

2.6.1

Supporting Documents: POs and COs for all the departments

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2.6.1. Programme Outcomes (POs), Course Outcomes (Cos) and PSOs for all Programmes offered by the institution

| S.No. | Description | Page Number | |
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| | COs and POs | | |
| A | Department of Electronics and Communication Engineering | 1 | 25 |
| B | Department of Computer Science and Engineering | 26 | 50 |
| C | Department of Electrical and Electronics Engineering | 51 | 70 |
| D | Department of Civil Engineering | 71 | 81 |
| E | Department of Mechanical Engineering | 82 | 101 |
| F | Department of Computer Science and Engineering (AIML) | 102 | 108 |
| G | Department of Computer Science and Engineering (Data Science) | 109 | 114 |
| H | Department of Computer Science and Engineering (Cyber Security) | 115 | 121 |
| I | POs of various departments | 122 | 122 |

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2.6.1. Programme Outcomes (POs) and Course Outcomes (COs) for all Programmes offered by the institution are stated and displayed on website and attainment of POs and COs are evaluated.

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| Program: B.Tech. Branch: Electronics & Communication Engg. | Academic Year :2023-2024 Regulation:R18 | Semester:1 |
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| S.No | Year/ Sem | Course Name | Course Code | Course Outcomes |
|------|--------------|---|-------------|--|
| 1 | II/I | Electronic Devices And Circuits | EC301PC | CO1: Know the characteristics of various components. CO2: Understand the utilization of components. CO3: Understand the biasing techniques. CO4: Design and analyze small signal amplifier circuits. |
| 2 | II/I | Network Analysis and Transmission lines | EC302PC | CO1: Gain the knowledge on basic RLC circuit behavior. CO2: Analyze the steady-state and transient analysis of RLC circuits. CO3: Know the characteristics of two-port network parameters. CO4: Analyze the transmission line parameters and configurations. |
| 3 | II/I | Digital System Design | EC303PC | CO1: Understand the numerical information in different forms and Boolean algebra theorems. CO2: Postulates of Boolean algebra and minimize combinational functions. CO3: Design and analyze combinational and sequential circuits. CO4: Know about the logic families and realization of logic gates. |
| 4 | II/I | Signals and Systems | EC304PC | CO1: Differentiate various signal functions. CO2: Represent any arbitrary signal in time and frequency domains. CO3: Represent any arbitrary signal in time and frequency domains. CO4: Analyze the signals with different transform techniques. |

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| 5 | II/I | Probability Theory and Stochastic Processes | EC304ES | <p>CO1: Understand the concepts of random processes and their characteristics.</p> <p>CO2: Understand the response of linear time-invariant systems to random processes.</p> <p>CO3: Determine the spectral and temporal characteristics of random signals.</p> <p>CO4: Understand the concepts of noise in communication systems.</p> |

| S.No | Year/ Sem | Course Name | Course Code | Course Outcomes |
|------|--------------|--|----------------|---|
| 1 | II/II | Laplace Transforms, Numerical Methods &Complex Variables | MA401BS | <p>CO1: Use the Laplace transform techniques for solving ODEs.</p> <p>CO2: Find the root of a given equation.</p> <p>CO3: Estimate the value for the given data using interpolation.</p> <p>CO4: Find the numerical solutions for given ODEs.</p> <p>CO5: Analyze complex functions with reference to their analyticity, integration using Cauchy's integral and residue theorems.</p> <p>CO6: Taylor's and Laurent's series expansions of complex functions.</p> |
| | | | | <p>CO1: Get the knowledge of basic laws, concepts, and proofs related to electrostatic fields and magnetostatic fields.</p> <p>CO2: Distinguish between the static and time-varying fields, and establish the corresponding sets of Maxwell's equations and boundary conditions.</p> <p>CO3: Analyze the wave equations for good conductors and good dielectrics, and</p> |

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| 2 | II/II | Electromagnetic Fields and Waves | EC402PC | evaluate the UPW characteristics for several practical media of interest. CO4: Analyze completely the rectangular waveguides, their mode characteristics, and design waveguides for solving practical problems. |
| 3 | II/II | Analog and Digital Communications | EC403PC | CO1: Analyze and design of various continuous wave and angle modulation and demodulation techniques. CO2: Understand the effect of noise present in continuous wave and angle modulation techniques. CO3: Understand the effect of noise present in continuous wave and angle modulation techniques. CO4: Analyze and design the various Pulse Modulation Techniques. CO5: Understand the concepts of Digital Modulation Techniques and Baseband transmission. |
| 4 | II/II | Linear IC Applications | EC404PC | CO1: A thorough understanding of operational amplifiers with linear integrated circuits. CO2: A thorough understanding of operational amplifiers with linear integrated circuits. CO3: A thorough understanding of operational amplifiers with linear integrated circuits. |

| S.No | Year/ Sem | Course Name | Course Code | Course Outcomes |
|------|--------------|------------------------------------|----------------|---|
| 1 | III/I | Microprocessors & Microcontrollers | EC501PC | CO1: Understand the internal architecture, organization and assembly language programming of 8086 processors. CO2: Understand the internal architecture, organization and assembly language programming of 8051 controllers. CO3: Understand the interfacing techniques to 8086 and 8051 based systems. |

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| | | | | CO4: Understand the internal architecture of ARM processors and basic concepts of advanced ARM processors. |
| 2 | III/I | Data Communications and Networks | EC502PC | CO1: Know the categories and functions of various data communication networks. CO2: Design and analyze various error detection techniques. CO3: Demonstrate the mechanism of routing the data in network layer. CO4: Know the significance of various flow control and congestion control mechanisms. CO5: Know the functioning of various application layer protocols. |
| 3 | III/I | Control Systems | EC503PC | CO1: Understand the modeling of linear-time-invariant systems using transfer function and state-space representations. CO2: Understand the concept of stability and its assessment for linear-time-invariant systems. CO3: Design simple feedback controllers. |
| 4 | III/I | Business Economics and Financial Analysis | SM504MS | CO1: Understand the various forms of business and the impact of economic variables on the business. The demand, supply, production, cost, market structure, and pricing aspects are learned. The students can study the firm's financial position by analyzing the financial statements of a company. |
| 5 | III/I | Computer Organization & Operating systems | EC511PE | CO1: Able to visualize the organization of different blocks in a computer. CO2: Able to use micro-level operations to control different units in a computer. CO3: Able to use operating systems in a computer. |
| 6 | III/I | Error Correcting Codes | EC512PE | CO1: Able to transmit and store reliable data and detect errors in data through coding. CO2: Able to understand the designing of various codes like block codes, cyclic codes, convolution codes, turbo codes, and space codes. |

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| 7 | III/I | Electronic measurements and Instrumentation | EC513PE | <p>CO1: Measure electrical parameters with different meters and understand the basic definition of measuring parameters.</p> <p>CO2: Use various types of signal generators and signal analyzers for generating and analyzing various real-time signals.</p> <p>CO3: Operate an oscilloscope to measure various signals.</p> <p>CO4: Measure various physical parameters by appropriately selecting the transducers.</p> |
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| S.No | Year/ Sem | Course Name | Course Code | Course Outcomes |
|------|--------------|---------------------------|----------------|---|
| 1 | III/II | Antennas and Propagation | EC601P C | <p>CO1: Characterize the antennas based on frequency, configure the geometry and establish the radiation patterns of VHF, UHF, and microwave antennas and also antenna arrays.</p> <p>CO2: Specify the requirements for microwave measurements and arrange a setup to carry out the antenna far-zone pattern and gain measurements in the laboratory.</p> <p>CO3: Classify the different wave propagation mechanisms, determine the characteristic features of different wave propagations, and estimate the parameters involved.</p> |
| 2 | III/II | Digital signal processing | EC602P C | <p>CO1: Understand the LTI system characteristics and multirate signal processing.</p> <p>CO2: Understand the inter-relationship between DFT and various transforms.</p> <p>CO3: Design a digital filter for a given specification.</p> <p>CO4: Understand the significance of various filter structures and effects of round-off errors.</p> |

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| 3 | III/II | Vlsi Design | EC603P C | <p>CO1: Acquire qualitative knowledge about the fabrication process of integrated circuits using MOS transistors.</p> <p>CO2: Draw the layout of any logic circuit which helps to understand and estimate the parasitic effect of any logic circuit.</p> <p>CO3: Design building blocks of data path systems, memories, and simple logic circuits using PLA, PAL, FPGA, and CPLD.</p> <p>CO4: Understand different types of faults that can occur in a system and learn the concept of testing and adding extra hardware to improve the testability of the system.</p> |
| 4 | III/II | Object Oriented Programming through Java | EI603PC/E C611PE | <p>CO1: Develop applications for a range of problems using object-oriented programming techniques.</p> <p>CO2: Design simple graphical user interface applications.</p> |
| 5 | III/II | Mobile Communications and Networks | EC612P E | <p>CO1: Know the evolution of cellular and mobile communication systems.</p> <p>CO2: The student will be able to understand co-channel and non-co-channel interferences.</p> <p>CO3: Understand impairments due to multipath fading channels and how to overcome the different fading effects.</p> <p>CO4: Be familiar with cell coverage for signal and traffic, diversity techniques, frequency management, channel assignment, and types of handoff.</p> <p>CO5: Know the difference between cellular and ad hoc networks and design goals of the MAC layer protocol.</p> |

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| 6 | III/II | Embedded System design | EC613PE | CO1: To understand the selection procedure of processors in the embedded domain. CO2: Design procedure for embedded firmware. CO3: To visualize the role of real-time operating systems in embedded systems. CO4: To evaluate the correlation between task synchronization and latency issues. |
| 7 | III/II | Environmental Science | MC609 | CO1: Understand, evaluate, and develop technologies on the basis of ecological principles and environmental regulations, which in turn helps in sustainable development. |

| S.No | Year/ Sem | Course Name | Course Code | Course Outcome |
|------|--------------|--------------------------------------|----------------|--|
| 1 | IV/I | Microwave and Optical Communications | EC701PC | CO1: Know power generation at microwave frequencies and derive the performance characteristics. CO2: Realize the need for solid-state microwave sources and understand the principles of solid-state devices. CO3: Distinguish between the different types of waveguide and ferrite components, and select proper components for engineering applications. CO4: Understand the utility of S-parameters in microwave component design and learn the measurement procedure of various microwave parameters. CO5: Understand the mechanism of light propagation through optical fibers. |
| | | Artificial neural | | CO1: Understand the similarity of biological networks and neural networks. CO2: Perform the training of neural networks using various learning rules. CO3: Understand the concepts of |

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| 2 | IV/I | Networks (PE – iii) | EC711PE/ EI723PE | forward and backward propagations. CO4: Understand and construct the Hopfield models. |
| 3 | IV/I | Scripting Languages (PE – III) | EC712PE | CO1: Know the basics of Linux and Linux networking. CO2: Use the Linux environment and write programs for automation. CO3: Understand the concepts of scripting languages. CO4: Create and run scripts using Perl/Tcl/Python. |
| 4 | IV/I | Digital Image Processing (PE – iii) | EC713PE/ EI812PE: | CO1: Explore the fundamental relations between pixels and the utility of 2-D transforms in image processing. CO2: Understand the enhancement, segmentation, and restoration processes on an image. CO3: Implement the various morphological operations on an image. CO4: Understand the need for compression and the evaluation of basic compression algorithms. |
| 5 | IV/I | Biomedical Instrumentation (PE – iv) | EC721PE | CO1: Understand biosystems and medical systems from an engineering perspective. CO2: Identify the techniques to acquire, record, and primarily understand the physiological activity of the human body through cell potential, ECG, EEG, BP, blood flow measurement, and EMG. CO3: Understand the working of various medical instruments and critical care |

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| | | | | equipment. CO4: Know the imaging techniques including CT, PET, SPECT, and MRI used in the diagnosis of various medical conditions. |
| 6 | IV/I | Database Management Systems (PE – iv) | EC722PE | CO1: Gain knowledge of fundamentals of DBMS, database design, and normal forms. CO2: Master the basics of SQL for retrieval and management of data. CO3: Be acquainted with the basics of transaction processing and concurrency control. CO4: Familiarity with database storage structures and access techniques. |
| 7 | IV/I | Network security and cryptography (PE – iv) | EC723PE | CO1: Describe network security fundamental concepts and principles. CO2: Encrypt and decrypt messages using block ciphers and network security technology and protocols. CO3: Analyze key agreement algorithms to identify their weaknesses. CO4: Identify and assess different types of threats, malware, spyware, viruses, and vulnerabilities. |
| 8 | IV/I | Professional practice, Law and Ethics (pc) | SM702MS | CO1: Understand the importance of professional practice, law, and ethics in their personal lives and professional careers. The students will learn the rights and responsibilities as an employee, team |

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| | | | | member, and a global citizen. |
| 9 | IV/I | Seminar | EC705PC | CO: Seminar |
| 10 | IV/I | Project Stage - I | EC706PC | CO: Project work |

| S.No | Year/ Sem | Course Name | Course Code | Course Outcome |
|------|--------------|--------------------------------------|----------------|---|
| 1 | IV/II | Satellite Communications (PE – V) | EC811PE | <p>CO1: Understand basic concepts and frequency allocations for satellite communication, orbital mechanics, and launch vehicles.</p> <p>CO2: Envision the satellite subsystems and design satellite links for specified C/N.</p> <p>CO3: Understand the various multiple access techniques for satellite communication systems and earth station technologies.</p> <p>CO4: Know the concepts of LEO, GEO, stationary satellite systems, and satellite navigation.</p> |
| 2 | IV/II | Radar Systems (PE – V) | EC812PE | <p>CO1: Derive the complete radar range equation.</p> <p>CO2: Understand the need and functioning of CW, FM-CW, and MTI radars.</p> <p>CO3: Know various tracking methods.</p> <p>CO4: Derive the matched filter response characteristics for radar receivers.</p> |
| | | | | CO1: Analyze and compare various |

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| 3 | IV/II | Wireless Sensor Networks (PE – V) | EC813PE | <p>architectures of wireless sensor networks.</p> <p>CO2: Understand design issues and challenges in wireless sensor networks.</p> <p>CO3: Analyze and compare various data gathering and data dissemination methods.</p> <p>CO4: Design, simulate, and compare the performance of various routing and MAC protocols.</p> |
| 4 | IV/II | System on chip architecture (PE – VI) | EC821PE | <p>CO1: Expected to understand SOC architectural features.</p> <p>CO2: To acquire the knowledge on processor selection criteria and limitations.</p> <p>CO3: To acquire the knowledge of memory architectures on SOC.</p> <p>CO4: To understand the interconnection strategies and their customization on SOC.</p> |
| 5 | IV/II | Test and Testability (PE – VI) | EC822PE | <p>CO1: To acquire the knowledge of fundamental concepts in fault and fault diagnosis.</p> <p>CO2: Test pattern generation using LFSR and CA.</p> <p>CO3: Design for testability rules and techniques for combinational circuits.</p> <p>CO4: Introduce scan architectures.</p> |
| | | | | <p>CO1: Understand the need for low power circuit design.</p> <p>CO2: Attain the knowledge of</p> |

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| 6 | IV/II | Low power Vlsi Design (PE– VI) | EC823PE | architectural approaches. CO3: Analyze and design low-voltage, low-power combinational circuits. CO4: Know the design of low-voltage, low-power memories. |
| 7 | IV/II | Project Stage - II | EC801PC | CO: Major Project Work |

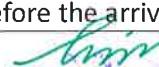


PROGRAM: B.Tech
BRANCH: ECE

YEAR :2022-26
REGULATION:R22

SEMESTER:2-1

| S.NO | YEAR/ SEM | COURSE CODE | COURSE TITLE | COURSE OUTCOME |
|------|--------------|----------------|---|--|
| 1. | 2-1 | MA301BS | Numerical Methods and Complex Variables | <p>Course Outcomes: Upon completing this course, the students will be able to</p> <ol style="list-style-type: none"> 1. Design the amplifiers with various biasing techniques. 2. Design single stage amplifiers using BJT and FET 3. Design multistage amplifiers and understand the concepts of High Frequency Analysis of BJT. 4. Utilize the Concepts of negative feedback to improve the stability of amplifiers and positive feedback to sustained oscillations |
| 2. | 2-1 | EC302PC | Analog Circuits | <p>Course Outcomes: Upon successful completion of the course, students will be able to:</p> <ol style="list-style-type: none"> 1. Gain the knowledge on basic RLC circuits behaviour. 2. Analyse the Steady state and transient analysis of RLC Circuits. 3. Characterization of two port network parameters. 4. Analyse the Design aspect of various filters and attenuators |
| 3. | 2-1 | EC303PC | Network analysis and Synthesis | <p>Course Outcomes: Upon successful completion of the course, students will be able to:</p> <ol style="list-style-type: none"> 1. Gain the knowledge on basic RLC circuits behaviour. 2. Analyse the Steady state and transient analysis of RLC Circuits. 3. Characterization of two port network parameters. 4. Analyse the Design aspect of various filters and attenuators |
| 4. | 2-1 | EC304PC | Digital Logic Design | <p>Course Outcomes: Upon completing this course, the students will be able to</p> <ol style="list-style-type: none"> 1. Acquire the knowledge on numerical information in different forms and Boolean Algebra theorems. 2. Define Postulates of Boolean algebra and to minimize combinational functions, and design the combinational circuits. 3. Design and analyse sequential circuits for various cyclic functions. 4. Characterize logic families and analyze them for the purpose of AC and DC parameters. |

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| 5. | 2-1 | EC305PC | Signals and Systems | <p>Course Outcomes: Upon completing this course the students able to:</p> <ol style="list-style-type: none"> 1. Characterize various signals, systems and their time and frequency domain analysis, using transform techniques. 2. Identify the conditions for transmission of signals through systems and conditions for physical realization of systems 3. Use sampling theorem for baseband and band pass signals for various types of sampling and for different duty cycles. 4. Apply the correlation and PSD functions for various applications. |
| 6. | 2-1 | EC306PC | Analog Circuits Laboratory | <p>Course Outcomes: Upon completing this course the students will be able to</p> <ol style="list-style-type: none"> 1. Design amplifiers with required Q point and analyze amplifier characteristics 2. Examine the effect multistage amplification on frequency response 3. Investigate feedback concept in amplifiers and oscillator |
| 7. | 2-1 | EC307PC | Digital logic Design Laboratory | <p>Course Outcomes: Upon completing this course, the students will be able to</p> <ol style="list-style-type: none"> 1. Acquire the knowledge on numerical information in different forms and Boolean Algebra theorems. 2. Define Postulates of Boolean algebra and to minimize combinational functions, and design the combinational circuits. 3. Design and analyze sequential circuits for various cyclic functions. 4. Characterize logic families and analyze them for the purpose of AC and DC parameters. |
| 8. | 2-1 | EC308PC | Basic Simulation Laboratory | <p>Course Outcomes: Upon completing this course, the students will be able to</p> <ol style="list-style-type: none"> 1. Generate, analyze and perform various operations on Signals/Sequences both in time and Frequency domain 2. Analyze and Characterize Continuous and Discrete Time Systems both in Time and Frequency domain along with the concept of Sampling 3. Generate different Random Signals and capable to analyze their Characteristics 4. Apply the Concepts of Deterministic and Random Signals for Noise removal Applications and on other Real Time Signals |
| 9. | 2-1 | MC309 | Constitution of India | <p>Course Outcomes: Students will be able to:</p> <ul style="list-style-type: none"> • Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in  |

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| | | | | <p>Indian politics.</p> <ul style="list-style-type: none"> • Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India. • Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution • Discuss the passage of the Hindu Code Bill of 1956 |
| 1. | 2-2 | EC401PC | Probability Theory and Stochastic Processes | <p>Course Outcomes: Upon completing this course, the students will be able to:</p> <ol style="list-style-type: none"> 1. Perform operations on single and multiple Random variables. 2. Determine the Spectral and temporal characteristics of Random Signals. 3. Characterize LTI systems driven by stationary random process by using ACFs and PSDs. 4. Understand the concepts of Noise and Information theory in Communication systems. |
| 2. | 2-2 | EC402PC | Electromagnetic Fields and Transmission Lines | <p>Course Outcomes: Upon completing this course, the student able to</p> <ol style="list-style-type: none"> 1. Acquire the knowledge of Basic Laws, Concept sand proofs related to Electrostatic Fields and Magneto static Fields. 2. Characterize the static and time-varying fields, establish the corresponding sets of Maxwell's Equations and Boundary Conditions. 3. Analyze the Wave Equations and classify conductors, dielectrics and evaluate the UPW Characteristics for several practical media of interest. 4. Analyze the Design aspect of transmission line parameters and configurations. |
| 3. | 2-2 | EC403PC | Analog and Digital Communications | <p>Course Outcomes: Upon completing this course, the student able to</p> <ol style="list-style-type: none"> 1. Design and analyze various Analog and Digital Modulation and Demodulation techniques. 2. Model the noise present in continuous wave Modulation techniques. 3. Implement the Super heterodyne Receiver concept and Pulse Modulation Techniques in various applications 4. Analyze and design the base band Transmission |
| 4. | 2-2 | EC404PC | Linear and Digital IC Applications | <p>Course Outcomes: Upon completing this course, the students will be able to</p> <ol style="list-style-type: none"> 1. A thorough understanding of operational amplifiers with linear integrated circuits. 2. Attain the knowledge of functional diagrams and design applications of IC555 and IC565. 3. Acquire the knowledge and design the Data converters. 4. Choose the proper digital integrated circuits by knowing their characteristics. |

