : No
   *(If yes, mention the number)*
7. Date of the examination : 12/6/2023
8. Signature of the faculty requesting for copies:
9. Signature of the HoD

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## f) WEBSITE LINKS FOR DISPLAYING COs AND POs OF ALL PROGRAMMES OFFERED BY INSTITUTION

**Links:**

**POs, PSOs and COs:**

**Department of AIML:** https://vidyaacademy.ac.in/department_details.php?dep_id=28

**Department of CE:** https://vidyaacademy.ac.in/department_details.php?dep_id=2

**Department of CSE:** https://vidyaacademy.ac.in/department_details.php?dep_id=3

**Department of ECE:** https://vidyaacademy.ac.in/department_details.php?dep_id=11

**Department of EEE:** https://vidyaacademy.ac.in/department_details.php?dep_id=4

**Department of ME:** https://vidyaacademy.ac.in/department_details.php?dep_id=5

**Department of MCA:** https://vidyaacademy.ac.in/department_details.php?dep_id=7

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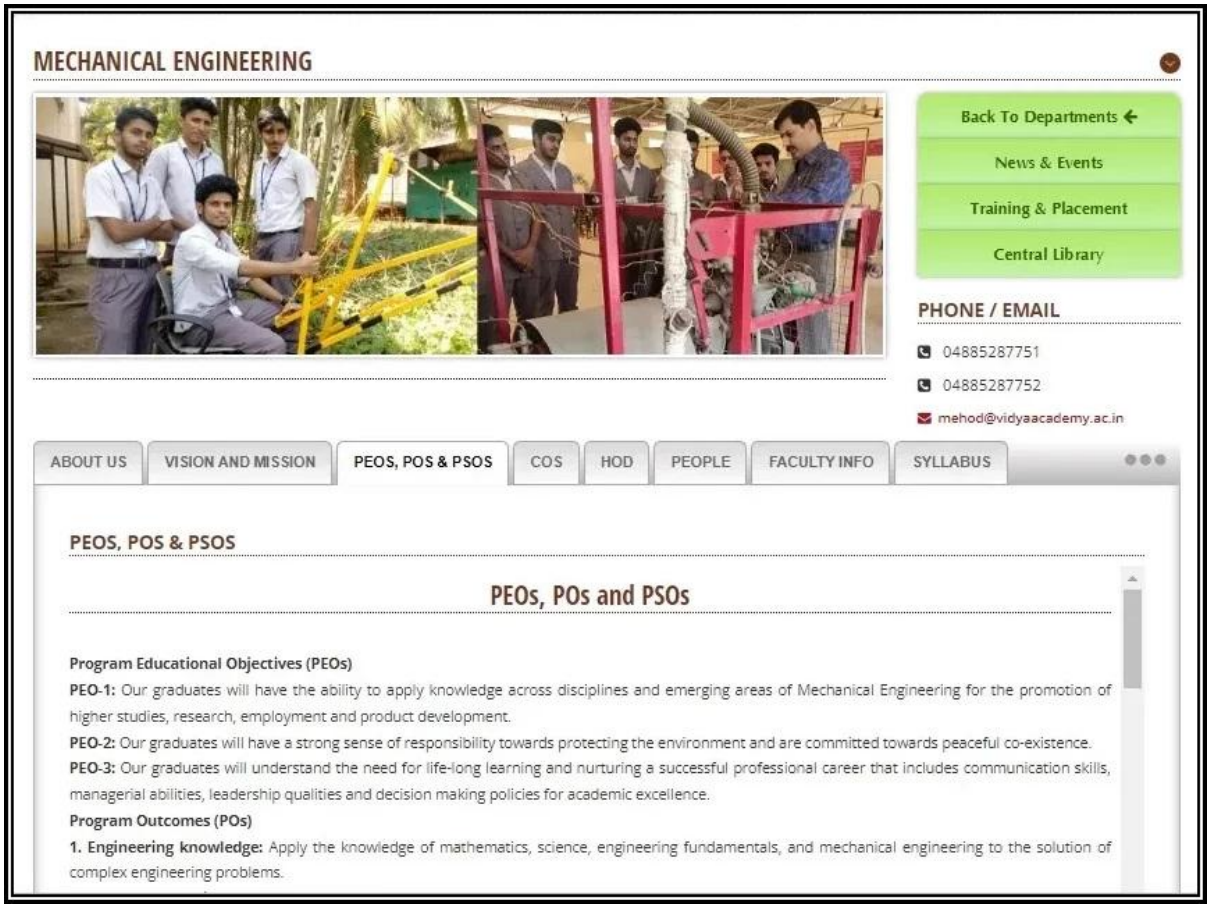
## SCREENSHOT OF COLLEGE WEBSITE DISPLAYING POs AND PSOs

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