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| 5. | 2-2 | EC405PC | Electronic Circuit Analysis | Course Outcomes: Upon completing this course, the student will be able to 1. Design the power amplifiers 2. Design the tuned amplifiers and analyse its frequency response 3. Design Multivibrators and sweep circuits for various applications. 4. Utilize the concepts of synchronization, frequency division and sampling gates |
| 6. | 2-2 | EC406PC | Analog and Digital Communications Laboratory | Course Outcomes: Upon completing this course, the student able to: 1. Design and implement various Analog modulation and demodulation Techniques and observe the time and frequency domain characteristics 2. Design and implement various Pulse modulation and demodulation Techniques and observe the time and frequency domain characteristics 3. Apply different types of Sampling with various Sampling rates and duty Cycles 4. Design and implement various Digital modulation and demodulation Techniques and observe the waveforms of these modulated Signals practically |
| 7. | 2-2 | EC407PC | Linear and Digital IC Applications Laboratory | Course Outcomes: Upon completing this course, the student able to 1. Design and implementation of various analog circuits using 741 ICs. 2. Design and implementation of various Multivibrators using 555 timer. 3. Design and implement various circuits using digital ICs. 4. Design and implement ADC, DAC and voltage regulators. |
| 8. | 2-2 | EC408PC | Electronic Circuit Analysis Laboratory | Course Outcomes: Upon completing this course, the students will be able to 1. Design power amplifiers and find its efficiency 2. Design tuned amplifiers and find its Q-factor 3. Design various multivibrators and sweep circuits. Understand the necessity of linearity 4. Design sampling gates and understanding the concepts of frequency division |
| 10. | 2-2 | MC410 | Gender Sensitization Lab | Learning Outcomes 1. Students will have developed a better understanding of important issues related to gender in contemporary India. 2. Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film. 3. Students will attain a finer grasp of how gender discrimination works in our society and how to counter it. |

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| | | | | <ol style="list-style-type: none"> 4. Students will acquire insight into the gendered division of labor and its relation to politics and economics. 5. Men and women students and professionals will be better equipped to work and live together as equals. 6. → Students will develop a sense of appreciation of women in all walks of life. → Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the textbook will empower students to understand and respond to gender violence. |
| 1. | 3-1 | EC501PC | Microcontrollers | <p>Course Outcomes: Upon completing this course, the student will be able to</p> <ol style="list-style-type: none"> 1. Known the internal architecture, organization and assembly language programming of 8086 processors. 2. Known the internal architecture, organization and assembly language programming of 8051/controllers 3. Learn the interfacing techniques to 8086 and 8051 based systems. 4. Known the internal architecture of ARM processors and basic concepts of advanced ARM processors. |
| 2. | 3-1 | EC502PC | IoT Architectures and Protocols | <p>Course Outcomes: After completion of this course the student will able to</p> <ol style="list-style-type: none"> 1. Explore the Evolution of IoT, its Growth and Applications. 2. Know the components of IoT and Compare the various architectures of IoT. 3. Acquire the knowledge on data management of IoT. 4. Establish the knowledge on various IoT protocols like Data link, Network, Transport, Session, Service layers. |
| 3. | 3-1 | EC503PC | Control Systems | <p>Course Outcomes: At the end of this course, students will demonstrate the ability to</p> <ol style="list-style-type: none"> 1. Model the linear-time-invariant systems using transfer function and state-space representations. 2. Understand the concept of stability and its assessment for linear-time invariant systems. 3. Design simple feedback controllers. |
| 4. | 3-1 | SM504MS | Business Economics & Financial Analysis | <p>Course Outcome: The students will understand</p> <ol style="list-style-type: none"> 1. The various Forms of Business and the impact of economic variables on the Business. 2. The Demand, Supply, Production, Cost, Market Structure, Pricing aspects are learnt. 3. The firm's financial position by analysing 4. The Financial Statements of a Company |
| 5. | 3-1 | EC511PE EC512PE EC513PE | Professional Elective – I | <p>Course Outcomes: After completion of this course the student will able to</p> <ol style="list-style-type: none"> 1. Visualize the organization of different blocks in a computer. 2. Utilize the micro-level operations to control different units in a computer. |

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| | | | | 3. Implement Operating systems in a computer. |
| 6. | 3-1 | EC505PC | Microcontrollers Laboratory | <p>Course Outcomes: Upon completing this course, the student will be able to</p> <ol style="list-style-type: none"> 1. Know the Categories and functions of various Data communication Networks 2. Design and analyze various error detection techniques. 3. Demonstrate the mechanism of routing the data in network layer 4. Know the significance of various Flow control and Congestion control Mechanisms 5. Know the Functioning of various Application layer Protocols. |
| 7. | 3-1 | EC506PC | IoT Architectures and Protocols Laboratory | <p>Course Outcomes: Upon completing this course, the student will be able to</p> <ol style="list-style-type: none"> 1. Measure electrical parameters with different meters and understand the basic definition of measuring parameters. 2. Use various types of signal generators, signal analyzers for generating and analyzing various real-time signals. 3. Operate an Oscilloscope to measure various signals. 4. Measure various physical parameters by appropriately selecting the transducers. |
| 8. | 3-1 | EN508HS | Advanced English Communication Skills Laboratory | <p>Course Outcomes: Upon completing this course, the students will be able to:</p> <ol style="list-style-type: none"> 1. Write assembly language programs and implement on 8086. 2. Write assembly language programs and implement on 8051 3. Interface the I/O devices with 8051 micro controllers 4. Perform experiments on Cortex-M3 development boards using GNU tool- chain |
| 9. | 3-1 | MC510 | Intellectual Property Rights | <p>Course Outcomes: Upon completing this course the students will be able to:</p> <ol style="list-style-type: none"> 1. Utilize the different sensors like room temperature, DHT, Humidity etc., 2. Interface the sensors and processor for transmission of data. 3. Capture the images and process it on Arduino/NodeMCU/Raspberry Pi. 4. know the utilization of various protocols like I2c, UART communication etc., |
| 1. | 3-2 | EC601PC | Antennas and Wave Propagation | <p>Course Outcomes: Upon completing this course, the student will be able to</p> <ol style="list-style-type: none"> 1. Explain the mechanism of radiation, definitions of different antenna characteristic parameters and establish their mathematical relations. 2. Characterize the antennas based on frequency, configure the geometry and establish the radiation |

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| | | | | patterns of VHF, UHF and Microwave antennas and also antenna arrays. 3. Specify the requirements for microwave measurements and arrange a setup to carry out the antenna far zone pattern and gain measurements in the laboratory. 4. Classify the different wave propagation mechanisms, determine the characteristic features of different wave propagations, and estimate the parameters involved. |
| 2. | 3-2 | EC602PC | Digital Signal Processing | Course Outcomes: Upon completing this course, the student will be able to 1. Explore the LTI system characteristics and Multirate signal processing. 2. Establish the inter-relationship between DFT and various transforms. 3. Design a digital filter for a given specification. 4. Demonstrate the various filter structures and effects of round off errors |
| 3. | 3-2 | EC603PC | CMOS VLSI Design | Course Outcomes: Upon completing this course, the student will be able to 1. Acquire qualitative knowledge about the fabrication process of integrated circuits using MOS transistors. 2. Draw the layout of any logic circuit which helps to understand and estimate parasitic effect of any logic circuit 3. Design building blocks of data path systems, memories and simple logic circuits using PLA, PAL, FPGA and CPLD. 4. Explore different types of faults that can occur in a system and learn the concept of testing and adding extra hardware to improve testability of system. |
| 4. | 3-2 | EC621PE EC622PE EC623PE | Professional Elective - II | Course Outcomes: Upon completing this course, the student will be able to 1. Explore the fundamental relations between pixels and utility of 2-D transforms in image processor. 2. Articulate the enhancement, segmentation and restoration processes on an image. 3. Implement the various Morphological operations on an image 4. Utilize basic compression algorithms. |
| 5. | 3-2 | EC723OE | Open Elective – I | Course Outcomes: Upon completing this course, the student will be able to: 1. Known the evolution of cellular and mobile communication system. 2. Explore the Co-Channel and Non-Co-Channel interferences. 3. Known how to overcome the different fading effects? 4. Familiar with cell coverage for signal and traffic, diversity, techniques, frequency management, Channel assignment and types of handoff. 5. Demonstrate the difference between cellular and Adhoc Networks and design goals of MAC Layer protocol. |
| 6. | 3-2 | EC613OE | DIGITAL ELECTRONICS | Course Outcomes: Upon completing this course, the |

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| | | | CS FOR ENGINEERING (OE-I) | student will be able to 1. Familiarize the selection procedure of Processors in the embedded domain. 2. Design Procedure for Embedded Firmware. 3. Visualize the role of Real time Operating Systems in Embedded Systems. 4. Evaluate the Correlation between task synchronization and latency issues |
| 7. | 3-2 | EC612OE | PRINCIPLES OF SIGNAL PROCESSING (OE - I) | Course Outcomes Upon completing this course, the student will be able to: 1. Differentiate various signal functions. 2. Understand the characteristics of linear time invariant systems. 3. Understand the concepts of sampling theorem and signal to noise ratios. 4. Determine the Spectral and temporal characteristics of Signals. |
| 8. | 3-2 | EC611OE | FUNDAMENTALS OF INTERNET OF THINGS (OE - I) | Course Outcomes: Upon completing this course, the students will be able to <ul style="list-style-type: none">• Know basic protocols in sensor networks.• Program and configure Arduino boards for various designs.• Python programming and interfacing for Raspberry Pi.• Design IoT applications in different domains. |
| 9. | 3-2 | MC609 | Environmental Science | Course Outcomes: Based on this course, the Engineering graduate will <ul style="list-style-type: none">1. understand /evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn helps in sustainable development |

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| 1. | 4-1 | EC701PC | Microwave and Optical Communications | Course Outcomes: Upon completing this course, the student will be able to 1. Known power generation at microwave frequencies and derive the performance characteristics. 2. Realize the need for solid state microwave sources and understand the principles of solid-state devices. 3. Distinguish between the different types of waveguide and ferrite components, and select proper components for engineering applications 4. Measure the S-parameters in microwave component design. 5. Demonstrate the mechanism of light propagation through Optical Fibres. |
| 2. | 4-1 | | Professional Elective – III | EC731PE: RADAR SYSTEMS (PE – III) Course Outcomes: Upon completing this course, the student will be able to <ul style="list-style-type: none">1. Derive the complete radar range equation.2. Familiarize the functioning of CW, FM-CW and MTI radars3. Known various Tracking methods.4. Derive the |

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| | | | | <p>matched filter response characteristics for radar receivers.</p> <hr/> <p>EC732PE: CMOS ANALOG IC DESIGN (PE - III) Course Outcomes: After studying the course, each student is expected to be able to</p> <ol style="list-style-type: none"> 1. Design basic building blocks of CMOS Analog ICs. 2. Carryout the design of single and two stage operational amplifiers and voltage references. 3. Determine the device dimensions of each MOSFETs involved. 4. Design various amplifiers like differential, current and operational amplifiers. <hr/> <p>EC733PE: ARTIFICIAL NEURAL NETWORKS (PE – III) Course Outcomes: Upon completing this course, the student will be able to</p> <ol style="list-style-type: none"> 1. Explore the similarity of Biological networks and Neural networks 2. Perform the training of neural networks using various learning rules. 3. Demonstrate the concepts of forward and backward propagations. 4. Construct the Hopfield models. |
| 3. | 4-1 | | Professional Elective – IV | <p>EC741PE: NETWORK SECURITY AND CRYPTOGRAPHY (PE – IV) Course Outcomes: Upon completing this course, the student will be able to</p> <ol style="list-style-type: none"> 1. Describe network security fundamental concepts and principles 2. Encrypt and decrypt messages using block ciphers and network security technology and protocols 3. Analyze key agreement algorithms to identify their weaknesses 4. Identify and assess different types of threats, malware, spyware, viruses, vulnerabilities <hr/> <p>EC742PE : SATELLITE COMMUNICATIONS (PE – IV) Course Outcomes: Upon completing this course, the student will be able to</p> <ol style="list-style-type: none"> 1. Explore the basic concepts and frequency allocations for satellite communication, orbital mechanics and launch vehicles. 2. Envision the satellite sub systems and design satellite links for specified C/N. 3. Familiarize the various multiple access techniques for satellite communication systems and earth station technologies. 4. Known the concepts of LEO, GEO Stationary Satellite Systems and satellite navigation. |

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| | | | | <p>EC743PE: BIOMEDICAL INSTRUMENTATION (PE – IV)</p> <p>Course Outcomes: After completion of the course the student is able to:</p> <ol style="list-style-type: none"> 1. Explore biosystems and medical systems from an engineering perspective. 2. Identify the techniques to acquire record and primarily understand physiological activity of the human body through cell potential, ECG, EEG, BP and blood flow measurement and EMG. 3. Articulate the working of various medical instruments and critical care equipment. 4. Know the imaging techniques including CT,PET, SPECT and MRI used in diagnosis of various medical conditions. <p>EC743PE: BIOMEDICAL INSTRUMENTATION (PE – IV)</p> <p>Course Outcomes: After completion of the course the student is able to:</p> <ol style="list-style-type: none"> 1. Explore biosystems and medical systems from an engineering perspective. 2. Identify the techniques to acquire record and primarily understand physiological activity of the human body through cell potential, ECG, EEG, BP and blood flow measurement and EMG. 3. Articulate the working of various medical instruments and critical care equipment. 4. Know the imaging techniques including CT,PET, SPECT and MRI used in diagnosis of various medical conditions |
| 4. | 4-1 | EC721OE | Open Elective – II | Course Outcomes: Upon completing this course, the student will be able to <ol style="list-style-type: none"> 1. Learn about sensor Principle, Classification and Characterization. 2. Explore the working of Electromechanical, Thermal, Magnetic radiation and Electro analytic sensors. 3. Understand the basic concepts of Smart Sensors. 4. Design a system with sensors |
| 5. | 4-1 | EC722OE | ELECTRONICS FOR HEALTH CARE (OE-II) | Course Outcomes: Upon completion of this course, the students will be able to <ol style="list-style-type: none"> 1. Know about health care data and its conversion to information and to knowledge. 2. Acquire knowledge on (Electronic Health Records) EHRs and their Implementation. 3. Understand the working of electronic devices used for the patient monitoring. 4. Know the concepts of Telemedicine and therapeutic devices used inside the human body |
| 7. | 4-1 | EC723OE | TELECOMMUNICATIONS FOR SOCIETY (OE - II) | Course Outcomes: Upon completion of this course, the students will be able to <ul style="list-style-type: none"> • Understand the concepts of simplex, half duplex, and full duplex of one-way and two-way circuits. |

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| | | | | <ul style="list-style-type: none"> • Get knowledge on subscriber loop design and VF repeaters of voice telephony. • Get brief overview of video transmission and its broadcasting standards in television transmission. • Know different modes of television transmission. |
| 6. | 4-1 | EC702PC | Professional Practice, Law & Ethics | <p>Course Outcome: The students will</p> <ol style="list-style-type: none"> 1. understand the importance of professional practice, Law and Ethics in their personal lives and professional careers. 2. learn the rights and responsibilities as an employee, team member and a global citizen |
| 1. | 4-2 | EC851PE EC852PE EC853PE | Professional Elective – V | <p>EC851PE: ARTIFICIAL INTELLIGENCE (PE – V)</p> <p>Course Outcomes: Upon completing this course, the students will be able to</p> <ul style="list-style-type: none"> • Understand the basics of the theory and about intelligent agents. • Capable of using heuristic searches, aware of knowledge based systems and expert systems. • Apply AI techniques to real-world problems to develop intelligent systems. • Select appropriately from a range of techniques when implementing intelligent systems <hr/> <p>EC853PE: MACHINE LEARNING (PE – V)</p> <p>Course Outcomes:</p> <ol style="list-style-type: none"> 1. Ability to understand the concepts of Neural Networks 2. Ability to select the Learning Networks in modeling real world systems 3. Ability to use an efficient algorithm for Deep Models 4. Ability to apply optimization strategies for large scale applications <hr/> <p>EC863PE: WIRELESS SENSOR NETWORKS (PE – V)</p> <p>Course Outcomes: Upon completion of the course, the student will be able to:</p> <ul style="list-style-type: none"> • Analyze and compare various architectures of Wireless Sensor Networks • Understand Design issues and challenges in wireless sensor networks • Analyze and compare various data gathering and data dissemination methods. • Design, Simulate and Compare the performance of various routing and MAC protocol |
| 2. | 4-2 | EC861PE EC862PE EC863PE | Professional Elective – VI | <p>EC861PE: MULTIMEDIA DATABASE MANAGEMENT SYSTEMS (PE – VI)</p> <p>Course Outcomes</p> <ul style="list-style-type: none"> • Gain knowledge of fundamentals of DBMS, database design and normal forms • Master the basics of SQL for retrieval and |

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| | | | | <p>management of data.</p> <ul style="list-style-type: none"> • Be acquainted with the basics of transaction processing and concurrency control. • Familiarity with database storage structures and access techniques <hr/> <p>EC862PE: SYSTEM ON CHIP ARCHITECTURE (PE – VI)</p> <p>Course Outcomes:</p> <ul style="list-style-type: none"> • Expected to understand SOC Architectural features. • To acquire the knowledge on processor selection criteria and limitations • To acquires the knowledge of memory architectures on SOC. • To understands the interconnection strategies and their customization on SOC |
| 3. | 4-2 | EC831OE | Open Elective – III | <p>EC831OE: MEASURING INSTRUMENTS (OE - III)</p> <p>Course Outcomes: Upon Completion of this course the student is 1. Able to identify suitable sensors and transducers for real time applications. 2. Able to translate theoretical concepts into working models. 3. Able to understand the basics of measuring devices and use them in relevant situation.</p> |
| | | EC832OE | OE-III | <p>EC832OE: COMMUNICATION TECHNOLOGIES (OE-III)</p> <p>Course Outcomes: Upon completing this course, the student will be able to 1. Understand the information theory and its coding styles. 2. Acquire knowledge on satellite communication and broadcasting services. 3. Know GSM, LTE and 5G mobile networks. 4. Know about network security through encryption and decryption.</p> |
| | | EC833OE | FUNDAMENTALS OF SOCIAL NETWORKS (OE-III) | <p>Course outcomes: upon completing this course the students will be able to 1. Understand concepts like small-world experiment and snowball sampling related to social networks. 2. Get knowledge on ties, weak ties and their strength. 3. Know about structure of the web, modern web search, link analysis using hubs. 4. Acquire knowledge on power laws and analysis of Rich-get-Richer phenomena.</p> |

2.6.1. Programme Outcomes (POs) and Course Outcomes (Cos) for all Programmes offered by the institution are stated and displayed on website and attainment of POs and Cos are evaluated.

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| Program: B.Tech. Branch: Computer Science and Engineering | Academic Year :2023- 2024 Regulation:R18 | Semester:1 |
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| S.No | Year/Sem | CourseName | Course Code | Course Outcomes |
|------|----------|--------------------------------|-------------|--|
| 1 | II/I | Analog and Digital Electronics | CS301 ES | <p>CO1:Know the characteristics of various components.</p> <p>CO2:Understand the utilization of components.</p> <p>CO3:Design and analyze small signal amplifier circuits.</p> <p>CO4:Learn Postulates of Boolean algebra and to minimize combinational functions</p> <p>CO5:Design and analyze combinational and sequential circuits</p> <p>CO6:Know about the logic families and realization of logic gates.</p> |
| 2 | II/I | Data Structures | CS302 PC | <p>CO1:Ability to select the data structures that efficiently model the information in a problem.</p> <p>CO2:Ability to assess efficiency trade-offs among different data structure implementations or</p> |

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| | | | | combinations. CO3:Implement and know the application of algorithms for sorting and pattern matching. CO4:Design programs using a variety of data structures, including hash tables, binary and generaltree structures, search trees, tries, heaps, graphs, and AVL-trees. |
| 3 | II/ I | Computer Oriented Statistical Methods | MA30 3BS | CO1:Apply the concepts of probability and distributions to some case studies CO2:Correlate the material of one unit to the material in other units CO3:Resolve the potential misconceptions and hazards in each topic of study. |
| 4 | II/I | Computer Organization and Architecture | CS304 PC | CO1:Understand the basics of instructions sets and their impact on processor design. CO2:Demonstrate an understanding of the design of the functional units of a digital computer system. CO3:Evaluate cost performance and design trade-offs in designing and constructing a computerprocessor including memory. CO4:Design a pipeline for consistent execution of instructions with minimum hazards. CO5:Recognize and manipulate representations of numbers stored in digital computers |
| 5 | II/I | Object Oriented Programming using C++ | CS305 PC | CO1:Able to develop programs with reusability CO2:Develop programs for file handling CO3:Handle exceptions in programming CO4:Develop applications for a range of |

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| | | | | problems using object-oriented programming techniques |
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| S.No | Year/Sem | Course Name | Course Code | Course Outcomes |
|------|----------|---|-------------|--|
| 1 | II/II | Discrete Mathematics | CS401 PC | <p>CO1:Ability to understand and construct precise mathematical proofs</p> <p>CO2:Ability to use logic and set theory to formulate precise statements</p> <p>CO3:Ability to analyze and solve counting problems on finite and discrete structures</p> <p>CO4:Ability to describe and manipulate sequences</p> <p>CO5:Ability to apply graph theory in solving computing problems</p> |
| 2 | II/II | Business Economics & Financial Analysis | SM402 MS | CO: understand the various Forms of Business and the impact of economic variables on the Business. The Demand, Supply, Production, Cost, Market Structure, Pricing aspects are learnt. The Students can study the firm's financial position by analysing the Financial Statements of a Company. |
| 3 | II/II | Operating Systems | CS403 PC | <p>CO1:Will be able to control access to a computer and the files that may be shared</p> <p>CO2:Demonstrate the knowledge of the components of computer and their respective roles in computing.</p> <p>CO3:Ability to recognize and resolve user problems with standard operating environments.</p> <p>CO4:Gain practical knowledge of how programming languages,</p> |


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| | | | | operating systems, and architectures interact and how to use each effectively. |
| 4 | II/II | Database Management Systems | CS404 PC | CO1:Gain knowledge of fundamentals of DBMS, database design and normal forms CO2:Master the basics of SQL for retrieval and management of data. CO3:Be acquainted with the basics of transaction processing and concurrency control. CO4:Familiarity with database storage structures and access techniques |
| 5 | II/II | JAVA PROGRAMMING | CS405 PC: | CO1:Able to solve real world problems using OOP techniques. CO2:Able to understand the use of abstract classes. CO3:Able to solve problems using java collection framework and I/o classes. CO4:Able to develop multithreaded applications with synchronization. CO5Able to develop applets for web applications. CO6Able to design GUI based applications |

| S.N0 | Year/Sem | Course Name | Course Code | Course Outcomes |
|------|----------|------------------------------------|-------------|--|
| 1 | III/I | Formal Languages & Automata Theory | CS501 PC | CO1:Able to understand the concept of abstract machines and their power to recognize the languages. CO2:Able to employ finite state machines for modeling and solving computing problems. CO3:Able to design context free grammars for formal languages. CO4:Able to distinguish between decidability and undecidability. CO4:Able to gain proficiency with mathematical tools and formal methods. |

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| 2 | III/I | Software Engineering | CS502 PC | CO1:Ability to translate end-user requirements into system and software requirements, using e.g. UML, and structure the requirements in a Software Requirements Document (SRD). CO2:Identify and apply appropriate software architectures and patterns to carry out high level designof a system and be able to critically compare alternative choices. CO3:Will have experience and/or awareness of testing problems and will be able to develop a simple testing report. |
| 3 | III/I | Computer Networks | CS503 PC | CO1:Gain the knowledge of the basic computer network technology. CO2:Gain the knowledge of the functions of each layer in the OSI and TCP/IP reference model. CO3:Obtain the skills of subnetting and routing mechanisms. CO4:Familiarity with the essential protocols of computer networks, and how they can be applied innetwork design and implementation. |
| 4 | III/I | Web Technologies | CS504 PC | CO1:gain knowledge of client-side scripting, validation of forms and AJAX programming CO2:understand server-side scripting with PHP language CO3:understand what is XML and how to parse and use XML Data with Java CO4:To introduce Server-side programming with Java Servlets and JSP |
| | III/I | Information Theory &Coding(PE-I) | CS511 PE: | CO1:Learn measurement of information and errors. CO2:Obtain knowledge in designing various source codes and channel codes CO3:Design encoders and decoders for block and cyclic codes |

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| | | | | CO4:Understand the significance of codes in various applications |
| | | Advanced Computer Architecture(PE-I) | CS512 PE | CO1:Computational models and Computer Architectures. CO2:Concepts of parallel computer models. CO3:Scalable Architectures, Pipelining, Superscalar processors, multiprocessors |
| | | Data Analytics(PE-I) | CS513 PE | CO1:To explore the fundamental concepts of data analytics. CO2:To learn the principles and methods of statistical analysis CO3:Discover interesting patterns, analyze supervised and unsupervised models and estimate the accuracy of the algorithms. CO4:To understand the various search methods and visualization techniques. |
| | | Image Processing (PE-I) | CS514PE | CO1:Provide a theoretical and mathematical foundation of fundamental Digital Image Processing concepts. The topics include image acquisition; sampling and quantization; preprocessing; enhancement; restoration; segmentation; and compression |
| | | PRINCIPLES OF PROGRAMMING LANGUAGES (Professional Elective - I) | CS515PE | CO1:Acquire the skills for expressing syntax and semantics in formal notation CO2:Identify and apply a suitable programming paradigm for a given computing application CO3:Gain knowledge of and able to compare the features of various programming languages. |
| | | ComputerGraphics(P E-II) | CS521PE : | CO1:The aim of this course is to provide an introduction of fundamental concepts and theory of computer graphics. CO2:Topics covered include graphics systems and input devices; geometric representations and 2D/3D transformations; viewing and |

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| | | | | projections; illumination and color models; animation; rendering and implementation; visible surface detection; |
| | | Advanced Operating Systems(P E-!!) | CS522PE | <p>CO1:Understand the design approaches of advanced operating systems</p> <p>CO2:Analyze the design issues of distributed operating systems.</p> <p>CO3:Evaluate design issues of multi processor operating systems.</p> <p>CO4:Identify the requirements Distributed File System and Distributed Shared Memory.</p> <p>CO5:Formulate the solutions to schedule the real time applications.</p> |
| | | Information Retrieval Systems(PE-II) | CS523PE | <p>CO1:Ability to apply IR principles to locate relevant information large collections of data</p> <p>CO2:Ability to design different document clustering algorithms</p> <p>CO3:Implement retrieval systems for web search tasks.</p> <p>CO4:Design an Information Retrieval System for web search tasks.</p> |
| | | Distributed Database(PE-II) | CS524PE | <p>CO1:The purpose of the course is to enrich the previous knowledge of database systems and exposing the need for distributed database technology to confront with the deficiencies of the centralized database systems.</p> <p>CO2:Introduce basic principles and implementation techniques of distributed database systems.</p> <p>CO3:Equip students with principles and knowledge of parallel and object-oriented databases.</p> <p>CO4:Topics include distributed DBMS architecture and design; query processing and optimization; distributed transaction management and reliability; parallel and object</p> |

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| | | | | database management systems. |
| | | Natural Language Processing (PE-II) | CS525PE : | <p>CO1: Show sensitivity to linguistic phenomena and an ability to model them with formal grammars.</p> <p>CO2: Understand and carry out proper experimental methodology for training and evaluating empirical NLP systems</p> <p>CO3: Able to manipulate probabilities, construct statistical models over strings and trees, and estimate parameters using supervised and unsupervised training methods.</p> <p>CO4: Able to design, implement, and analyze NLP algorithms</p> <p>CO5: Able to design different language modeling Techniques.</p> |

| S.No | Year/ Sem | Course Name | Course Code | Course Outcome |
|------|--------------|------------------|----------------|--|
| 1 | III/II | Machine Learning | CS601PC | <p>CO1: Understand the concepts of computational intelligence like machine learning</p> <p>CO2: Ability to get the skill to apply machine learning techniques to address the real time problems in different areas</p> <p>CO3: Understand the Neural Networks and its usage in machine learning application.</p> |
| 2 | III/II | Compiler Design | CS602PC | <p>CO1: Demonstrate the ability to design a compiler given a set of language features.</p> <p>CO2: Demonstrate the knowledge of patterns, tokens & regular expressions for lexical analysis.</p> <p>CO3: Acquire skills in using lex tool & yacc tool for developing a scanner and parser.</p> |

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| | | | | CO4:Design and implement LL and LR parsers CO5:Design algorithms to do code optimization in order to improve the performance of a program in terms of space and time complexity. CO6:Design algorithms to generate machine code. |
| 3 | III/II | DESIGN AND ANALYSIS OF ALGORITHMS | CS603PC | CO1:Ability to analyze the performance of algorithms CO2:Ability to choose appropriate data structures and algorithm design methods for a specified application CO3:Ability to understand how the choice of data structures and the algorithm design methods impact the performance of programs |
| 4 | III/II | Concurrent Programming (PE-III) | CS611PE: | CO1:Ability to implement the mechanisms for communication and co-ordination among concurrent processes. CO2:Ability to understand and reason about concurrency and concurrent objects CO3:Ability to implement the locking and non-blocking mechanisms CO4:Ability to understand concurrent objects |
| 5 | III/II | NETWORK PROGRAMMING (Professional Elective - III) | CS612PE | CO1:To write socket API based programs CO2:To design and implement client-server applications using TCP and UDP sockets CO3:To analyze network programs |
| 6 | III/II | Scripting Languages (PE-III) | CS613PE | CO1:Comprehend the differences between typical scripting languages and typical system and application programming languages. CO2:Acquire programming skills in scripting language |
| | | MOBILE APPLICATION DEVELOPMENT | CS614PE | CO1:Student understands the working of Android OS Practically. CO2:Student will be able to develop |


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| | | (Professional Elective - III) | | Android user interfaces CO3:Student will be able to develop, deploy and maintain the Android Applications. |
| | | SOFTWARE TESTING METHODOLOGIES (Professional Elective - III) | CS615PE | CO1:Design and develop the best test strategies in accordance to the developmentmodel. |
| | | ENVIRONMENTAL SCIENCE | MC609 | CO1:Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn helps insustainable development |

| S.No | Year/Sem | CourseName | Course Code | Course Outcome |
|------|----------|--|-------------|--|
| 1 | IV/I | CRYPTOGRAPHY AND NETWORK SECURITY (PC) | CS701PC: | CO1:Student will be able to understand basic cryptographic algorithms, message and web authentication and security issues. CO2:Ability to identify information system requirements for both of them such as client and server. CO3:Ability to understand the current legal issues towards information security. |
| 2 | IV/I | DATA MINING (PC) | CS702PC: | CO1:Ability to understand the types of the data to be mined and present a general classification oftasks and primitives to integrate a data mining system. CO2:Apply preprocessing methods for any given raw data. CO3:Extract interesting patterns from large amounts of data. CO4:Discover the role played by data mining in various fields. CO5:Choose and employ suitable data mining algorithms to build analytical |

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| | | | | applications CO6:Evaluate the accuracy of supervised and unsupervised models and algorithms. |
| 3 | IV/I | GRAPH THEORY (Professional Elective - IV) | CS711PE | CO1:Know some important classes of graph theoretic problems; CO2:Be able to formulate and prove central theorems about trees, matching, connectivity, colouring and planar graphs; CO3:Be able to describe and apply some basic algorithms for graphs; CO4:Be able to use graph theory as a modelling tool. |
| 4 | IV/I | INTRODUCTION TO EMBEDDED SYSTEMS (Professional Elective - IV) | CS712PE | CO1:Expected to understand the selection procedure of processors in the embedded domain. CO2:Design procedure of embedded firmware. CO3:Expected to visualize the role of realtime operating systems in embedded systems. CO4:Expected to evaluate the correlation between task synchronization and latency issues |
| | | ARTIFICIAL INTELLIGENCE (Professional Elective - IV) | CS713PE | CO1:Ability to formulate an efficient problem space for a problem expressed in natural language. CO2:Select a search algorithm for a problem and estimate its time and space complexities. CO3:Possess the skill for representing knowledge using the appropriate technique for a given problem. CO4:Possess the ability to apply AI techniques to solve problems of game playing, and machine learning. |
| | | CS714PE: CLOUD COMPUTING (Professional Elective - IV) | CS714PE | CO1:Ability to understand various service delivery models of a cloud computing architecture. CO2:Ability to understand the ways in which the cloud can be programmed and deployed. |

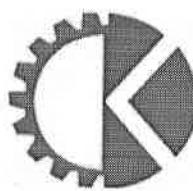

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| | | | | CO3:Understanding cloud service providers. |
| | | AD-HOC & SENSOR NETWORKS (Professional Elective - IV) | CS715PE: | <p>CO1:Ability to understand the state-of-the-art research in the emerging subject of Ad Hoc and Wireless Sensor Networks</p> <p>CO2:Ability to solve the issues in real-time application development based on ASN.</p> <p>CO3:Ability to conduct further research in the domain of AS</p> |
| | | ADVANCED ALGORITHMS (Professional Elective - V) | CS721PE | <p>CO1:Ability to analyze the performance of algorithms</p> <p>CO2:Ability to choose appropriate data structures and algorithm design methods for a specified application</p> <p>CO3:Ability to understand how the choice of data structures and the algorithm design methods impact the performance of programs</p> |
| | | REAL TIME SYSTEMS (Professional Elective - V) | CS722PE | <p>CO1:Be able to explain real-time concepts such as preemptive multitasking, task priorities, priority inversions, mutual exclusion, context switching, and synchronization, interrupt latency and response time, and semaphores.</p> <p>CO2:Able describe how a real-time operating system kernel is implemented.</p> <p>CO3:Able explain how tasks are managed.</p> <p>CO4:Explain how the real-time operating system implements time management.</p> <p>CO5:Discuss how tasks can communicate using semaphores, mailboxes, and queues.</p> <p>CO6:Be able to implement a real-time system on an embedded processor.</p> <p>CO7:Be able to work with real time operating systems like RT Linux, Vx Works, MicroC /OSII, TinyOs</p> |
| | | Soft Computing(PE-V) | CS723PE | <p>CO1:Understand fuzzy logic and reasoning to handle and solve engineering problems</p> |

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| | | | | <p>CO2:Apply the Classification and clustering techniques on various applications.</p> <p>CO3:Understand the advanced neural networks and its applications</p> <p>CO4:Perform various operations of genetic algorithms, Rough Sets.</p> <p>CO5:Comprehend various techniques to build model for various applications</p> |
| | | SOFTWARE PROCESS & PROJECT MANAGEMENT (Professional Elective - V) | CS725PE | <p>CO1:Gain knowledge of software economics, phases in the life cycle of software development, project organization, project control and process instrumentation</p> <p>CO2:Analyze the major and minor milestones, artifacts and metrics from management and technical perspective</p> <p>CO3:Design and develop software product using conventional and modern principles of software project management</p> |

| S.N o | Year/Se m | Course Name | Course Code | Course Outcome |
|----------|--------------|--|----------------|---|
| 1 | IV/II | ORGANIZATIONAL BEHAVIOUR (PC) | SM801MS: | CO1:To provide the students with the conceptual framework and the theories underlying Organizational Behaviour. |
| 2 | IV/II | COMPUTATIONAL COMPLEXITY (P.E - VI) | CS811PE | <p>CO1:Ability to classify decision problems into appropriate complexity classes</p> <p>CO2:Ability to specify what it means to reduce one problem to another, and construct reductions for simple examples.</p> <p>CO3:Ability to classify optimization problems into appropriate approximation complexity classes</p> <p>CO4:Ability to choose appropriate data</p> |

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| | | | | structure for the given problem CO5:Ability to choose and apply appropriate design method for the given problem |
| 3 | IV/II | DISTRIBUTED SYSTEMS (Professional Elective - VI) | CS812PE: | CO1:This course provides an insight into Distributed systems. CO2:Topics include- Peer to Peer Systems, Transactions and Concurrency control, Security and Distributed shared memory |
| | | CS813PE: NEURAL NETWORKS & DEEP LEARNING (Professional Elective - VI) | | CO1:Ability to understand the concepts of Neural Networks CO2:Ability to select the Learning Networks in modeling real world systems CO3:Ability to use an efficient algorithm for Deep Models CO4:Ability to apply optimization strategies for large scale applications |
| | | CS814PE: HUMAN COMPUTER INTERACTION (Professional Elective - VI) | | CO1:Ability to apply HCI and principles to interaction design. CO2:Ability to design certain tools for blind or PH people. |
| | | CS815PE: CYBER FORENSICS (Professional Elective - VI) | | CO1:Students will understand the usage of computers in forensic, and how to use various forensictools for a wide variety of investigations. CO2:It gives an opportunity to students to continue their zeal in research in computer forensics |



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(Approved by AICTE & Affiliated to JNTUH)

| Program: B.Tech Branch: Computer Science & Engineering | | Academic year :2023-2024 Regulation : R22 | | Semester :I |
|---|-----------|--|-------------|---|
| S.No | Year /Sem | Course name | Course Code | Course Outcome |
| 1 | II/I | DIGITAL ELECTRONICS | CS301P C | <p>CO1: Course Objectives: This course aims at through understanding of binary number system, logic gates, combination logic and synchronous and asynchronous logic.</p> |
| 2 | II/I | DATA STRUCTURE | CS302P C | <p>CO1: Ability to select the data structures that efficiently model the information in a problem.</p> <p>CO2: Ability to assess efficiency trade-offs among different data structure implementations or combinations.</p> <p>CO3: Implement and know the application of algorithms for sorting and pattern matching.</p> <p>CO4: Design programs using a variety of data structures, including hash tables, binary and general tree structures, search trees, tries, heaps, graphs, and AVL-trees.</p> |
| 3 | II/I | Computer Oriented | CS303P C | CO1: Apply the concepts of probability and distributions to case studies. |

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| | | Statistical Methods | | <p><i>CO2:</i> Formulate and solve problems involving random variables and apply statistical methods for analyzing experimental data.</p> <p><i>CO3:</i> Apply concept of estimation and testing of hypothesis to case studies.</p> <p><i>CO4:</i> Correlate the concepts of one unit to the concepts in other units.</p> |
| 4 | 11/1 | Computer Organization And Architecture | CS304P C | <p><i>CO1:</i> Understand the basics of instruction sets and their impact on processor design.</p> <p><i>CO2:</i> Demonstrate an understanding of the design of the functional units of a digital computer system.</p> <p><i>CO3:</i> Evaluate cost performance and design trade-offs in designing and constructing a computer processor including memory.</p> <p><i>CO4:</i> Design a pipeline for consistent execution of instructions with minimum hazards.</p> <p><i>CO5:</i> Recognize and manipulate representations of numbers stored in digital computers</p> |
| 5 | 11/1 | Object Oriented Program | CS305P C | <p><i>CO1:</i> Demonstrate the behavior of programs involving the basic programming constructs like control structures, constructors, string handling and garbage collection.</p> <p><i>CO2:</i> Demonstrate the implementation of inheritance (multilevel, hierarchical and multiple) by using extend and implement</p> |

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| | | | | keywords |
| | | | | <i>CO3: Use multithreading concepts to develop inter process communication.</i> |
| | | | | <i>CO4: Understand the process of graphical user interface design and implementation using AWT or swings.</i> |
| | | | | <i>CO5: Develop applets that interact abundantly with the client environment and deploy on the server.</i> |
| 1 | 11/11 | Discrete Mathematics | CS401P C | <i>CO1: Understand and construct precise mathematical proofs</i> <i>CO2: Apply logic and set theory to formulate precise statements</i> <i>CO3: Analyze and solve counting problems on finite and discrete structures.</i> <i>CO4: Describe and manipulate sequences</i> <i>CO5: Apply graph theory in solving computing problems</i> |
| 2 | 11/11 | BUSINESS ECONOMICS AND FINANCIAL ANALYSIS | SM402 MS | <i>CO1:: The students will understand the various Forms of Business and the impact of economic variables on the Business. The Demand, Supply, Production, Cost, Market Structure, Pricing aspects are learnt. The Students can study the firm's financial position by analysing the Financial Statements of a Company.</i> |
| 3 | 11/11 | OPERATING SYSTEMS | CS403P C | <i>CO1: Will be able to control access to a computer and the files that may be shared</i> <i>CO2: Demonstrate the knowledge of the components of computers and their respective roles in computing.</i> <i>CO3: Ability to recognize and resolve user problems with standard operating environments.</i> |

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| | | | | CO4: Gain practical knowledge of how programming languages, operating systems, and architectures interact and how to use each effectively. |
| 4 | II/II | DATABASE MANAGEMENT SYSTEMS | CS404P C | <p>CO1: Gain knowledge of fundamentals of DBMS, database design and normal forms</p> <p>CO2: Master the basics of SQL for retrieval and management of data.</p> <p>CO3: Be acquainted with the basics of transaction processing and concurrency control.</p> <p>CO4: Familiarity with database storage structures and access techniques</p> |
| 5 | II/II | SOFTWARE ENGINEERING | CS405P C | <p>CO1: Ability to translate end-user requirements into system and software requirements, using e.g. UML, and structure the requirements in a Software Requirements Document (SRD).</p> <p>CO2: Identify and apply appropriate software architectures and patterns to carry out high level design of a system and be able to critically compare alternative choices.</p> <p>CO3: Will have experience and/or awareness of testing problems and will be able to develop a simple testing report</p> |
| 1 | III/I | DESIGN AND ANALYSIS OF ALGORITHMS | CS501P C | <p>CO1: Analyze the performance of algorithms</p> <p>CO2: Choose appropriate data structures and algorithm design methods for a specified application</p> <p>CO3: Understand the choice of data structures and the algorithm design methods</p> |
| 2 | III/I | COMPUTER NETWORKS | CS502P C | <p>CO1: Gain the knowledge of the basic computer network technology.</p> <p>CO2: Gain the knowledge of the functions of each layer in the OSI and TCP/IP reference model.</p> <p>CO3: Obtain the skills of subnetting and routing mechanisms.</p> |

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| | | | | <p>CO4:Familiarity with the essential protocols of computer networks, and how they can be applied in network design and implementation.</p> |
| 3 | III/I | DEVOPS | CS503P C | <p>CO1: Understand the various components of DevOps environment.</p> |
| | | | | <p>CO2:Identify Software development models and architectures of DevOps</p> |
| | | | | <p>CO3: Use different project management and integration tools.</p> |
| | | | | <p>CO4:Select an appropriate testing tool and deployment model for project.</p> |
| 4 | III/I | QUANTUM COMPUTING | CS511P E | <p>CO1:Understand basics of quantum computing</p> |
| | | | | <p>CO2: Understand physical implementation of Qubit</p> |
| | | | | <p>CO3: Understand Quantum algorithms and their implementation</p> |
| | | | | <p>CO4:Understand The impact of Quantum Computing on Cryptography</p> |
| 5 | III/I | ADVANCED COMPUTER ARCHITECTURE | CS512P E | <p>CO1:Computational models and Computer Architectures.</p> |
| | | | | <p>CO2:Concepts of parallel computer models.</p> |
| | | | | <p>CO3: Scalable Architectures, Pipelining, Superscalar processors</p> |
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| 1 | III/II | MACHINE LEARNING | CS601P C | <p>CO1:Distinguish between, supervised, unsupervised and semi-supervised learning</p> |
| | | | | <p>CO2:Understand algorithms for building classifiers applied on datasets of non-linearly separable classes</p> |
| | | | | <p>CO3:Understand the principles of evolutionary computing algorithms</p> |
| | | | | <p>CO4: Design an ensembler to increase the classification accuracy</p> |
| 2 | III/II | FORMAL LANGUAGES AND AUTOMATA | CS602P C | <p>CO1: Understand the concept of abstract machines and their power to recognize the languages.</p> |
| | | | | <p>CO2: Employ finite state machines for modeling and solving computing problems.</p> |
| | | | | <p>CO3: Design context free grammars for formal</p> |

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| | | THEORY | | languages. CO4:Distinguish between decidability and undecidability. |
| 3 | III/II | ARTIFICIAL INTELLIGENCE | CS603P C | CO1:Understand search strategies and intelligent agents |
| | | | | CO2: Understand different adversarial search techniques |
| | | | | CO3:Apply propositional logic, predicate logic for knowledge representation |
| | | | | CO4: Apply AI techniques to solve problems of game playing, and machine learning. |
| | | | | CO1: Understand Full stack components for developing web application. |
| | III/II | FULL STACK DEVELOPMENT | CS631P E | CO2: Apply packages of NodeJS to work with Data, Files, Http Requests and Responses. |
| | | | | CO3:Use MongoDB data base for storing and processing huge data and connects with NodeJS application |
| | | | | CO4:Design faster and effective single page applications using Express and Angular. |
| | | | | CO5>Create interactive user interfaces with react components. |
| | | | | CO1:Interpret the impact and challenges posed by IoT networks leading to new architectural models. |
| | III/II | INTERNET OF THINGS | CS632P E | CO2:Compare and contrast the deployment of smart objects and the technologies to connect them to network. |
| | | | | CO3:Appraise the role of IoT protocols for efficient network communication. |
| | | | | CO4: Identify the applications of IoT in Industry. |
| | | | | CO1:Comprehend the differences between typical scripting languages and typical system and application programming languages. |
| | | | | CO2:Gain knowledge of the strengths and weakness of Perl, TCL and Ruby; and select an appropriate language for solving a given |

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| | | | | problem. CO3:Acquire programming skills in scripting language. |
| | III/II | MOBILE APPLICATION DEVELOPMENT | CS634P E | CO1: Understand the working of Android OS Practically CO2:Develop Android user interfaces CO3:Develop, deploy and maintain the Android Applications. |
| | III/II | SOFTWARE TESTING METHODOLOGIES | CS635P E | CO1:Understand purpose of testing and path testing CO2:Understand strategies in data flow testing and domain testing CO3:Develop logic-based test strategies CO4:Understand graph matrices and its applications. CO5: Implement test cases using any testing automation tool |
| 5 | III/II | DATA STRUCTURES | CS6110 E | CO1:Ability to select the data structures that efficiently model the information in a problem. CO2:Ability to assess efficiency trade-offs among different data structure implementations or combinations. CO3:Implement and know the application of algorithms for sorting and pattern matching. CO4:Design programs using a variety of data structures, including hash tables, binary and general tree structures, search trees, tries, heaps, graphs, and AVL-trees |
| | III/II | DATABASE MANAGEMENT SYSTEMS | CS6120 E | CO1:Gain knowledge of fundamentals of DBMS, database design and normal forms CO2:Master the basics of SQL for retrieval and management of data. CO3:Be acquainted with the basics of transaction processing and concurrency control. CO4: Familiarity with database storage structures and access techniques |
| 1 | IV/I | CRYPTOGRAPHY | CS701P | CO1:Student will be able to understand basic |

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| | | PHY AND NETWORK SECURITY | C | cryptographic algorithms, message and web authentication and security issues. CO2:Ability to identify information system requirements for both of them such as client and server CO3:Ability to understand the current legal issues towards information security. |
| 2 | IV/I | COMPILER DESIGN | CS702P C | CO1:Demonstrate the ability to design a compiler given a set of language features. |
| | | | | CO2: Demonstrate the knowledge of patterns, tokens & regular expressions for lexical analysis. |
| | | | | CO3:Acquire skills in using lex tool & yacc tool for developing a scanner and parser. |
| | | | | CO4:Design and implement LL and LR parsers |
| | | | | CO5:Design algorithms to do code optimization in order to improve the performance of a program in terms of space and time complexity. |
| | | | | CO6: Design algorithms to generate machine code. |
| 3 | IV/I | GRAPH THEORY | CS741P E | CO1: Know some important classes of graph theoretic problems. |
| | | | | CO2: Prove central theorems about trees, matching, connectivity, coloring and planar graphs. |
| | | | | CO3:Describe and apply some basic algorithms for graphs |
| | | | | CO4:Use graph theory as a modeling tool |
| | IV/I | CYBER SECURITY | CS742P E | CO1:Analyze and evaluate the cyber security needs of an organization. |
| | | | | CO2:Understand Cyber Security Regulations and Roles of International Law. |
| | | | | CO3:Design and develop security architecture for an organization. |
| | | | | CO4:Understand fundamental concepts of data privacy attacks. |
| | IV/I | SOFT | CS743P | CO1: Identify the difference between Conventional Artificial Intelligence to |

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| | | COMPUTING | E | <p>Computational Intelligence.</p> <p>CO2: Understand fuzzy logic and reasoning to handle and solve engineering problems</p> <p>CO3: Apply the Classification techniques on various applications.</p> <p>CO4: Perform various operations of genetic algorithms and Rough Sets.</p> |
| | IV/I | CLOUD COMPUTING | CS744P E | <p>CO1: Understand different computing paradigms and potential of the paradigms and specifically cloud computing</p> <p>CO2: Understand cloud service types, cloud deployment models and technologies supporting and driving the cloud</p> <p>CO3: Acquire the knowledge of programming models for cloud and development of software application that runs the cloud and various services available from major cloud providers</p> <p>CO4: Understand the security concerns and issues in cloud computing</p> <p>CO5: Acquire the knowledge of advances in cloud computing.</p> |
| 4 | IV/I | AD-HOC & SENSOR NETWORKS | CS745P E | <p>CO1: Understand the concepts of sensor networks and applications</p> <p>CO2: Understand and compare the MAC and routing protocols for adhoc networks</p> <p>CO3: Understand the transport protocols of sensor networks</p> |
| | IV/I | ADVANCED ALGORITHMS | CS751P E | <p>CO1: Familiarize with advanced methods on analysis of algorithms</p> <p>CO2: Familiarize with the graphs, graph matching and shortest path algorithms</p> <p>CO3: Understand matrix computations and modulo representations</p> <p>CO4: Understand randomized, approximation algorithms and computational complexity topics</p> |
| | IV/I | AGILE | CS752P | CO1: Identify basic concepts of agile methodology and Extreme programming |

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| | | METHODOL OGY | E | <p>CO2: Analyze real customer involvement in collaboration</p> <p>CO3: Discuss risk management and iteration planning</p> <p>CO4: Understanding incremental requirements, refactoring, incremental design and architecture</p> |
| | IV/I | ROBOTIC PROCESS AUTOMATIO N | CS753P E | <p>CO1: Understand the concepts of Robotic Process Automation.</p> <p>CO2: Apply the flow chart mechanism in various calculations.</p> <p>CO3: Applying UIPath tool for debugging process</p> <p>CO4: Design system managing techniques.</p> <p>CO5: Create application for process automation using UIPath tool</p> |
| 5 | IV/I | BLOCKCHAI N TECHNOLO GY | CS754P E | <p>CO1: Understanding concepts behind cryptocurrency</p> <p>CO2: Applications of smart contracts in decentralized application development</p> <p>CO3: Understand frameworks related to public, private and hybrid blockchain</p> <p>CO4: Create blockchain for different application case studies</p> |
| | IV/I | SOFTWARE PROCESS & PROJECT MANAGEME NT | CS755P E | <p>CO1: Understand the software process change, assessment, project plans and Quality Standards.</p> <p>CO2: Examine the life cycle phases, artifacts, workflows and checkpoints of a process.</p> <p>CO3: Design and develop software products using conventional and modern principles of software project management</p> <p>CO4: Identify the new project management process and practices.</p> |
| | IV/I | OPERATING SYSTEMS | CS721O E | <p>CO1: Will be able to control access to a computer and the files that may be shared</p> <p>CO2: Demonstrate the knowledge of the components of computers and their respective</p> |

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| | | | | roles in computing. CO3:Ability to recognize and resolve user problems with standard operating environments CO4:Gain practical knowledge of how programming languages, operating systems, and architectures interact and how to use each effectively. |
| | IV/I | SOFTWARE ENGINEERING | CS7220 E | CO1:Ability to translate end-user requirements into system and software requirements, using e.g. CO2:UML, and structure the requirements in a Software Requirements Document (SRD). CO3: Identify and apply appropriate software architectures and patterns to carry out high level design of a system and be able to critically compare alternative choices. CO4:Will have experience and/or awareness of testing problems and will be able to develop a simple testing report |
| 1 | IV/II | ORGANIZATIONAL BEHAVIOUR | CS801P C | CO1:Students understand their personality, perception and attitudes for overall development and further learn the importance of group behavior in the organizations. |
| 2 | IV/II | COMPUTATIONAL COMPLEXITY | CS861P E | CO1:Understand the complexity of time and space for computational models CO2:Understand optimizational problems CO3:Understand NP completeness problems CO4:Understand hierarchical theorems |
| | IV/II | DISTRIBUTED SYSTEMS | CS862P E | CO1:Understand Transactions and Concurrency control. CO2:Understand distributed shared memory CO3: Design a protocol for a given distributed application |
| | IV/II | DEEP LEARNING | CS863P E | CO1:Understand machine learning basics and neural networks CO2:Understand optimal usage of data for training deep models |

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| | | | | CO3:Apply CNN and RNN models for real-world data CO4:Evaluate deep models CO5:Develop deep models for real-world problems |
| | IV/II | HUMAN COMPUTER INTERACTION | CS864P E | CO1:Apply HCI and principles to interaction design. CO2:Design certain tools for blind or PH people CO3:Understand the social implications of technology and ethical responsibilities as engineers. CO4: Understand the importance of a design and evaluation methodology |
| | IV/II | CYBER FORENSICS | CS865P E | CO1:Students will understand the usage of computers in forensic, and how to use various forensic tools for a wide variety of investigations. CO2: It gives an opportunity to students to continue their zeal in research in computer forensics |
| 3 | IV/II | ALGORITHM DESIGN AND ANALYSIS | CS8310 E | CO1:Analyze the performance of algorithms CO2:Choose appropriate data structures and algorithm design methods for a specified application CO3:Understand the choice of data structures and the algorithm design methods |
| | IV/II | INTRODUCTION TO COMPUTER NETWORKS | CS8320 E | CO1:Gain the knowledge of the basic computer network technology. CO2:Gain the knowledge of the functions of each layer in the OSI and TCP/IP reference model. CO3:Understand subnetting and routing mechanisms. CO4:Familiarity with the essential application protocols of computer networks |


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2.6.1. Programme Outcomes (POs) and Course Outcomes (COs) for all Programmes offered by the institution are stated and displayed on website and attainment of POs and COs are evaluated.

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| Program: B.Tech. Branch: ELECTRICAL & ELECTRONICS ENGINEERING. | Academic Year :2023-2024 Regulation:R18 | Semester:1 |
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| S.N o | Year/Se m | Course Name | Course Code | Course Outcome |
|----------|--------------|-----------------------------|----------------|---|
| 1 | II/I | Engineering Mechanics | EE301ES | CO1:Determine resultant of forces acting on a body and analyse equilibrium of a body subjected to a system of forces. CO2:Solve problem of bodies subjected to friction. CO3:Find the location of centroid and calculate moment of inertia of a given section. CO4: Understand the kinetics and kinematics of a body undergoing rectilinear, curvilinear, rotatory motion and rigid body motion. |
| 2 | II/I | Electrical Circuit Analysis | EE302PC | CO1: Apply network theorems for the analysis of electrical circuits. CO2:Obtain the transient and steady-state response of electrical circuits. CO3:Analyze circuits in the sinusoidal steady-state (single-phase and three-phase). CO4:Analyze two port circuit behavior. |
| 3 | | Analog Electronics | EE303PC | CO1:Know the characteristics, utilization of various components. CO2: Understand the biasing techniques CO3:Design and analyze various rectifiers, small signal amplifier circuits. CO4:Design sinusoidal and non-sinusoidal oscillators. |

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| | | | | CO5: A thorough understanding, functioning of OP-AMP, design OP-AMP based circuits with linear integrated circuits. |
| 4 | | Electrical Machines - I | EE304PC | <p>CO1: Identify different parts of a DC machine & understand its operation</p> <p>CO2: Carry out different testing methods to predetermine the efficiency of DC machines</p> <p>CO3: Understand different excitation and starting methods of DC machines</p> <p>CO4: Control the voltage and speed of a DC machines</p> <p>CO5: Analyze single phase and three phase transformers circuits.</p> |
| | | Electromagnetic Fields | EE305P C | <p>CO1: To understand the basic laws of electromagnetism.</p> <p>CO2: To obtain the electric and magnetic fields for simple configurations under static conditions.</p> <p>CO3: To analyze time varying electric and magnetic fields.</p> <p>CO4: To understand Maxwell's equation in different forms and different media.</p> <p>CO5: To understand the propagation of EM waves.</p> |

| S.No | Year/Sem | CourseName | CourseCode | CourseOutcomes |
|------|----------|---|------------|---|
| 1 | II/II | Laplace Transforms, Numerical Methods & Complex variables | MA401BS | <p>CO1: Use the Laplace transforms techniques for solving ODE's</p> <p>CO2: Find the root of a given equation.</p> <p>CO3: Estimate the value for the given data using interpolation</p> <p>CO4: Find the numerical solutions for a</p> |

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| | | | | given ODE's CO6: Analyze the complex function with reference to their analyticity, integration using Cauchy's integral and residue theorems CO7: Taylor's and Laurent's series expansions of complex function |
| 2 | II/II | Electrical Machines – II | EE402PC | CO1: Understand the concepts of rotating magnetic fields. CO2: Understand the operation of ac machines. CO3: Analyze performance characteristics of ac machines. |
| 3 | II/II | Digital Electronics | EE403PC | CO1: Understand working of logic families and logic gates. CO2: Design and implement Combinational and Sequential logic circuits. CO3: Understand the process of Analog to Digital conversion and Digital to Analog conversion. CO4: Be able to use PLDs to implement the given logical problem. |
| 4 | II/II | Control Systems | EE404PC | CO1: Understand the modeling of linear-time-invariant systems using transfer function and state-space representations. CO2: Understand the concept of stability and its assessment for linear-time invariant systems. CO3: Design simple feedback controllers. |
| 5 | II/II | Power System - I | EE405PC | CO1: Understand the concepts of power systems. CO2: Understand the operation of conventional generating stations and renewable sources of electrical |

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| | | | | <p>power.</p> <p>CO3: Evaluate the power tariff methods.</p> <p>CO4: Determine the electrical circuit parameters of transmission lines</p> <p>CO5: Understand the layout of substation and underground cables and corona.</p> |
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| S.No | Year/Sem | Course Name | CourseCode | CourseOutcome |
|------|----------|----------------------------------|------------|--|
| 1 | III/I | Power Electronics | EE501PE | <p>CO1: Understand the differences between signal level and power level devices.</p> <p>CO2: Analyze controlled rectifier circuits.</p> <p>CO3: Analyze the operation of DC-DC choppers.</p> <p>CO4: Analyze the operation of voltage source inverters.</p> |
| 2 | III/I | Power System-II | EE502PE | <p>CO1: Analyze transmission line performance.</p> <p>CO2: Apply load compensation techniques to control reactive power</p> <p>CO3: Understand the application of per unit quantities.</p> <p>CO4: Design over voltage protection and insulation coordination</p> <p>CO5: Determine the fault currents for symmetrical and unbalanced faults</p> |
| 3 | III/I | Measurements and Instrumentation | EE503PE | <p>CO1: Understand different types of measuring instruments, their construction, operation and characteristics</p> <p>CO2: Identify the instruments suitable for typical measurements</p> <p>CO3: Apply the knowledge about transducers and instrument transformers to use them effectively.</p> |


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| | | | | CO4: Apply the knowledge of smart and digital metering for industrial applications |
| 4 | III/I | COMPUTER ARCHITECTURE (Professional Elective) | EE511PE: - I) | <p>CO1: Understand the concepts of microprocessors, their principles and practices.</p> <p>CO2: Write efficient programs in assembly language of the 8086 family of microprocessors.</p> <p>CO3: Organize a modern computer system and be able to relate it to real examples.</p> <p>CO4: Develop the programs in assembly language for 80286, 80386 and MIPS processors in real and protected modes.</p> <p>CO5: Implement embedded applications using ATOM processor.</p> |
| 5 | III/I | Business Economics and Financial Analysis | SM504M S | CO1: Understand the various forms of Business and the impact of economic variables on the Business. The Demand, Supply, Production, Cost, Market Structure, Pricing aspects are learnt. The Students can study the firm's financial position by analysing the Financial Statements of a Company. |

| S.No | Year/Sem | Course Name | Course Code | CourseOutcomes |
|------|----------|--|-------------|---|
| 1 | III/II | OPTIMIZATION TECHNIQUES (Professional Elective - III) | EE611PE | <p>CO1: Explain the need of optimization of engineering systems</p> <p>CO2: Understand optimization of electrical and electronics engineering problems</p> <p>CO3: Apply classical optimization</p> |


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| | | | | techniques, linear programming, simplex algorithm, transportation problem CO4: Apply unconstrained optimization and constrained non-linear programming and dynamic programming CO5: Formulate optimization problems. |
| 2 | III/II | POWER SEMICONDUCTOR DRIVES (Professional Elective - II) Professional Elective-II | EE612PE: | CO1: Identify the drawbacks of speed control of motor by conventional methods. CO2: Differentiate Phase controlled and chopper-controlled DC drives speed-torque characteristics merits and demerits CO3: Understand Ac motor drive speed-torque characteristics using different control strategies its merits and demerits CO4: Describe Slip power recovery schemes |
| 3 | III/II | Signals and Systems | EE601PC | CO1: Differentiate various signal functions. CO2: Represent any arbitrary signal in time and frequency domain. CO3: Understand the characteristics of linear time invariant systems. CO4: Analyze the signals with different transform technique |
| 4 | III/II | Microprocessors & Microcontrollers | EE602PC | CO1: Understands the internal architecture, organization and assembly language programming of 8086 processors. CO2: Understands the internal architecture, organization and assembly language programming of 8051/controllers CO3: Understands the interfacing techniques to 8086 and 8051 based |

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| | | | | systems. CO4: Understands the internal architecture of ARM processors and basic concepts of advanced ARM processors. |
| 5 | III/II | Power System Protection | EE603PC | CO1: Compare and contrast electromagnetic, static and microprocessor-based relays CO2: Apply technology to protect power system components. CO3: Select relay settings of over current and distance relays. CO4: Analyze quenching mechanisms used in air, oil and vacuum circuit breakers |
| 6 | III/II | Power System Operation and Control | EE604PC | CO1: Understand operation and control of power systems. CO2: Analyze various functions of Energy Management System (EMS) functions. CO3: Analyze whether the machine is in stable or unstable position. CO4: Understand power system deregulation and restructuring |

| S.No | Year/Sem | Course Name | Course Code | Course OutCome |
|------|----------|------------------------------------|-------------|--|
| 1 | IV/I | DIGITAL CONTROL SYSTEMS (PE – III) | EE711PE | CO1: Obtain discrete representation of LTI systems. CO2: Analyze stability of open loop and closed loop discrete-time systems. CO3: Design and analyze digital controllers. CO4: Design state feedback and output feedback controllers. |
| 2 | IV/I | DIGITAL | EE712PE | CO1: Understand the LTI system characteristics and Multirate signal |

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| | | SIGNAL PROCESSING (PE – III) Professional Elective-III | | processing. CO2: Understand the inter-relationship between DFT and various transforms. CO3: Design a digital filter for a given specification. CO4: Understand the significance of various filter structures and effects of round off errors |
| 3 | IV/I | HVDC TRANSMISSION (PE – IV) Professional Elective-IV | EE721PE | CO1: Compare EHV AC and HVDC system and to describe various types of DC links CO2: Analyze Graetz circuit for rectifier and inverter mode of operation CO3: Describe various methods for the control of HVDC systems and to perform power flow analysis in AC/DC systems CO4: Describe various protection methods for HVDC systems and classify Harmonics and design different types of filters |
| 4 | IV/I | Fundamentals of Management for Engineers | SM701MS | CO1: The students understand the significance of Management in their Profession. The various Management Functions like Planning, Organizing, Staffing, Leading, Motivation and Control aspects are learnt in this course. The students can explore the Management Practices in their domain area. |

| S.No | Year/Sem | Course Name | Course Code | Course Outcome |
|------|----------|---|-------------|---|
| 1 | IV/II | POWER QUALITY AND FACTS (PE - V) | EE811PE: | CO1: Know the severity of power quality problems in distribution system CO2: Understand the concept of voltage sag transformation from up- |

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| | | | | <p>stream (higher voltages) to down-stream (lower voltage)</p> <p>CO3: Concept of improving the power quality to sensitive load by various mitigating custom power devices</p> <p>CO5: Choose proper controller for the specific application based on system requirements</p> <p>CO6: Understand various systems thoroughly and their requirements</p> <p>CO7: Understand the control circuits of Shunt Controllers SVC & STATCOM for various functions viz. Transient stability Enhancement, voltage instability prevention and power oscillation damping</p> <p>CO8: Understand the Power and control circuits of Series Controllers GCSC, TSSC and TCSC</p> |
| 2 | | CONTROL SYSTEMS DESIGN (PE – V) | EE812PE: | <p>CO1: Understand various design specifications.</p> <p>CO2: Design controllers to satisfy the desired design specifications using simple controller structures(P, PI, PID, compensators).</p> <p>CO3: Design controllers using the state-space approach.</p> |
| 3 | | SMART GRID TECHNOLOGIES (PE – VI) | EE821PE | <p>CO1:Understand the features of small grid in the context of Indian grid.</p> <p>CO2: Understand the role of automation in transmission and distribution.</p> <p>CO3: Apply evolutionary algorithms for smart grid.</p> <p>CO4:Understand operation and maintenance of PMUs, PDCs, WAMs, and voltage and frequency control in micro grid</p> |

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| PROGRAM: B.Tech BRANCH: EEE (ELECTRICAL & ELECTRONICS ENGINEERING) | | | YEAR:2022-26 REGULATION:R22 | SEMESTER 2-1 |
|---|----------|-------------|---|---|
| S.NO | YEAR/SEM | COURSE CODE | COURSE TITLE | COURSE OUTCOME |
| 1. | 2-1 | MA301 BS | Numerical Methods and Complex Variables | <p>Course outcomes: After learning the contents of this paper the student must be able to</p> <ul style="list-style-type: none"> • Express any periodic function in terms of sine and cosine • Find the root of a given polynomial and transcendental equations. • Estimate the value for the given data using interpolation • Find the numerical solutions for a given first order ODE's • Analyze the complex function with reference to their analyticity, integration using Cauchy's integral and residue theorems • Taylor's and Laurent's series expansions in complex function |
| 1. | 2-1 | EE302P C | Electrical Machines-I | <p>Course Outcomes: After learning the contents of this paper the student must be able to</p> <ul style="list-style-type: none"> • Identify different parts of a DC machines & understand their operation. • Carry out different excitation, starting, speed control methods and testing of DC machines. • Analyze single & three phase transformers and their performance through testing. |
| 2. | 2-1 | EE303P C | Power System-I | <p>Course Objectives:</p> <ul style="list-style-type: none"> • To understand the power generation through conventional and non-conventional sources. • To illustrate the economic aspects of power generation and tariff methods. • To know about overhead line insulators, substations and AC & DC distribution systems.. |
| 3. | 2-1 | EE304P C | Analog Electronic Circuits | <p>Course Outcomes: At the end of this course, students will be able to</p> <ul style="list-style-type: none"> • Know the characteristics, utilization of various components. • Understand the biasing techniques • Design and analyze various rectifiers, small signal amplifier circuits. • Design sinusoidal and non-sinusoidal oscillators. • Designs OP-AMP based circuits with linear integrated circuits. |

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| | | | | <ul style="list-style-type: none"> Analyze time varying electric and magnetic fields. Understand the propagation of EM waves. |
| 5. | 2-1 | EE306 PC | Electrical Machines Laboratory-I | <p>Course Outcomes: After learning the contents of this paper the student must be able to</p> <ul style="list-style-type: none"> Start and control the Different DC Machines. Assess the performance of different machines using different testing methods Evaluate the performance of different Transformers using different testing methods |
| 6. | 2-1 | EE307 PC | Analog Electronic Circuits Laboratory | <p>Course Outcomes: At the end of this course, students will demonstrate the ability to</p> <ul style="list-style-type: none"> Know the characteristics, utilization of various components. <ul style="list-style-type: none"> Understand the biasing techniques Design and analyze various rectifiers, small signal amplifier circuits. Design sinusoidal and non-sinusoidal oscillators. Design OP-AMP based circuits with linear integrated circuits. |
| 7. | 2-1 | EE308 PC | Electrical Simulation tools Laboratory | <p>Course Outcomes: After learning the contents of this paper the student must be able to</p> <ul style="list-style-type: none"> Develop knowledge of software packages to model and program electrical and electronics systems. Model different electrical and electronic systems and analyze the results. Articulate importance of software packages used for simulation in laboratory experimentation by analyzing the simulation results. |
| 8. | 2-1 | MC30 9 | Gender Sensitization Laboratory | <ul style="list-style-type: none"> Students will have developed a better understanding of important issues related to gender in contemporary India. Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film. Students will attain a finer grasp of how gender discrimination works in our society and how to counter it. Students will acquire insight into the gendered division of labor and its relation to politics and economics. Men and women students and professionals will be better equipped to work and live together as equals. Students will develop a sense of appreciation of women in all walks of life. Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the textbook will empower students to understand and respond to gender violence. |

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| 1. | 2-2 | EE401 PC | Solid Mechanics & Hydraulic Machines | <p>Course Outcomes: After learning the contents of this paper the student must be able to</p> <ul style="list-style-type: none"> • Solve problems dealing with forces, beam and cable problems and understand distributed force systems. • Solve friction problems and determine moments of Inertia and centroid of practical shapes. • Apply knowledge of mechanics in addressing problems in hydraulic machinery and its principles that will be utilized in Hydropower development and for other practical usages. |
| 2. | 2-2 | EE402 PC | Measurements and Instrumentation | <p>Course Outcomes: After learning the contents of this paper the student must be able to</p> <ul style="list-style-type: none"> • Understand different types of measuring instruments, their construction, operation and characteristics and identify the instruments suitable for typical measurements. • Apply the knowledge about transducers and instrument transformers to use them effectively. • Apply the knowledge of smart and digital metering for industrial applications. |
| 3. | 2-2 | EE403 PC | Electrical Machines-II | <p>Course Outcomes: After learning the contents of this paper the student must be able to</p> <ul style="list-style-type: none"> • Understand the concepts of rotating magnetic fields. • Examine the operation of ac machines. • Analyze performance characteristics of ac machines. |
| 4. | 2-2 | EE404 PC | Digital Electronics | <p>Course Outcomes: After learning the contents of this paper the student must be able to</p> <ul style="list-style-type: none"> • Understand the working of logic families and logic gates. • Design and implement Combinational and Sequential logic circuits. • Implement the given logical problems using programmable logic devices. |
| 5. | 2-2 | EE405 PC | Power System-II | <p>Course Outcomes: After learning the contents of this paper the student must be able to</p> <ul style="list-style-type: none"> • Analyze transmission line performance and Apply load compensation techniques to control reactive power. • Understand the application of per unit quantities in power systems. • Design over voltage protection, insulation coordination and determine the fault currents for symmetrical and unbalanced faults. |
| 6. | 2-2 | EE406 PC | Digital Electronics Laboratory | <p>Course Outcomes: After learning the contents of this paper the student must be able to</p> <ul style="list-style-type: none"> • Understand the working of logic families and logic gates. • Design and implement Combinational and Sequential logic circuits. • Analyze different types of semiconductor memories. |
| 7. | 2-2 | EE407 PC | Measurements and Instrumentation Laboratory | <p>Course Outcomes: After learning the contents of this paper the student must be able to</p> <ul style="list-style-type: none"> • Choose and test any measuring instruments. • Find the accuracy of any instrument by performing experiments. • Calculate the various parameters using different types of measuring instruments. |
| 8. | 2-2 | EE408 | Electrical | Course Outcomes: After learning the contents of this paper the |

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| | | PC | Machines Laboratory-II | <p>student must be able to</p> <ul style="list-style-type: none"> • Assess the performance of different types of AC machines using different testing methods. • Analyze the suitability of AC machines and Transformers for real word applications. • Design the machine models based on the application requirements |
| 9. | 2-2 | MC410 | Constitution of India | <p>Course Outcomes: Students will be able to:</p> <ol style="list-style-type: none"> 1. Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics. 2. Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India. 3. Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution 4. Discuss the passage of the Hindu Code Bill of 1956. |
| 1. | 3-1 | EE501 PC | Power Electronics | <p>Course Outcomes: At the end of this course, students will be able to:</p> <ul style="list-style-type: none"> • Understand the differences between signal level and power level devices. • Analyze controlled rectifier circuits. • Analyze the operation of DC-DC choppers and voltage source inverters. |
| 2. | 3-1 | EE502 PC | Control System | <p>Course Outcomes: At the end of this course, students will be able to:</p> <ul style="list-style-type: none"> • Find the transfer function and state-space representation of linear time-invariant dynamical systems. • Analyze the performance and stability of linear time-invariant systems in both time and frequency domains. • Design classical controllers/compensators to improve the performance and stability of linear time-invariant systems. |
| 3. | 3-1 | EE503 PC | Microprocessors & Microcontrollers | <p>Course Outcomes: At the end of this course, students will be able to:</p> <ul style="list-style-type: none"> • Understand the internal architecture and organization of 8086, 8051 and ARM processors/controllers. • Understand the interfacing techniques to 8086 and 8051 • Develop assembly language programming to design microprocessor/ micro controller-based systems. |
| 4. | 3-1 | | Professional Elective-I | <p>Course Outcomes: At the end of this course, students will be able to:</p> <ul style="list-style-type: none"> • To get exposed to recent trends in few applications of IoT in Electrical Engineering • To understand about usage of various types of motionless sensors and motion detectors • To get exposed to various applications of IoT in smart grid • To get exposed to future working environment with Energy internet <p>EE512PE: HIGH VOLTAGE ENGINEERING</p> <p>Course outcomes: At the end of this course, students will be able to:</p> <ul style="list-style-type: none"> • Understand the basic physics related to various breakdown |

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| | | | | <p>processes in solid, liquid and gaseous insulating materials, generation and measurement of D. C., A.C., & Impulse voltages. • Knowledge of tests on H. V. equipment and on insulating materials, as per the standards.</p> <ul style="list-style-type: none"> • Knowledge of how over-voltages arise in a power system, and protection against these overvoltages. <hr/> <p>EE513PE: COMPUTER AIDED ELECTRICAL MACHINE DESIGN</p> <p>Course Outcomes: At the end of this course, students will be able to:</p> <ul style="list-style-type: none"> • Understand the construction and performance characteristics of electrical machines. • Understand the various factors which influence the design: electrical, magnetic and thermal loading of electrical machines • Understand the principles of electrical machine design and carry out a basic design of an ac machine using software tools. |
| 5. | 3-1 | SM50 4MS | Business Economics and Financial Analysis | Course Outcome: The students will understand the various Forms of Business and the impact of economic variables on the Business. The Demand, Supply, Production, Cost, Market Structure, Pricing aspects are learnt. The Students can study the firm's financial position by analysing the Financial Statements of a Company. |
| 6. | 3-1 | EE505 PC | Microprocessors & Microcontrollers Laboratory | Course Outcomes: At the end of this course, students will be able to: <ul style="list-style-type: none"> • Understands the internal architecture and organization of 8086, 8051 and ARM processors/controllers. • Understands the interfacing techniques to 8086 and 8051 and can develop assembly language programming to design microprocessor/ micro controller-based systems. • Develop programs for interfacing various external devices |
| 7. | 3-1 | EE506 PC | Power Electronics Laboratory | Course Outcomes: At the end of this course, students will be able to: <ul style="list-style-type: none"> • Understand the operating principles of various power electronic converters. • Use power electronic simulation packages& hardware to develop the power converters. • Analyse and choose the appropriate converters for various applications |
| 8. | 3-1 | EN508 HS | Advanced English Communication Skills Laboratory | Course Outcomes: At the end of the course the student will be able to: <ul style="list-style-type: none"> • Understand the fundamentals of Electric Vehicles. • Design of batteries, EV motors and Power electronic controllers for EV systems. • Analyze the economics of EV market and EV data using Analytical tools |
| 9. | 3-1 | MC51 0 | Intellectual Property Rights | Course Outcomes: <ul style="list-style-type: none"> • Distinguish and Explain various forms of IPRs. • Identify criteria to fit one's own intellectual work in particular form of IPRs. • Apply statutory provisions to protect particular form of IPRs. • Appraise new developments in IPR laws at national and international level |
| 1. | 3-2 | EE611 OE | Open Elective-I | Course Outcomes: At the end of the course the student will be able to: <ul style="list-style-type: none"> • Understand the principles of wind power and solar |

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| | | | | <p>photovoltaic power generation, fuel cells.</p> <ul style="list-style-type: none"> • Assess the cost of generation for conventional and renewable energy plants • Design suitable power controller for wind and solar applications and analyze the issues involved in the integration of renewable energy sources to the grid |
| | | EE612 OE | OE-I | <p>Course Outcomes: At the end of the course the student will be able to:</p> <ul style="list-style-type: none"> • Understand the fundamentals of Electric Vehicles. • Design of batteries, EV motors and Power electronic controllers for EV systems. • Analyze the economics of EV market and EV data using Analytical tools. |
| 3. | 3-2 | EE601 PC | Digital Signal Processing | <p>Course Outcomes: At the end of this course, students will be able to:</p> <ul style="list-style-type: none"> • Demonstrate proficiency in performing time, frequency, and Z-transform analysis on signals and systems. • Understand the inter-relationship between DFT and various transforms, appreciate the significance of filter structures, and recognize the effects of round-off errors in the design. • Apply knowledge to design digital filters, comprehend fast computation methods such as FFT, and understand trade-offs between normal and multi-rate DSP techniques, including finite length word effects. |
| 4. | 3-2 | EE602 PC | Power System Protection | <p>Course Outcomes: At the end of the course the student will be able to:</p> <ul style="list-style-type: none"> • Compare and contrast electromagnetic, static and microprocessor-based relays • Apply technology to protect power system components. • Analyze quenching mechanisms used in air, oil and vacuum circuit breakers |
| 5. | 3-2 | EE603 PC | Power System Operation and Control | <p>Course Outcomes: At the end of the course the student will be able to:</p> <ul style="list-style-type: none"> • Understand operation and control of power systems. • Analyze various functions of EMS functions and stability of machines. • Understand power system deregulation and restructuring |
| 6. | 3-2 | EE604 PC | Power System Laboratory | <p>Course Outcomes: At the end of this course, students will be able to</p> <ul style="list-style-type: none"> • Perform various load flow techniques • Understand Different protection methods • Analyse the experimental data and draw the conclusions. |
| 7. | 3-2 | EE605 PC | Control Systems Laboratory | <p>Course Outcomes: At the end of this course, students will be able to:</p> <ul style="list-style-type: none"> • Improve system performance by skillfully selecting appropriate controllers and compensators tailored to specific applications. • Apply diverse time domain and frequency domain techniques to effectively assess and enhance system performance. • Demonstrate the application of various control strategies to different systems such as power systems and electrical drives, showcasing adaptability and versatility in control applications |
| 8. | 3-2 | EE606 PC | Digital Signal Processing Lab | <p>Course Outcomes: At the end of this course, students will be able to:</p> <ul style="list-style-type: none"> • Carry out simulation of DSP system and abilities towards DSP |

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| | | | | <p>processor-based implementation of DSP systems.</p> <ul style="list-style-type: none"> Analyze Finite word length effect on DSP systems and applications of FFT to DSP. Implement adaptive filters for various applications of DSP. |
| 9. | 3-2 | EE607 PC | Industry Oriented Mini Project/ Internship | <p>Understand the construction and performance characteristics of electrical machines.</p> <ul style="list-style-type: none"> Understand the various factors which influence the design: electrical, magnetic and thermal loading of electrical machines Understand the principles of electrical machine design and carry out a basic design of an ac machine using software tools. |
| 10. | 3-2 | MC60 9 | Environmental Science | Course Outcomes: Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn helps in sustainable development |
| 1. | 4-1 | EE701 PC | Power Electronic Applications to Renewable Energy Systems | <p>Course Outcomes: At the end of this course, students will be able to:</p> <ul style="list-style-type: none"> Proficiently demonstrate various renewable energy technologies utilized for electrical power generation. Analyze the operating principles of different types of wind generators and identify suitable converters (AC-DC, DC-DC, AC-AC) for renewable energy systems. Interpret and analyze various wind and photovoltaic (PV) systems, including stand-alone, gridconnected, and hybrid configurations, showcasing a comprehensive understanding of renewable energy applications. |
| 2. | 4-1 | EE721 OE | Open Elective-II | <p>Course Outcomes: At the end of the course the student will be able to:</p> <ul style="list-style-type: none"> Understand basic principles of electric heating and welding. Determine the lighting requirements for flood lighting, household and industrial needs. Calculate heat developed in induction furnace and evaluate speed time curves for traction |
| 3. | 4-1 | EE722 OE | ENERGY STORAGE SYSTEMS(OE) | <p>Course Outcomes: At the end of this course, students will be able to:</p> <ul style="list-style-type: none"> Understand the role of electrical energy storage technologies in electricity usage Know the behavior and features and applications of energy storage system Understand the hierarchy, demand for energy storage and valuation techniques. |
| 4. | 4-1 | EE702 PC | Fundamentals of Management for Engineers | Course Outcome: The students understand the significance of Management in their Profession. The various Management Functions like Planning, Organizing, Staffing, Leading, Motivation and Control aspects are learnt in this course. The students can explore the Management Practices in their domain area. |
| 5. | 4-1 | EE703 PC | Simulation of Renewable Energy Systems Laboratory | <p>Course Outcomes: At the end of this course, students will be able to:</p> <ul style="list-style-type: none"> Demonstrate the ability to model and analyze the steady-state and dynamic characteristics of PV, fuel cell, and wind energy sources. Apply knowledge to understand, design, and analyze power converter topologies for both stand-alone and grid-connected PV, fuel cell, and wind energy systems. |

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| | | | | • Acquire advanced expertise in power electronics, covering topics such as maximum power point tracking, power factor correction, switched capacitor converters, ZVS/ZCS configurations, compensation schemes, and new power converter topologies. |
| 1. | 4-2 | EE831 OE | Open Elective-III | <p style="text-align: center;">Course Outcomes:</p> <p>: At the end of this course, students will be able to:</p> <ul style="list-style-type: none"> • Understand the various components of Electric vehicle charging system • Comprehend the different types of Electric vehicle chargers and their standards • Interpret the various communication protocols and recent trends in Electric vehicle charging |
| 2. | | EE832 OE | RELIABILITY ENGINEERING (Open Elective - III.2) | <p>Course Outcomes: At the end of this course, students will be able to:</p> <ul style="list-style-type: none"> • model various systems applying reliability networks and evaluation of the same • estimate the limiting state probabilities of repairable systems • apply various mathematical models for evaluating reliability of irreparable systems <p>Course Outcomes: At the end of this course, students will be able to:</p> <ul style="list-style-type: none"> • model various systems applying reliability networks and evaluation of the same • estimate the limiting state probabilities of repairable systems • apply various mathematical models for evaluating reliability of irreparable systems |


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2.6.1. Programme Outcomes (POs) and Couse Outcomes (Cos) for all Programmes offered by the institution are stated and displayed on website and attainment of POs and COs are evaluated.

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| Program: B.Tech. Branch: Civil | Academic Year :2023-2024 Regulation:R18 | Semester:1 |
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| S.No | Year/Sem | CourseName | Course Code | CourseOutOutcome |
|------|----------|---------------------------|-------------|---|
| 1 | II/I | Surveying and Geomatics | CE301PC | <p>CO1: Apply the knowledge to calculate angles, distances and levels</p> <p>CO2: Identify data collection methods and prepare field notes</p> <p>CO3: Understand the working principles of survey instruments, measurement errors and corrective measures</p> <p>CO4: Interpret survey data and compute areas and volumes, levels by different type of equipmentand relate the knowledge to the modern equipment and methodologies</p> |
| 2 | II/I | Engineering Geology | CE302PC | <p>CO1: Site characterization and how to collect, analyze, and report geologic data using standards inengineering practice</p> <p>CO2:The fundamentals of the engineering properties of Earth materials and fluids.</p> <p>CO3:Rock mass characterization and the mechanics of planar rock slides and topples</p> |
| 3 | II/I | Strength of Materials - I | CE303PC | CO1: Describe the concepts and principles, understand the theory of elasticity including strain/displacement and Hooke's |

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| | | | | <p>law relationships; and perform calculations, related to the strength of structured and mechanical components.</p> <p>CO2: Recognize various types loads applied on structural components of simple framing geometries and understand the nature of internal stresses that will develop within the components.</p> <p>CO3: To evaluate the strains and deformation that will result due to the elastic stresses developed within the materials for simple types of loading</p> <p>CO4: Analyze various situations involving structural members subjected to plane stresses by application of Mohr's circle of stress;</p> <p>CO5: Frame an idea to design a system, component, or process</p> |
| 4 | II/I | Probability and Statistics | MA304BS | <p>CO1: Formulate and solve problems involving random variables and apply statistical methods for analysing experimental data.</p> |
| 5 | II/I | Fluid Mechanics | CE305PC | <p>CO1: Understand the broad principles of fluid statics, kinematics and dynamics Understand definitions of the basic terms used in fluid mechanics and characteristics of fluids and its flow</p> <p>CO2: Understand classifications of fluid flow</p> <p>CO3: Be able to apply the continuity, momentum and energy principles</p> |

| S.No | Year/Sem | CourseName | CourseCode | CourseOutCome |
|------|----------|--|------------|--|
| 1 | II/II | Basic Electrical and Electronics Engineering | EE401ES | <p>CO1: To analyze and solve electrical circuits using network laws and theorems.</p> <p>CO2: To understand and analyze basic Electric and Magnetic circuits</p> <p>CO2:To study the working principles of Electrical Machines</p> <p>CO3: To introduce components of Low Voltage Electrical Installations</p> <p>CO4: To identify and characterize diodes and various types of transistors.</p> |
| 2 | II/II | Basic Mechanical Engineering for Civil Engineers | CE402ES | <p>CO1: To understand the mechanical equipment for the usage at civil engineering systems,</p> <p>CO2: To familiarize with the general principles and requirement for refrigeration, manufacturing,</p> <p>CO3: To realize the techniques employed to construct civil engineering systems.</p> |
| 3 | II/II | Building Materials, Construction and Planning | CE403PC | <p>CO1: Define the Basic terminology that is used in the industry</p> <p>CO2: Categorize different building materials, properties and their uses</p> <p>CO3: Understand the Prevention of damage measures and good workmanship</p> <p>CO4: Explain different building services</p> |
| 4 | II/II | Strength of Materials - II | CE404PC | <p>CO1: Describe the concepts and principles, understand the theory of elasticity, and perform calculations, relative to the strength of structures and mechanical components in particular to torsion and direct compression;</p> <p>CO2: To evaluate the strains and deformation that will result due to the elastic stresses developed</p> |


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| | | | | within the materials for simple types of loading CO3: Analyze strength and stability of structural members subjected to Direct, and Direct and Bending stresses; CO4: Understand and evaluate the shear center and unsymmetrical bending. CO5: Frame an idea to design a system, component, or process |
| 5 | II/II | Hydraulics and Hydraulic Machinery | CE405 PC | CO1: Apply their knowledge of fluid mechanics in addressing problems in open channels and hydraulic machinery. CO2: Understand and solve problems in uniform, gradually and rapidly varied flows in open channel in steady state conditions. CO3: Apply dimensional analysis and to differentiate the model, prototype and similitude conditions for practical problems. CO4: Get the knowledge on different hydraulic machinery devices and its principles that will be utilized in hydropower development and for other practical usages |
| 6 | II/II | Structural Analysis - I | CE406PC | CO1: An ability to apply knowledge of mathematics, science, and engineering CO2: Analyse the statically indeterminate bars and continuous beams CO3: Draw strength behaviour of members for static and dynamic loading. CO4: Calculate the stiffness parameters in beams and pin jointed trusses. CO5: Understand the indeterminacy aspects to consider for a total structural system. |

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| | | | | <input type="checkbox"/> Identify, formulate, and solve engineering problems with real time loading |
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| S.No | Year/Sem | CourseName | CourseCode | Course Outcome |
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| 1 | III/I | Structural Analysis-II | CE501 | <p>CO1: Analyze the two hinged arches.</p> <p>CO2: Solve statically indeterminate beams and portal frames using classical methods</p> <p>CO3: Sketch the shear force and bending moment diagrams for indeterminate structures.</p> <p>CO4: Formulate the stiffness matrix and analyze the beams by matrix methods</p> |
| 2 | III/I | Geotechnical Engineering | CE502PC | <p>CO1: Characterize and classify the soils</p> <p>CO2: Able to estimate seepage, stresses under various loading conditions and compaction characteristics</p> <p>CO3: Able to analyse the compressibility of the soils</p> <p>CO4: Able to understand the strength of soils under various drainage conditions</p> |
| 3 | III/I | Structural Engineering -I (RCC) | CE503PC | <p>CO1: Compare and Design the singly reinforced, doubly reinforced and flanged sections.</p> <p>CO2: Design the axially loaded, uniaxial and biaxial bending columns.</p> <p>CO3: Classify the footings and Design the isolated square, rectangular and circular footings</p> <p>CO4: Distinguish and Design the one-way and two-way slabs.</p> |
| 4 | III/I | Transportation Engineering | CE504PC | CO1: An ability to apply the |

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| | | | | <p>knowledge of mathematics, science and engineering in the areas of traffic engineering, highway development and maintenance</p> <p>CO2: An ability to design, conduct experiments to assess the suitability of the highway materials like soil, bitumen, aggregates and a variety of bituminous mixtures. Also the students will develop the ability to interpret the results and assess the suitability of these materials for construction of highways.</p> <p>CO3: An ability to design flexible and rigid highway pavements for varying traffic compositions as well as soil subgrade and environmental conditions using the standards stipulated by Indian Roads Congress.</p> <p>CO4: An ability to evaluate the structural and functional conditions of in-service highway pavements and provide solution in the form of routine maintenance measures or designed overlays using Indian Roads congress guidelines.</p> <p>CO5: An ability to assess the issues related to road traffic and provide engineering solutions supported with an understanding of road user psychological and behavioural patterns.</p> |
| 5 | III/I | Concrete Technology Professional Elective-I | CE511PE | <p>CO1: Determine the properties of concrete ingredients i.e. cement, sand, coarse aggregate by conducting different tests. Recognize the effects of the rheology and early age properties</p> <p style="text-align: right;"><i>lhrw</i></p> |

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| | | | | <p>of concrete on its long-term behavior.</p> <p>CO2: Apply the use of various chemical admixtures and mineral additives to design cement-based materials with tailor-made properties</p> <p>CO3: Use advanced laboratory techniques to characterize cement-based materials.</p> <p>CO4: Perform mix design and engineering properties of special concretes such as high-performance concrete, self-compacting concrete, and fibre reinforced concrete.</p> |
| 6 | III/I | Engineering Economics and Accountancy | SM505 MS | <p>CO1: To perform and evaluate present and future worth of the alternate projects and to appraise projects by using traditional and DCF Methods. To carry out cost benefit analysis of projects and to calculate BEP of different alternative projects.</p> |

| S.No | Year/Sem | CourseName | CourseCode | CourseOutcome |
|------|----------|---|------------|---|
| 1 | III/II | Hydrology & Water Resources Engineering | CE601PC | <p>CO1: Understand the different concepts and terms used in engineering hydrology</p> <p>CO2: To identify and explain various formulae used in estimation of surface and Ground waterhydrology components</p> <p>CO3: Demonstrate their knowledge to connect hydrology to the field requirement</p> |

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| 2 | III/II | Environmental Engineering | CE602PC | CO1: Assess characteristics of water and wastewater and their impacts CO2: Estimate quantities of water and waste water and plan conveyance components CO3: Design components of water and waste water treatment plants CO4: Be conversant with issues of air pollution and control |
| 3 | III/II | Foundation Engineering | CE603PC | CO1: understand the principles and methods of Geotechnical Exploration CO2: decide the suitability of soils and check the stability of slopes CO3: calculate lateral earth pressures and check the stability of retaining walls CO4: analyse and design the shallow and deep foundations |
| 4 | III/II | Structural Engineering -II (Steel) | CE604PC | CO1: Analyze the tension members, compression members. CO2: Design the tension members, compression members and column bases and joints and connections CO3: Analyze and Design the beams including built-up sections and beam and connections. CO4: Identify and Design the various components of welded plate girder including stiffeners |
| 5 | III/II | Prestressed Concrete Professional Elective -II | CE611PE | CO1: Acquire the knowledge of evolution of process of prestressing. CO2: Acquire the knowledge of various prestressing techniques. CO3: Develop skills in analysis design of prestressed structural elements as per the IS codal provisions |
| 6 | III/II | Elements of | CE612PE | CO1: Explain and derive fundamental |

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| | | Earthquake Engineering | | equations in structural dynamics CO2: Discuss and explain causes and Theories on earthquake, seismic waves, measurement of earthquakes CO3: Evaluate base shear using IS methods CO4: Design and Detail the reinforcement for earthquake forces |
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| S.No | Year/Sem | CourseName | CourseCode | CourseOutcome |
|------|----------|--|------------|---|
| 1 | IV/I | Estimation, Costing and Project Management | CE701PC | <p>CO1: understand the technical specifications for various works to be performed for a project and how they impact the cost of a structure.</p> <p>CO2: quantify the worth of a structure by evaluating quantities of constituents, derive their costs and build up the overall cost of the structure.</p> <p>CO3: understand how competitive bidding works and how to submit a competitive bid proposal.</p> <p>CO4: An idea of how to optimize construction projects based on costs</p> <p>CO5: An idea how construction projects are administered with respect to contract structures and issues.</p> <p>CO6: An ability to put forward ideas and understandings to others with effective communication processes</p> |
| 2 | IV/I | Remote | | CO1: Describe different concepts and |

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| | | Sensing & GIS Professional Elective -III | CE711PE | terms used in Remote Sensing and its data CO2: Understand the Data conversion and Process in different coordinate systems of GIS interface CO3: Evaluate the accuracy of Data and implementing a GIS CO4: Understand the applicability of RS and GIS for various applications. |
| 3 | IV/I | Irrigation Hydralic Structures Professional Elective -IV | CE721PE | CO1: Know types of water retaining structures for multiple purposes and its key parameters considered for planning and designing CO2: Understand details in any Irrigation System and its requirements CO3: Know, Analyze and Design of a irrigation system components |
| 4 | IV/I | Ground Water Hydrology Open Elective - II | CE723PE | CO1: Identify different fundamental equations and concepts as applied in the Groundwater studies CO2: Discuss and derive differential equation governing groundwater flow in three dimensions CO3: To solve groundwater mathematical equations and analyze pumping tests in steady and non-steady flow cases CO4: Distinguish and understand the saline water intrusion problem in costal aquifers |
| 5 | IV/I | Professional Practice, Law & Ethics | SM702MS | CO1: understand the importance of professional practice, Law and Ethics in their personal lives and professional careers. The students will learn the rights and responsibilities as an employee, team member and a global citizen. |

| S.No | Year/Sem | CourseName | CourseCode | CourseOutcome |
|------|----------|---|------------|---|
| 1 | IV/II | Solid Water Management Professional Elective -V | CE811PE | <p>CO1: Identify the physical and chemical composition of solid wastes</p> <p>CO2: Analyze the functional elements for solid waste management.</p> <p>CO3: Understand the techniques and methods used in transformation, conservation, and recovery of materials from solid wastes.</p> <p>CO4: Identify and design waste disposal systems</p> |
| 2 | IV/II | Air port,Railways and Waterways Professional Elective –VI | CE821PE | <p>CO1: An ability to design of runways and taxiways.</p> <p>CO2: An ability to design the infrastructure for large and small airports</p> <p>CO3: An ability to design various crossings and signals in Railway Projects.</p> <p>CO4: An ability plan the harbors and ports projects including the infrastructure required for newports and harbors.</p> |
| 3 | IV/II | Finite Element Method For Civil Engineering Open Elective – III | CE823PE | <p>CO1: At the end of the course the student will able to Anslyse simple structral elements using Finite Element approach</p> |


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2.6.1. Programme Outcomes (POs) and Course Outcomes (COs) for all Programmes offered by the institution are stated and displayed on website and attainment of POs and COs are evaluated.

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| Program: B.Tech. Branch: MECH | Academic Year :2023-2024 Regulation:R18 | Semester:1 |
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| S.No | Year/Sem | Course Name | Course Code | Course Outcome |
|------|----------|--|-------------|---|
| 1 | II/I | Probability and Statistics & Complex Variables | MA301BS | <p>CO1: Formulate and solve problems involving random variables and apply statistical methods for analysing experimental data.</p> <p>CO2: Analyse the complex function with reference to their analyticity, integration using Cauchy's integral and residue theorems.</p> <p>CO3: Taylor's and Laurent's series expansions of complex function.</p> |
| 2 | II/I | Mechanics of Solids | ME302PC | <p>CO1: Analyze the behavior of the solid bodies subjected to various types of loading;</p> <p>CO2: Apply knowledge of materials and structural elements to the analysis of simple structures;</p> <p>CO3: Undertake problem identification, formulation and solution using a range of analytical methods;</p> <p>CO4: Analyze and interpret laboratory data relating to behavior of structures and the materials they are made of, and undertake associated laboratory work individually</p> |

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| | | | | <p>and in teams.</p> <p>CO5: Expectation and capacity to undertake lifelong learning</p> |
| 3 | II/I | Material Science and Metallurgy | ME303PC | <p>CO1: Understand good knowledge about materials</p> |
| 4 | II/I | Production Technology | ME304PC | <p>CO1: Understand the idea for selecting materials for patterns.</p> <p>CO2: Know Types and allowances of patterns used in casting and analyze the components of moulds.</p> <p>CO3: Design core, core print and gating system in metal casting processes</p> <p>CO4: Understand the arc, gas, solid state and resistance welding processes.</p> <p>CO5: Develop process-maps for metal forming processes using plasticity principles.</p> <p>CO6: Identify the effect of process variables to manufacture defect free products.</p> |
| 5 | II/I | Thermodynamics | ME305PC | <p>CO1: To Understand and differentiate between different thermodynamic systems and processes.</p> <p>CO2: Understand and apply the laws of Thermodynamics to different types of systems undergoing various processes and to perform thermodynamic analysis.</p> <p>CO3: Understand and analyze the Thermodynamic cycles and evaluate performance parameters.</p> |


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 Principal
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| S.No | Year/Sem | Course Name | Course Code | Course Outcome |
|------|----------|--|-------------|---|
| 1 | II/II | Basic Electrical and Electronics Engineering | EE401ES | <p>CO1: To analyze and solve electrical circuits using network laws and theorems.</p> <p>CO2: To understand and analyze basic Electric and Magnetic circuits</p> <p>CO3: To study the working principles of Electrical Machines</p> <p>CO4: To introduce components of Low Voltage Electrical Installations</p> <p>CO5: To identify and characterize diodes and various types of transistors.</p> |
| 2 | II/II | Kinematics of Machinery | ME402PC | CO1: To give an idea about the relative motions obtained in all the above type of components used in mechanical Engineering |
| 3 | II/II | Thermal Engineering - I | ME403PC | <p>CO1: To evaluate the performance of IC engines and compressors under the given operating conditions. Apply the laws of Thermodynamics to evaluate the performance of Refrigeration and air-conditioning cycles.</p> <p>CO2: Understand the functionality of the major components of the IC Engines and effects of operating conditions on their performance</p> |
| 4 | II/II | Fluid Mechanics and Hydraulic Machines | ME404PC | CO1: Able to explain the effect of fluid properties on a flow system. |

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| | | | | <p>CO2: Able to identify type of fluid flow patterns and describe continuity equation.</p> <p>CO3: To analyze a variety of practical fluid flow and measuring devices and utilize Fluid Mechanics principles in design.</p> <p>CO4: To select and analyze an appropriate turbine with reference to given situation in power plants.</p> <p>CO5: To estimate performance parameters of a given Centrifugal and Reciprocating pump.</p> <p>CO6: Able to demonstrate boundary layer concepts.</p> |
| 5 | II/II | Instrumentation and Control Systems | ME405PC | <p>CO1: To identify various elements and their purpose in typical instruments, to identify various errors that would occur in instruments.</p> <p>CO2: Analysis of errors so as to determine correction factors for each instrument.</p> <p>CO3: To understand static and dynamic characteristics of instrument and should be able to determine loading response time.</p> <p>CO4: For given range of displacement should be able to specify transducer, its accurate and loading time of that transducer.</p> |

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| S.No | Year/Sem | CourseName | CourseCode | CourseOutcome |
|------|----------|-----------------------------|------------|--|
| 1 | III/I | Dynamics of Machinery | ME501PC | CO1: the study of KOM & DOM are necessary to have an idea while designing the various machine members like shafts, bearings, gears, belts & chains and various I.C. Engine Components & Machine tool parts. |
| 2 | III/I | Design of Machine Members-I | ME502PC | CO1: The student acquires the knowledge about the principles of design, material selection, component behavior subjected to loads, and criteria of failure. CO2: Understands the concepts of principal stresses, stress concentration in machine members and fatigue loading. CO3: Design on the basis of strength and rigidity and analyze the stresses and strains induced in a machine element. |
| 3 | III/I | Metrology & Machine Tools | ME503PC | CO1: Identify techniques to minimize the errors in measurement. CO2: Identify methods and devices for measurement of length, angle, gear & thread parameters, surface roughness and geometric features of parts. CO3: Understand working of lathe, shaper, planer, drilling, milling and grinding machines. |

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| | | | | CO4: Comprehend speed and feed mechanisms of machine tools. CO5: Estimate machining times for machining operations on machine tools |
| 4 | III/I | Business Economics & Financial Analysis | SM504MS | CO1: understand the various Forms of Business and the impact of economic variables on the Business. The Demand, Supply, Production, Cost, Market Structure, Pricing aspects are learnt. The Students can study the firm's financial position by analysing the Financial Statements of a Company. |
| 5 | III/I | Thermal Engineering-II | ME505PC | CO1: Develop state – space diagrams based on the schematic diagrams of process flow of steam and gas turbine plants CO2: Apply the laws of Thermodynamics to analyze thermodynamic cycles CO3: Differentiate between vapour power cycles and gas power cycles CO4: Infer from property charts and tables and to apply the data for the evaluation of performance parameters of the steam and gas turbine plants CO5: Understand the functionality of major components of steam and |

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| | | | | gas turbine plants and to do the analysis of these components |
| 6 | III/I | Operations Research | ME506PC | CO1: Understanding the problem, identifying variables & constants, Formulation of optimization model and applying appropriate optimization technique |

| S.No | Year/Sem | CourseName | CourseCode | CourseOutcome |
|------|----------|------------------------------|------------|---|
| 1 | III/II | Design of Machine Members-II | ME601PC | <p>CO1: Knowledge about journal bearing design using different empirical relations.</p> <p>CO2: Estimation of life of rolling element bearings and their selection for given service conditions.</p> <p>CO3: Acquaintance with design of the components as per the standard, recommended procedures which is essential in design and development of machinery in industry.</p> |
| 2 | III/II | Heat Transfer | ME602PC | <p>CO1: Understand the basic modes of heat transfer</p> <p>CO2: Compute one dimensional steady state heat transfer with and without heat generation</p> <p>CO3: Understand and analyze heat transfer through extended surfaces</p> <p>CO4: Understand one dimensional transient conduction heat transfer</p> <p>CO5: Understand concepts of continuity, momentum and energy equations</p> |

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| | | | | CO6: Interpret and analyze forced and free convective heat transfer CO7: Understand the principles of boiling, condensation and radiation heat transfer CO8: Design of heat exchangers using LMTD and NTU methods |
| 3 | III/II | CAD & CAM | ME603PC | CO1: Understand geometric transformation techniques in CAD. Develop mathematical models to represent curves and surfaces. Model engineering components using solid modeling techniques. Develop programs for CNC to manufacture industrial components. To understand the application of computers in various aspects of Manufacturing viz., Design, Proper planning, Manufacturing cost, Layout & Material Handling system. |
| 4 | III/II | Unconventional Machining Processes Professional Elective - I | ME611PE | CO1: Understand the basic techniques of Unconventional Machining processes modeling CO2: Estimate the material removal rate and cutting force, in an industrially useful manner, for Unconventional Machining processes. |

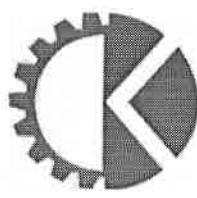
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| 5 | III/II | Production, Planning and Control Open Elective - I | ME613PE | <p>CO1: Able to understand production systems and their characteristics. Evaluate MRP and JIT systems against traditional inventory control systems.</p> <p>CO2: Understand basics of variability and its role in the performance of a production system.</p> <p>CO3: Analyze aggregate planning strategies. Apply forecasting and scheduling techniques to production systems.</p> <p>CO4: Understand theory of constraints for effective management of production systems</p> |
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| S.No | Year/Sem | CourseName | CourseCode | Course Outcome |
|------|----------|--------------------------|------------|---|
| 1 | IV/I | INDUSTRIAL MANAGEMENT | ME701PC | <p>CO1: apply principles of management</p> <p>CO2: design the organization structure</p> <p>CO3: apply techniques for plant location, design plant layout and value analysis</p> <p>CO4: carry out work study to find the best method for doing the work and establish standard time for a given method</p> <p>CO5: apply various quality control techniques and sampling plans</p> <p>CO6: do job evaluation and network analysis.</p> |

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| 2 | IV/I | REFRIGERATION & AIR CONDITIONING | ME702PC | <p>CO1: Differentiate between different types of refrigeration systems with respect to application as well as conventional & unconventional refrigeration systems.</p> <p>CO2: Analyse thermodynamically low temperature refrigeration and Vapour absorption refrigeration for evaluation of performance parameters.</p> <p>CO3: Apply the air refrigeration principles for different types of Air craft refrigeration systems</p> <p>CO4: Elaborate the principles of psychometrics to design the air conditioning heating /cooling loads for industrial applications.</p> <p>CO5: explain the requirement of ventilation air, various sources of infiltration air, ventilation and infiltration as a part of cooling load</p> |
| 3 | IV/I | QUANTITATIVE ANALYSIS FOR BUSINESS DECISIONS | ME721OE | <p>CO1: Understand the origin and application of operations research.</p> <p>CO2: Learn about the Formulation of Linear Programming Problem for different areas.</p> <p>CO3: appreciate the significance of variations of assignment problem, methods for finding Initial feasible solution.</p> <p>CO4: Learn the aspects of Decision Theory and Network Analysis</p> <p>CO5: Gain insights of the theoretical principles and practical applications of different queuing models.</p> |
| 4 | IV/I | INDUSTRIAL ENGINEERING & MANAGEMENT | ME722OE | <p>CO1: Practice the management theories proposed by Taylor, Fayol etc</p> <p>CO2: Consider various factors and identify plant location for given industry</p> <p>CO3: Determine EOQ, classify items and implement P-system and Q-system</p> <p>CO4: Conduct work study (method study+ Work measurement: a) Time study & Work sampling)</p> |

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| | | | | CO5: Practice HRM principles CO6: Analyze the networks by using PERT & CPM |
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| S.No | Year/Sem | CourseName | CourseCode | CourseOutcome |
|------|----------|--|------------|---|
| 1 | IV/II | ENTREPRENEURSHIP DEVELOPMENT | ME831OE | CO1: Identify the factors affecting entrepreneurial growth CO2: Understand various programs supporting entrepreneurship CO3: Write preliminary project report CO4: Estimate the finances for the project CO5: Appraise and avail support rendered by the Government and other Appropriate Agencies |
| 2 | IV/II | ELEMENTS OF ELECTRIC AND HYBRID VEHICLES | ME832OE | CO1: Choose the appropriate source of energy for the hybrid electric vehicle based on driving cycle. CO2: Analyze the power and energy need of the various hybrid electric vehicle and Measure and Estimate the energy consumption of the Hybrid Vehicles CO3: Evaluate energy efficiency of the vehicle for its drive trains CO4: Elaborate the types of storage systems such as battery based, fuel cell based etc. CO5: Explain the types of Driving Cycles, Fuel Cell EV, Solar Powered Vehicles |



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| Program: B.Tech Branch: MECHANICAL ENGINEERING | | | Academic year :2023- 2024 Regulation : R22 | Semester :I |
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| S.No | Year /Sem | Course name | Course Code | Course Outcome |
| 1 | II/I | PROBABILIT Y, STATISTICS & COMPLEX VARIABLES | MA301 BS | <p>CO1: Formulate and solve problems involving random variables and apply statistical methods for analyzing experimental data</p> <p>CO2: Apply concept of estimation and testing of hypothesis to case studies.</p> <p>CO3: Analyze the complex function with reference to their analyticity, integration using Cauchy's integral and residue theorems.</p> <p>CO4: Analyze the complex function with reference to their analyticity, integration using Cauchy's integral and residue theorems.</p> |
| 2 | II/I | MECHANICS OF SOLIDS | ME302P C | <p>CO1: Evaluate the internal forces, moments, stresses, strains, and deformations in structures made of various materials acted on by a variety of loads.</p> <p>CO2: Draw axial force, shear force and bending moment diagrams for beams and frames.</p> <p>CO3: Develop the Bending and Torsion formula and apply to the design of beams and shafts.</p> <p>CO4: Use the stress transformation equations to find the state of stress at a point for various rotated positions of the stress element and display the same in graphical form as Mohr's circle.</p> <p>CO5: Understand the different criteria for the safety of the component by applying the theories of elastic failure.</p> |

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| 3 | II/I | METALLUR GY & MATERIAL SCIENCE | ME303P C | CO1: Memorize the types of Crystal structures and their defects. |
| | | | | CO2: Learn the necessity of alloying and identify types of alloy phases. |
| | | | | CO3: Demonstrate importance of critical understanding of heat treatment in achieving required properties. |
| | | | | CO4: Apply the knowledge of heat treatment to enhance surface properties. |
| | | | | CO5: Analyze the properties and micro structure of ferrous and non-ferrous alloys. |
| | | | | CO6: Develop new materials and enhance properties for the advanced applications. |
| 4 | II/I | PRODUCTION TECHNOLOGY | ME304P C | CO1: Elaborate the fundamentals of various moulding, casting techniques and furnaces. |
| | | | | CO2: Identify the importance of permanent joining and principle behind different welding processes. |
| | | | | CO3: Explain the concepts of solid-state welding processes |
| | | | | CO4: Understand the concepts of rolling and sheet metal operations in metal working. |
| | | | | CO5: Elaborates the uniqueness of extrusion, forging and high energy rate forming processes in metal working. |
| 5 | II/I | THERMODYNAMICS | ME305P C | CO1: Understand the basics of Thermodynamics |
| | | | | CO2: Apply first and second laws of thermodynamics to different systems |
| | | | | CO3: Determine the feasibility of a process w.r.to entropy changes |
| | | | | CO4: Apply concepts of thermodynamic property relations to ideal gas and real gases. |
| | | | | CO5: Evaluate performance of power cycles and refrigeration cycles. |
| 1 | II/II | BASIC | ME401P | CO1: To analyze and solve electrical circuits using network laws and theorems. |

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| | | ELECTRICAL AND ELECTRONI CS ENGINEERI NG | C | CO2: To understand and analyze basic Electric and Magnetic circuits. CO3: To study the working principles of Electrical Machines. CO4: To introduce components of Low Voltage Electrical Installations. CO5: To identify and characterize diodes and various types of transistors. |
| 2 | II/II | KINEMATIC S OF MACHINERY | ME402P C | CO1: Understand the various elements in mechanism and the inversions of commonly used mechanisms such as four bar, slider crank and double slider crank mechanisms. CO2: Draw the velocity and acceleration polygons for a given configuration of a mechanism. CO3: Understand the conditions for straight line motion mechanisms, steering mechanism and the usage of Hooke's joint. CO4: Draw the displacement diagrams and cam profile diagram for followers executing different types of motions and various configurations of followers. CO5: Calculate the number of teeth and velocity ratio required for a given combination of gears. |
| 3 | II/II | FLUID MECHANICS & HYDRAULIC MACHINES | ME403P C | CO1: Able to explain the effect of fluid properties on a flow system. CO2: Able to identify type of fluid flow patterns and describe continuity equation. CO3: To analyze a variety of practical fluid flow and measuring devices and utilize Fluid Mechanics principles in design. CO4: To select and analyze an appropriate turbine with reference to given situation in power plants. CO5: To estimate performance parameters of a given Centrifugal and Reciprocating pump. CO6: Able to demonstrate boundary layer concepts. |

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| 4 | 11/11 | IC ENGINES & GAS TURBINES | ME404P C | <p>CO1: Elaborate the working principles of IC Engine systems and its classification.</p> <p>CO2: Explore the combustion stages of SI and CI engines, and factors influence for better combustion.</p> <p>CO3: Evaluate the testing and performance parameters of IC engines.</p> <p>CO4: Explain the function and working principles of rotary, reciprocating, dynamic axial compressors.</p> <p>CO5: Understand the working principle of gas turbine and its classification with thermodynamic analysis</p> |
| 5 | 11/11 | INSTRUMENTATION AND CONTROL SYSTEMS | ME405P C | <p>CO1: Know the basic knowledge of the functional blocks of measurement systems.</p> <p>CO2: Describe the working of various physical variable Temperature and pressure measuring instruments.</p> <p>CO3: Explain the working of various physical variable Level, flow, Speed and Acceleration measuring instruments.</p> <p>CO4: Understand the working of various physical and Electrical variables Stress, Humidity, Force, Torque and Power measuring instruments.</p> <p>CO5: Understand the concept of control system and calculate transfer functions of mechanical and translational systems with different techniques.</p> |
| 1 | 11/11 | DYNAMICS OF MACHINERY | ME501P C | <p>CO1: Analyze the effect of a gyroscope on ships, aeroplanes and automobile</p> <p>CO2: Explain the inertia forces in the working of important machine elements like flywheels, connecting rod etc.</p> <p>CO3: Understand the types of brakes and the roll of friction</p> <p>CO4: Understand the working of governors and estimate the unbalanced forces in a multi-cylinder reciprocating engine</p> |

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| | | | | <i>CO5: Estimate the longitudinal, transverse and torsional vibrations so as to avoid resonance</i> |
| 2 | III/I | DESIGN OF MACHINE ELEMENTS | ME502P C | <p><i>CO1: The student acquires the knowledge about the principles of design, material selection, component behavior subjected to loads, and criteria of failure.</i></p> <p><i>CO2: Understands the concepts of principal stresses, stress concentration in machine members and fatigue loading.</i></p> <p><i>CO3: Design on the basis of strength and rigidity and analyze the stresses and strains induced in a machine element.</i></p> |
| 3 | III/I | METROLOGY & MACHINE TOOLS | ME503P C | <p><i>CO1: Explain the principles of metal cutting and working of lathe machine tools.</i></p> <p><i>CO2: Understand working of drilling, boring, shaping, slotting, planning machine tools and estimation of machining time.</i></p> <p><i>CO3: Describe the Principles of working and operations performed on milling and grinding machines.</i></p> <p><i>CO4: Explain the use of various measuring instruments, gauges and system of limits, fits and tolerances.</i></p> <p><i>CO5: Describe the process of measuring the surface roughness, screw thread parameters & principles of coordinate measuring machines.</i></p> |
| 4 | III/I | BUSINESS ECONOMICS & FINANCIAL ANALYSIS | SM504 MS | <p><i>CO1: The students will understand the various Forms of Business and the impact of economic variables on the Business. The Demand, Supply, Production, Cost, Market Structure, Pricing aspects are learnt. The Students can study the firm's financial position by analysing the Financial Statements of a Company.</i></p> |
| 5 | III/I | STEAM POWER & JET PROPULSION | ME505P C | <p><i>CO1: Develop state – space diagrams based on the schematic diagrams of process flow of steam and gas turbine plants</i></p> <p><i>CO2: Apply the laws of Thermodynamics to analyze thermodynamic cycles</i></p> <p><i>CO3: Differentiate between vapour power</i></p> |

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| | | N | | cycles and gas power cycles CO4: Infer from property charts and tables and to apply the data for the evaluation of performance parameters of the steam and gas turbine plants CO5: Understand the functionality of major components of steam and gas turbine plants and to do the analysis of these components |
| 6 | III/I | CAD/CAM | ME506P C | CO1: Understand geometric transformation techniques in CAD. CO2: Develop mathematical models to represent curves and surfaces. CO3: Model engineering components using solid modeling techniques. CO4: Develop programs for CNC to manufacture industrial components. |
| | | | | CO5: Understand the application of computers in various aspects of Manufacturing viz., Design, Proper planning, Manufacturing cost, Layout & Material Handling system. |
| | | | | CO1: Distinguish and Explain various forms of IPRs. CO2: Identify criteria to fit one's own intellectual work in particular form of IPRs. CO3: Apply statutory provisions to protect particular form of IPRs. CO4: Appraise new developments in IPR laws at national and international level |
| | | | | CO1: Understand the types of bearings, bearing material, bearing design using different empirical relations. CO2: Estimate the life of rolling element bearings and their selection for given service conditions. CO3: Design of engine components like piston, connecting rod CO4: Design of springs, pulleys and belts. CO5: Design of gears |
| | | | | CO1: Understand the basic modes of heat |
| 2 | III/II | HEAT | ME602P | |

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| | | TRANSFER | C | transfer CO2: Compute one dimensional steady state heat transfer with and without heat generation CO3: Understand and analyze heat transfer through extended surfaces CO4: Understand one dimensional transient conduction heat transfer CO5: Understand concepts of continuity, momentum and energy equations CO6: Interpret and analyze forced and free convective heat transfer CO7: Understand the principles of boiling, condensation and radiation heat transfer CO8: Design of heat exchangers using LMTD and NTU methods |
| 3 | III/II | FINITE ELEMENT METHODS | ME603P C | CO1: Apply finite element method to solve problems in solid mechanics, fluid mechanics and heat transfer CO2: Formulate and solve problems in one dimensional structures including trusses, beams and frames. CO3: Formulate FE characteristic equations for two dimensional elements and analyze plain stress, plain strain, axi-symmetric and plate bending problems. CO4: Use of ANSYS, ABAQUS, NASTRAN, etc. |
| 4 | III/II | BASIC MECHANICAL ENGINEERING | ME611 OE | CO1: Understand different types of power generation, working of refrigerator CO2: Summarize different types of manufacturing processes and Power transmission systems CO3: Discuss about conventional and non-conventional sources of energy CO4: Identify automation of various manufacturing processes in engineering practice. CO5: Describe the basic concepts and applications of industrial robotics. |
| 5 | III/II | RENEWABLE | ME612 | CO1: Explain the main sources of energy |

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| | | E ENERGY SOURCES | OE | <p>including Solar energy and their primary applications in Global Context.</p> <p>CO2: Describe the challenges and problems associated with the use of solar energy sources and its Economic Evaluation</p> <p>CO3: Discuss significance of Wind energy systems and its components with basic working principles</p> <p>CO4: Elaborate the sources of energy from water by various means such as OTEC, Tidal energy etc.</p> <p>CO5: Narrate the importance and potential of geo thermal energy and MHD power generation</p> |
| 6 | III/II | ENVIRONMENTAL SCIENCE | MC609 | <p>CO1: Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn helps in sustainable development</p> |
| 1 | IV/I | INDUSTRIAL MANAGEMENT | ME701P C | <p>CO1: apply principles of management</p> <p>CO2: design the organization structure</p> <p>CO3: apply techniques for plant location, design plant layout and value analysis</p> <p>CO4: carry out work study to find the best method for doing the work and establish standard time for a given method</p> <p>CO5: apply various quality control techniques and sampling plans</p> <p>CO6: do job evaluation and network analysis.</p> |
| 2 | IV/I | REFRIGERATION & AIR CONDITIONING | ME702P C | <p>CO1: Differentiate between different types of refrigeration systems with respect to application as well as conventional & unconventional refrigeration systems.</p> <p>CO2: Analyse thermodynamically low temperature refrigeration and Vapour absorption refrigeration for evaluation of performance parameters.</p> <p>CO3: Apply the air refrigeration principles for different types of Air craft refrigeration</p> |

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| | | | | systems |
| | | | | CO4:Elaborate the principles of psychometrics to design the air conditioning heating /cooling loads for industrial applications. |
| | | | | CO5:explain the requirement of ventilation air, various sources of infiltration air, ventilation and infiltration as a part of cooling load |
| 3 | IV/I | QUANTITATIVE ANALYSIS FOR BUSINESS DECISIONS | ME721 OE | CO1:Understand the origin and application of operations research. CO2:Learn about the Formulation of Linear Programming Problem for different areas. CO3:appreciate the significance of variations of assignment problem, methods for finding Initial feasible solution. CO4:Learn the aspects of Decision Theory and Network Analysis CO5:Gain insights of the theoretical principles and practical applications of different queuing models. |
| 4 | IV/I | INDUSTRIAL ENGINEERING & MANAGEMENT | ME722 OE | CO1:Practice the management theories proposed by Taylor, Fayol etc CO2:Consider various factors and identify plant location for given industry CO3:Determine EOQ, classify items and implement P-system and Q-system CO4:Conduct work study (method study+ Work measurement: a) Time study & Work sampling)) CO5:Practice HRM principles CO6:Analyze the networks by using PERT & CPM |
| 1 | IV/II | ENTREPRENEURSHIP DEVELOPMENT | ME831 OE | CO1:Identify the factors affecting entrepreneurial growth CO2:Understand various programs supporting entrepreneurship CO3:Write preliminary project report CO4:Estimate the finances for the project CO5:Appraise and avail support rendered by the Government and other Appropriate |

| Agencies | | | | |
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| 2 | IV/II | ELEMENTS OF ELECTRIC AND HYBRID VEHICLES | ME832 OE | <p>CO1:Choose the appropriate source of energy for the hybrid electric vehicle based on driving cycle.</p> <p>CO2:Analyze the power and energy need of the various hybrid electric vehicle and Measure and Estimate the energy consumption of the Hybrid Vehicles</p> <p>CO3:Evaluate energy efficiency of the vehicle for its drive trains</p> <p>CO4:Elaborate the types of storage systems such as battery based, fuel cell based etc.</p> <p>CO5:Explain the types of Driving Cycles, Fuel Cell EV, Solar Powered Vehicles</p> |



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| Program: B.Tech Branch: Computer Science & Engineering(AI &ML) | Academic year :2023- 2024 Regulation : R22 | Semester :I |
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| S.No | Year /Sem | Course name | Course Code | Course Outcome |
|------|-----------|--|-------------|---|
| 1 | II/I | MATHEMATICAL AND STATISTICAL FOUNDATIONS | CS301P C | <p>CO1: Apply the number theory concepts to cryptography domain</p> <p>CO2: Apply the concepts of probability and distributions to some case studies</p> <p>CO3: Correlate the material of one unit to the material in other units</p> <p>CO4: Resolve the potential misconceptions and hazards in each topic of study.</p> |
| 2 | II/I | DATA STRUCTURE | CS302P C | <p>CO1: Ability to select the data structures that efficiently model the information in a problem.</p> <p>CO2: Ability to assess efficiency trade-offs among different data structure implementations or combinations.</p> <p>CO3: Implement and know the application of algorithms for sorting and pattern matching.</p> <p>CO4: Design programs using a variety of data structures, including hash tables, binary and general tree structures, search trees, tries, heaps, graphs, and AVL-trees.</p> |

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| | | | | | <p>CO1: Understand the basics of instruction sets and their impact on processor design.</p> |
| 3 | II/I | Computer Organization And Architecture | CS303P | C | <p>CO2: Demonstrate an understanding of the design of the functional units of a digital computer system.</p> |
| | | | | | <p>CO3: Evaluate cost performance and design trade-offs in designing and constructing a computer processor including memory.</p> |
| | | | | | <p>CO4: Design a pipeline for consistent execution of instructions with minimum hazards.</p> |
| | | | | | <p>CO5: Recognize and manipulate representations of numbers stored in digital computers.</p> |
| 4 | II/I | SOFTWARE ENGINEERING | CS304P | C | <p>CO1: Ability to translate end-user requirements into system and software requirements, using e.g. UML, and structure the requirements in a Software Requirements Document (SRD).</p> |
| | | | | | <p>CO2: Identify and apply appropriate software architectures and patterns to carry out high level design of a system and be able to critically compare alternative choices.</p> |
| | | | | | <p>CO3: Will have experience and/or awareness of testing problems and will be able to develop a simple testing report</p> |
| 5 | II/I | OPERATING SYSTEMS | CS305P | C | <p>CO1: Will be able to control access to a computer and the files that may be shared</p> |
| | | | | | <p>CO2: Demonstrate the knowledge of the components of computers and their respective roles in computing.</p> |
| | | | | | <p>CO3: Ability to recognize and resolve user problems with standard operating environments.</p> |

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| | | | | CO4: Gain practical knowledge of how programming languages, operating systems, and architectures interact and how to use each effectively. |
| 1 | II/II | Discrete Mathematics | CS401P C | CO1: Understand and construct precise mathematical proofs CO2: Apply logic and set theory to formulate precise statements CO3: Analyze and solve counting problems on finite and discrete structures CO4: Describe and manipulate sequences CO5: Apply graph theory in solving computing problems |
| 2 | II/II | AUTOMATA THEORY AND COMPILER DESIGN | CS402P C | CO1: Able to employ finite state machines for modeling and solving computing problems. CO2: Able to design context free grammars for formal languages. CO3: Able to distinguish between decidability and undecidability. CO4: Demonstrate the knowledge of patterns, tokens & regular expressions for lexical analysis. CO5: Acquire skills in using lex tool and design LR parsers |
| 3 | II/II | DATABASE MANAGEMENT SYSTEMS | CS403P C | CO1: Gain knowledge of fundamentals of DBMS, database design and normal forms CO2: Master the basics of SQL for retrieval and management of data. CO3: Be acquainted with the basics of transaction processing and concurrency control.. CO4: Familiarity with database storage structures and access techniques |
| 4 | II/II | INTRODUCTION TO ARTIFICIAL INTELLIGENCE | CS404P C | CO1: Learn the distinction between optimal reasoning Vs human like reasoning and formulate an efficient problem space for a problem expressed in natural language. Also select a search algorithm for a problem and estimate its time and space complexities. CO2: Apply AI techniques to solve problems of |

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| | | | | game playing, theorem proving, and machine learning. CO3: Learn different knowledge representation techniques. CO4: Understand the concepts of state space representation, exhaustive search, heuristic search together with the time and space complexities. CO5: Comprehend the applications of Probabilistic Reasoning and Bayesian Networks. CO6: Analyze Supervised Learning Vs. Learning Decision Trees |
| 5 | II/II | OBJECT ORIENTED PROGRAMMING THROUGH JAVA | CS405P C | CO1: Demonstrate the behavior of programs involving the basic programming constructs like control structures, constructors, string handling and garbage collection. CO2: Demonstrate the implementation of inheritance (multilevel, hierarchical and multiple) by using extend and implement keywords CO3: Use multithreading concepts to develop inter process communication. CO4: Understand the process of graphical user interface design and implementation using AWT or swings. CO5: Develop applets that interact abundantly with the client environment and deploy on the server. |
| 1 | III/I | DESIGN AND ANALYSIS OF ALGORITHM S | AM501 PC | CO1: Analyze the performance of algorithms CO2: Choose appropriate data structures and algorithm design methods for a specified application CO3: Understand the choice of data structures and the algorithm design methods |
| 2 | III/I | MACHINE LEARNING | AM502 PC | CO1: Distinguish between, supervised, unsupervised and semi-supervised learning CO2: Understand algorithms for building |

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| | | | | classifiers applied on datasets of non-linearly separable classes. |
| | | | | CO3: Understand the principles of evolutionary computing algorithms |
| | | | | CO4: Design an ensemble to increase the classification accuracy |
| 3 | III/I | COMPUTER NETWORKS | AM503 PC | CO1: Gain the knowledge of the basic computer network technology. CO2: Gain the knowledge of the functions of each layer in the OSI and TCP/IP reference model. CO3: Obtain the skills of subnetting and routing mechanisms. CO4: Familiarity with the essential protocols of computer networks, and how they can be applied in network design and implementation. |
| 4 | III/I | BUSINESS ECONOMICS AND FINANCIAL ANALYSIS | SM504 MS | CO1: The students will understand the various forms of Business and the impact of economic variables on the Business. The Demand, Supply, Production, Cost, Market Structure, Pricing aspects are learnt. The Students can study the firm's financial position by analysing the Financial Statements of a Company. |
| 5 | III/I | INTELLECTUAL PROPERTY RIGHTS | MC510 | CO1: Distinguish and Explain various forms of IPRs. CO2: Identify criteria to fit one's own intellectual work in particular form of IPRs. CO3: Apply statutory provisions to protect particular form of IPRs. CO4: Appraise new developments in IPR laws at national and international level |
| 1 | III/II | KNOWLEDGE REPRESENTATION AND REASONING | AM601 PC | CO1: Analyze and design knowledge-based systems intended for computer implementation. CO2: Acquire theoretical knowledge about principles for logic-based representation and reasoning. CO3: Ability to understand knowledge-engineering process |

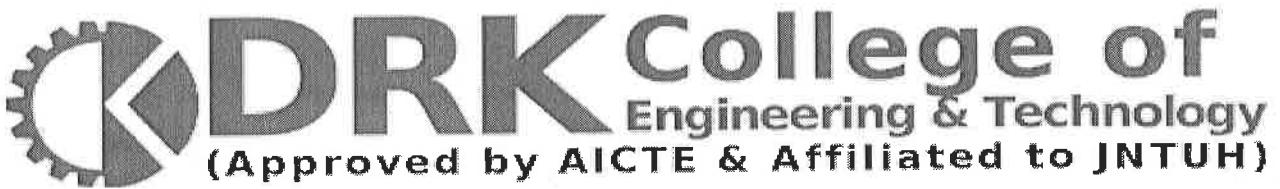
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| | | | | | <p>CO4: Ability to implement production systems, frames, inheritance systems and approaches to handle uncertain or incomplete knowledge.</p> |
| 2 | III/II | <p>DATA ANALYTICS</p> | <p>AM602 PC</p> | | <p>CO1: Understand the impact of data analytics for business decisions and strategy</p> |
| | | | | | <p>CO2: Carry out data analysis/statistical analysis</p> |
| | | | | | <p>CO3: To carry out standard data visualization and formal inference procedures</p> |
| | | | | | <p>CO4: Design Data Architecture</p> |
| | | | | | <p>CO5: Understand various Data Sources</p> |
| 3 | III/II | <p>NATURAL LANGUAGE PROCESSIN G</p> | <p>AM603 PC</p> | | <p>CO1: Show sensitivity to linguistic phenomena and an ability to model them with formal grammars.</p> |
| | | | | | <p>CO2: Understand and carry out proper experimental methodology for training and evaluating empirical NLP systems</p> |
| | | | | | <p>CO3: Manipulate probabilities, construct statistical models over strings and trees, and estimate parameters using supervised and unsupervised training methods.</p> |
| | | | | | <p>CO4: Design, implement, and analyze NLP algorithms; and design different language modeling Techniques.</p> |
| 4 | III/II | <p>FUNDAMENTALS OF AI</p> | <p>AM611 OE</p> | | <p>CO1: Gain the knowledge of what is AI, risks and benefits of AI, limits of AI and the ethics involved in building an AI application.</p> |
| | | | | | <p>CO2: Understand the nature of environments and the structure of agents.</p> |
| | | | | | <p>CO3: Possess the ability to select a search algorithm for a problem and characterize its time and space complexities.</p> |
| | | | | | <p>CO4: Possess the skill for representing knowledge using the appropriate technique</p> |
| | | | | | <p>CO5: Gain an understanding of the applications of AI</p> |
| 5 | III/II | <p>MACHINE LEARNING</p> | <p>AM612 OE</p> | | <p>CO1: Distinguish between, supervised, unsupervised and semi-supervised learning</p> |
| | | | | | <p>CO2: Understand algorithms for building</p> |

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| | | BASICS | | classifiers applied on datasets of non-linearly separable classes |
| | | | | CO3: Understand the principles of evolutionary computing algorithms |
| | | | | CO4: Design an ensembler to increase the classification accuracy |
| 6 | III/II | ENVIRONMENTAL SCIENCE | MC609 | CO1: Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn helps in sustainable development |
| 1 | IV/I | DEEP LEARNING | AM701 PC | CO1: Understand machine learning basics and neural networks CO2: Understand optimal usage of data for training deep models CO3: Apply CNN and RNN models for real-world data CO4: Evaluate deep models CO5: Develop deep models for real-world problems |
| 2 | IV/I | NATURE INSPIRED COMPUTING | AM702 PC | CO1: Familiar with Evolutionary Computing algorithms CO2: Understand scope of neurocomputing CO3: Compare different Ant Colony Optimization algorithmic models. CO4: Understand the scope of artificial immune systems. CO5: Tackle different real world problems |
| 3 | IV/I | INTRODUCTION TO NATURAL LANGUAGE PROCESSING | AM721 OE | CO1: Show sensitivity to linguistic phenomena and an ability to model them with formal grammars. CO2: Understand and carry out proper experimental methodology for training and evaluating empirical NLP systems CO3: Able to manipulate probabilities, construct statistical models over strings and trees, and estimate parameters using supervised and unsupervised training methods. CO4: Able to design, implement, and analyze |


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| | | | | NLP algorithms; and design different language modeling Techniques. |
| 4 | IV/I | AI APPLICATIONS | AM722 OE | <p>CO1: Correlate AI and solutions to modern problems.</p> <p>CO2: Use of AI in business applications</p> <p>CO3: Application of AI in manufacturing automation</p> <p>CO4: Use of AI in streaming of data and Network applications</p> |
| 5 | IV/I | PROFESSIONAL PRACTICE, LAW & ETHICS | AM703 PC | <p>CO1: Practice ethics and rule of the land in their profession</p> <p>CO2: Follow the principles and elements of legal contracts</p> <p>CO3: Able to resolve disputes pertaining to arbitration, reconciliation</p> <p>CO4: Aware of intellectual property loss</p> |
| 1 | IV/II | CHATBOTS | AM831 OE | <p>CO1: Understand basic concepts of chatbots</p> <p>CO2: Analyze different entities in building bots</p> <p>CO3: Understand the concepts of advanced bot building</p> <p>CO4: Discuss different types of chatbot use cases</p> |
| 2 | IV/II | EVOLUTIONARY COMPUTING | AM832 OE | <p>CO1: Appraise the significance of evolutionary computing</p> <p>CO2: Apply genetic operators and genetic programming for classification problems</p> <p>CO3: Hybridization of genetic algorithms with other techniques</p> <p>CO4: Understand multi objective, interactive evolutionary algorithms</p> |



| Program: B.Tech Branch: Computer Science & Engineering(DATA SCIENCE) | | | Academic year :2023-2024 Regulation : R22 | Semester : 1 |
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| S.No | Year /Sem | Course name | Course Code | Course Outcome |
| 1 | II/I | DIGITAL ELECTRONICS CS | DS301P C | <p>CO1: This course aims at through understanding of binary number system, logic gates, combination logic and synchronous and asynchronous logic.</p> |
| 2 | II/I | DATA STRUCTURE | DS302P C | <p>CO1: Ability to select the data structures that efficiently model the information in a problem.</p> <p>CO2: Ability to assess efficiency trade-offs among different data structure implementations or combinations.</p> <p>CO3: Implement and know the application of algorithms for sorting and pattern matching.</p> <p>CO4: Design programs using a variety of data structures, including hash tables, binary and general tree structures, search trees, tries, heaps, graphs, and AVL-trees.</p> |
| 3 | II/I | Computer Oriented Statistical Methods | DS303P C | <p>CO1: Apply the concepts of probability and distributions to case studies.</p> <p>CO2: Formulate and solve problems involving random variables and apply statistical methods</p> |

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| | | | | for analyzing experimental data. |
| | | | | CO3: Apply concept of estimation and testing of hypothesis to case studies. |
| | | | | CO4: Correlate the concepts of one unit to the concepts in other units. |
| 4 | 11/1 | Computer Organization And Architecture | DS304P C | <p>CO1: Understand the basics of instruction sets and their impact on processor design.</p> <p>CO2: Demonstrate an understanding of the design of the functional units of a digital computer system.</p> <p>CO3: Evaluate cost performance and design trade-offs in designing and constructing a computer processor including memory.</p> <p>CO4: Design a pipeline for consistent execution of instructions with minimum hazards.</p> <p>CO5: Recognize and manipulate representations of numbers stored in digital computers.</p> |
| 5 | 11/1 | Object Oriented Program | DS305P C | <p>CO1: Demonstrate the behavior of programs involving the basic programming constructs like control structures, constructors, string handling and garbage collection.</p> <p>CO2: Demonstrate the implementation of inheritance (multilevel, hierarchical and multiple) by using extend and implement keywords</p> |

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| | | | | <p>CO3: Use multithreading concepts to develop inter process communication.</p> |
| | | | | <p>CO4: Understand the process of graphical user interface design and implementation using AWT or swings.</p> |
| | | | | <p>CO5: Develop applets that interact abundantly with the client environment and deploy on the server.</p> |
| 1 | 11/11 | Discrete Mathematics | DS401P C | <p>CO1: Understand and construct precise mathematical proofs</p> <p>CO2: Apply logic and set theory to formulate precise statements</p> <p>CO3: Analyze and solve counting problems on finite and discrete structures</p> <p>CO4: Describe and manipulate sequences</p> <p>CO5: Apply graph theory in solving computing problems</p> |
| 2 | 11/11 | BUSINESS ECONOMICS AND FINANCIAL ANALYSIS | SM402 MS | <p>CO1: The students will understand the various Forms of Business and the impact of economic variables on the Business. The Demand, Supply, Production, Cost, Market Structure, Pricing aspects are learnt. The Students can study the firm's financial position by analysing the Financial Statements of a Company.</p> |
| 3 | 11/11 | OPERATING SYSTEMS | DS403P C | <p>CO1: Will be able to control access to a computer and the files that may be shared</p> <p>CO2: Demonstrate the knowledge of the components of computers and their respective roles in computing</p> <p>CO3: Ability to recognize and resolve user problems with standard operating environments.</p> <p>CO4: Gain practical knowledge of how programming languages, operating systems, and architectures interact and how to use each effectively.</p> |

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| 4 | II/II | DATABASE MANAGEMENT SYSTEMS | DS404P C | <i>CO1:Gain knowledge of fundamentals of DBMS, database design and normal forms</i> |
| | | | | <i>CO2:Master the basics of SQL for retrieval and management of data.</i> |
| | | | | <i>CO3:Be acquainted with the basics of transaction processing and concurrency control.</i> |
| | | | | <i>CO4:Familiarity with database storage structures and access techniques</i> |
| 5 | II/II | SOFTWARE ENGINEERING | DS405P C | <i>CO1:Ability to translate end-user requirements into system and software requirements, using e.g. UML, and structure the requirements in a Software Requirements Document (SRD).</i> |
| | | | | <i>CO2:Identify and apply appropriate software architectures and patterns to carry out high level design of a system and be able to critically compare alternative choices.</i> |
| | | | | <i>CO3:Will have experience and/or awareness of testing problems and will be able to develop a simple testing report</i> |
| 1 | III/I | ALGORITHM DESIGN AND ANALYSIS | | <i>CO1: Analyze the performance of algorithms</i> |
| | | | DS501P C | <i>CO2:Choose appropriate data structures and algorithm design methods for a specified application</i> |
| | | | | <i>CO3:Understand the choice of data structures and the algorithm design methods</i> |
| 2 | III/I | INTRODUCTION TO DATA SCIENCE | | <i>CO1:Understand basic terms of statistical modeling and data science</i> |
| | | | DS502P C | <i>CO2:Implementation of R programming concepts</i> |
| | | | | <i>CO3:utilize R elements for data visualization and prediction</i> |
| 3 | III/I | COMPUTER NETWORKS | DS503P C | <i>CO1: Gain the knowledge of the basic computer network technology.</i> |
| | | | | <i>CO2:Gain the knowledge of the functions of each layer in the OSI and TCP/IP reference model.</i> |
| | | | | <i>CO3:Obtain the skills of subnetting and routing mechanisms.</i> |
| | | | | <i>CO4:Familiarity with the essential protocols of</i> |

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| | | | | computer networks, and how they can be applied in network design and implementation. |
| 4 | III/I | INTELLECTUAL PROPERTY RIGHTS | MC510 | <p>CO1:Distinguish and Explain various forms of IPRs.</p> <p>CO2:Identify criteria to fit one's own intellectual work in particular form of IPRs.</p> <p>CO3:Apply statutory provisions to protect particular form of IPRs.</p> <p>CO4:Appraise new developments in IPR laws at national and international level</p> |
| 1 | III/II | AUTOMATA THEORY AND COMPILER DESIGN | DS601P C | <p>CO1: Able to employ finite state machines for modeling and solving computing problems.</p> <p>CO2:Able to design context free grammars for formal languages.</p> <p>CO3:Able to distinguish between decidability and undecidability.</p> <p>CO4: Demonstrate the knowledge of patterns, tokens & regular expressions for lexical analysis.</p> <p>CO5:Acquire skills in using lex tool and design LR parsers</p> |
| 2 | III/II | MACHINE LEARNING | DS602P C | <p>CO1:Distinguish between, supervised, unsupervised and semi-supervised learning</p> <p>CO2:Understand algorithms for building classifiers applied on datasets of non-linearly separable classes</p> <p>CO3:Understand the principles of evolutionary computing algorithms</p> <p>CO4:Design an ensemble to increase the classification accuracy</p> |
| 3 | III/II | BIG DATA ANALYTICS | DS603P C | <p>CO1:Understand the importance of big data analytics and its types</p> <p>CO2:Perform analytics on big data</p> <p>CO3:Proficiency in big data storage and processing in Hadoop</p> <p>CO4:Data analytics through MongoDB</p> <p>CO5:Data analytics through R</p> |
| 4 | III/II | FUNDAMENTALS OF | DS611O E | <p>CO1:Understand basic terms of statistical modeling and data science</p> <p>CO2:Implementation of R programming</p> |

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| | | DATA SCIENCE | | concepts CO3:Implementation of R programming concepts |
| 5 | III/II | R PROGRAMMING | DS6120 E | CO1:Understand to use and program in the programming language R |
| | | | | CO2:Understand to use R to solve statistical problems |
| | | | | CO3:Implement and describe Monte Carlo the technology |
| | | | | CO4:Implement minimize and maximize functions using R |
| 6 | III/II | ENVIRONMENTAL SCIENCE | MC609 | CO1:Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn helps in sustainable development |
| 1 | IV/I | PREDICTIVE ANALYTICS | DS701P C | CO1:Understand the processing steps for predictive analytics |
| | | | | CO2:Construct and deploy prediction models with integrity |
| | | | | CO3:Explore various techniques (machine learning/data mining, ensemble) for predictive analytics. |
| | | | | CO4:Apply predictive analytics to real world examples. |
| 2 | IV/I | WEB AND SOCIAL MEDIA ANALYTICS | DS702P C | CO1:Knowledge on decision support systems |
| | | | | CO2:Apply natural language processing concepts on text analytics |
| | | | | CO3:Understand sentiment analysis |
| | | | | CO4:Knowledge on search engine optimization and web analytics |
| 3 | IV/I | DATA MINING | DS7210 E | CO1:Understand the need of data mining and pre-processing techniques. |
| | | | | CO2:Perform market basket analysis using association rule mining. |
| | | | | CO3:Utilize classification techniques for analysis and interpretation of data. |
| | | | | CO4:Identify appropriate clustering and outlier detection techniques to handle complex data. |

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| | | | | <i>C05:Understand the mining of data from web, text and time series data.</i> |
| 4 | IV/I | DATA ANALYTICS | DS7220 E | <i>C01:Understand the impact of data analytics for business decisions and strategy</i> |
| | | | | <i>C02: Carry out data analysis/statistical analysis</i> |
| | | | | <i>C03:To carry out standard data visualization and formal inference procedures</i> |
| | | | | <i>C04:Design Data Architecture</i> |
| | | | | <i>C05:Understand various Data Sources</i> |
| 1 | IV/II | ORGANIZATIONAL BEHAVIOUR | DS801P C | <i>C01:Students understand their personality, perception and attitudes for overall development and further learn the importance of group behavior in the organizations.</i> |
| 2 | IV/II | INTRODUCTION TO SOCIAL MEDIA MINING | DS8310 E | <i>C01:Understand social media and its data.</i> |
| | | | | <i>C02:Apply mining technologies on twitter, Facebook, LinkedIn and Google.</i> |
| | | | | <i>C03:Learn about community</i> |
| | | | | <i>C04:Apply various Recommendation Algorithms</i> |
| | | | | <i>C05:Analyze the Behavior of people</i> |
| 3 | IV/II | DATA VISUALIZATION USING PYTHON | DS8320 E | <i>C01:Perform data wrangling</i> |
| | | | | <i>C02:Explain principles of visual perception</i> |
| | | | | <i>C03:Apply core skills for visual analysis</i> |
| | | | | <i>C04: Apply visualization techniques for various data analysis tasks</i> |
| | | | | <i>C05:Evaluate visualization techniques</i> |

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| Program: B.Tech Branch: Computer Science & Engineering(CYBER SECURITY) | | | Academic year :2023- 2024 | Semester :I Regulation : R22 |
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| S.No | Year /Sem | Course name | Course Code | Course Outcome |
| 1 | II/I | DIGITAL ELECTRONIC CS | CY301P C | <p>CO1: This course aims at through understanding of binary number system, logic gates, combination logic and synchronous and asynchronous logic.</p> |
| 2 | II/I | DATA STRUCTURE | CY302P C | <p>CO1: Ability to select the data structures that efficiently model the information in a problem.</p> <p>CO2: Ability to assess efficiency trade-offs among different data structure implementations or combinations.</p> <p>CO3: Implement and know the application of algorithms for sorting and pattern matching.</p> <p>CO4: Design programs using a variety of data structures, including hash tables, binary and general tree structures, search trees, tries, heaps, graphs, and AVL-trees.</p> |
| 3 | II/I | Computer Oriented Statistical Methods | CY303P C | <p>CO1: Apply the concepts of probability and distributions to case studies.</p> <p>CO2: Formulate and solve problems involving random variables and apply statistical methods for analyzing experimental data.</p> |

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| | | | | <p>CO3: Apply concept of estimation and testing of hypothesis to case studies.</p> |
| | | | | <p>CO4: Correlate the concepts of one unit to the concepts in other units.</p> |
| 4 | II/I | <p>Computer Organization And Architecture</p> | <p>CY304P C</p> | <p>CO1: Understand the basics of instruction sets and their impact on processor design.</p> |
| | | | | <p>CO2: Demonstrate an understanding of the design of the functional units of a digital computer system.</p> |
| | | | | <p>CO3: Evaluate cost performance and design trade-offs in designing and constructing a computer processor including memory.</p> |
| | | | | <p>CO4: Design a pipeline for consistent execution of instructions with minimum hazards.</p> |
| | | | | <p>CO5: Recognize and manipulate representations of numbers stored in digital computers.</p> |
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| 5 | II/I | <p>Object Oriented Program</p> | <p>CY305P C</p> | <p>CO1: Demonstrate the behavior of programs involving the basic programming constructs like control structures, constructors, string handling and garbage collection.</p> |
| | | | | <p>CO2: Demonstrate the implementation of inheritance (multilevel, hierarchical and multiple) by using extend and implement keywords</p> |
| | | | | <p>CO3: Use multithreading concepts to develop</p> |

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| | | | | inter process communication. |
| | | | | CO4: Understand the process of graphical user interface design and implementation using AWT or swings. |
| | | | | CO5: Develop applets that interact abundantly with the client environment and deploy on the server. |
| 1 | 11/11 | Discrete Mathematics | CY401P C | CO1: Understand and construct precise mathematical proofs CO2: Apply logic and set theory to formulate precise statements CO3: Analyze and solve counting problems on finite and discrete structures CO4: Describe and manipulate sequences CO5: Apply graph theory in solving computing problems |
| 2 | 11/11 | BUSINESS ECONOMICS AND FINANCIAL ANALYSIS | SM402 MS | CO1: The students will understand the various Forms of Business and the impact of economic variables on the Business. The Demand, Supply, Production, Cost, Market Structure, Pricing aspects are learnt. The Students can study the firm's financial position by analysing the Financial Statements of a Company. |
| 3 | 11/11 | OPERATING SYSTEMS | CY403P C | CO1: Will be able to control access to a computer and the files that may be shared CO2: Demonstrate the knowledge of the components of computers and their respective roles in computing. CO3: Ability to recognize and resolve user problems with standard operating environments. CO4: Gain practical knowledge of how programming languages, operating systems, and architectures interact and how to use each effectively. |
| 4 | 11/11 | COMPUTER | CY404P | CO1: Gain the knowledge of the basic computer |

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| | | NETWORKS | C | <p>network technology.</p> <p>CO2: Gain the knowledge of the functions of each layer in the OSI and TCP/IP reference model.</p> <p>CO3: Obtain the skills of subnetting and routing mechanisms.</p> <p>CO4: Familiarity with the essential protocols of computer networks, and how they can be applied in network design and implementation.</p> |
| 5 | II/II | SOFTWARE ENGINEERING | CY405P C | <p>CO1: Ability to translate end-user requirements into system and software requirements, using e.g. UML, and structure the requirements in a Software Requirements Document (SRD).</p> <p>CO2: Identify and apply appropriate software architectures and patterns to carry out high level design of a system and be able to critically compare alternative choices.</p> <p>CO3: Will have experience and/or awareness of testing problems and will be able to develop a simple testing report</p> |
| | | | | <p>CO1: Student will be able to understand basic cryptographic algorithms, message and web authentication and security issues.</p> <p>CO2: Ability to identify information system requirements for both of them such as client and server.</p> <p>CO3: Ability to understand the current legal issues towards information security.</p> |
| | | | | <p>CO1: Gain knowledge of fundamentals of DBMS, database design and normal forms</p> <p>CO2: Master the basics of SQL for retrieval and management of data.</p> <p>CO3: Be acquainted with the basics of transaction processing and concurrency control.</p> <p>CO4: Familiarity with database storage structures and access techniques</p> |
| 3 | III/I | FORMAL LANGUAGE | CY503P C | <p>CO1: Understand the concept of abstract machines and their power to recognize the languages.</p> |

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| | | S AND AUTOMATA THEORY | | <p>CO2: Employ finite state machines for modeling and solving computing problems.</p> <p>CO3: Design context free grammars for formal languages.</p> <p>CO4: Distinguish between decidability and undecidability.</p> |
| 4 | III/I | INTELLECTUAL PROPERTY RIGHTS | MC510 | <p>CO1: Distinguish and Explain various forms of IPRs.</p> <p>CO2: Identify criteria to fit one's own intellectual work in particular form of IPRs.</p> <p>CO3: Apply statutory provisions to protect particular form of IPRs.</p> <p>CO4: Appraise new developments in IPR laws at national and international level</p> |
| 1 | III/II | CYBER SECURITY ESSENTIALS | CY601P C | <p>CO1: Understand basic cryptographic techniques for securing information and analyze cyber threats using concepts such as proxies, tunneling, and fraud techniques.</p> <p>CO2: Develop skills in identifying and exploiting vulnerabilities, including shellcode, buffer overflows, SQL injection, and web exploit tools.</p> <p>CO3: Demonstrate knowledge of malicious code, its types (worms, viruses), and countermeasures against evasion, privilege escalation, and information theft.</p> <p>CO4: Analyze defense and analysis techniques, including memory forensics, honeypots, and intrusion detection systems, for proactive cybersecurity measures.</p> |
| 2 | III/II | CYBER CRIME INVESTIGATION & DIGITAL FORENSICS | CY602P C | <p>CO1: To obtain and analyze digital information for possible use as evidence in civil, criminal or administrative cases.</p> <p>CO2: To learn about the importance of digital forensic principles and procedures</p> <p>CO3: To know legal considerations and digital evidence controls</p> <p>CO4: To learn about digital forensic tools</p> |
| 3 | III/II | ALGORITHM | CY603P | <p>CO1: Analyze the performance of algorithms</p> <p>CO2: Choose appropriate data structures and</p> |

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| | | S DESIGN AND ANALYSIS | C | algorithm design methods for a specified application CO3:Understand the choice of data structures and the algorithm design methods |
| 4 | III/II | CYBER LAWS | CY6110 E | CO1:Learn evolution and key aspects of Indian cyber law, including recent amendments. CO2:Gain knowledge about the legalities of digital signatures and the role of e-governance in the IT Act CO3:Develop an understanding of the legalities involved in electronic contracts and international conventions. CO4:Adapt in understanding and analyzing cybercrime, electronic evidence, and intellectual property rights in the context of IT. |
| 5 | III/II | ETHICAL HACKING | CY6120 E | CO1:Gain the knowledge of the use and availability of tools to support an ethical hack CO2:Gain the knowledge of interpreting the results of a controlled attack CO3:Understand the role of politics, inherent and imposed limitations and metrics for planning of a test CO4:Comprehend the dangers associated with penetration testing |
| 1 | IV/I | VULNERABI LITY ASSESSMEN T AND PENETRATI ON TESTING | CY701P C | CO1: Learn to handle the vulnerabilities of a Web application CO2:Able to learn various penetration testing tools. CO3:Knowledge on Metasploit, Linux exploit and windows exploit tools CO4:Analyze various vulnerabilities |
| 2 | IV/I | NETWORK MANAGEME NT SYSTEMS AND | CY702P C | CO1:Understanding the challenges and structure of network management in the context of the Internet. CO2: Defining network management and comprehending its scope, challenges, and variety in multivendor environments CO3: Identifying and diagnosing network |

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| | | OPERATION S | | <p>faults, understanding trouble reports, and learning troubleshooting techniques.</p> <p>CO4: Exploring the various network management tools.</p> |
| 3 | IV/I | INFORMATION SYSTEM AUDIT AND ASSURANCE | CY7210 E | <p>CO1: Acquire knowledge of the COBIT framework and its application in auditing and assurance services.</p> <p>CO2: Develop expertise in Internal Control and Information System Audit</p> <p>CO3: Learn standard practices, policies, audit planning, and risk assessment to be able to do thorough audits of computer systems.</p> <p>CO4: Learn to evaluate and manage risks effectively.</p> <p>CO5: Learn to conduct business impact analyses and develop appropriate disaster recovery strategies</p> |
| 4 | IV/I | SOCIAL MEDIA SECURITY | CY7220 E | <p>CO1: Learn about browser's risks</p> <p>CO2: Learn about Social Networking,</p> <p>CO3: Understand the risks while using social media.</p> <p>CO4: Understand security of different web browsers</p> <p>CO5: Understand threats and safety measures involved using an email communication</p> |
| 1 | IV/II | ORGANIZATIONAL BEHAVIOUR | CY801P C | <p>CO1: Students understand their personality, perception and attitudes for overall development and further learn the importance of group behavior in the organizations.</p> |
| 2 | IV/II | 5G TECHNOLOGIES | CY8610 E | <p>CO1: Understand 5G and 5G Broadband Wireless Communications</p> <p>CO2: Understand 5G wireless Propagation Channels</p> <p>CO3: Understand the significance of radio access technologies for 5G</p> <p>CO4: Analyze Device-to-device (D2D) communications</p> <p>CO5: Learn Massive MIMO propagation channel models</p> |


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| 3 | IV/II | DATA PRIVACY | CY8620 E | <p><i>CO1:</i> Outline essential rules and principles for safeguarding privacy and personally identifiable information.</p> <p><i>CO2:</i> Develop data that facilitates meaningful statistical inference while minimizing the exposure of sensitive information.</p> <p><i>CO3:</i> Identify potential threats related to different types of anonymized data.</p> <p><i>CO4:</i> Classify and evaluate methods for generating test data with a focus on both privacy and utility considerations.</p> |
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Program outcomes (POs)-12 Graduate Attributes

- 1. Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an 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 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 lifelong learning in the broadest context of technological change.