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**END SEMESTER EXAMINATION – NOV / DEC 2024**

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| --- | --- | --- | --- |
| **Course Code** | **17EE3023** | **Duration** | **3hrs** |
| **Course Title** | **SIMULATION OF POWER ELECTRONIC SYSTEMS** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Explain how to set up and simulate a basic DC motor model in SIMULINK. Describe the steps involved, including selecting appropriate blocks from the Machines Library and configuring their parameters. | CO1 | U | 12 |
|  | b. | Explain each block used in the Power Electronics Library to simulate a three-phase inverter in SIMULINK. | CO1 | U | 8 |
|  |  | **(OR)** |  |  |  |
| 2. |  | Write the steps involved in performing harmonic analysis on an inverter circuit using SIMULINK’s FFT tool. Analyze the significance of harmonic distortion in the output, and explain how the FFT results help in assessing the quality of power in the simulated circuit. | CO1 | A | 20 |
|  |  |  |  |  |  |
| 3. | a. | Apply the principles of state-space representation to develop a mathematical model for a given power electronic system. Explain how this representation helps in understanding the system’s dynamic behavior. | CO2 | A | 8 |
|  | b. | Write a MATLAB script to generate a basic PWM signal and explain how different parameters (such as duty cycle and frequency) affect the signal characteristics and output. | CO3 | A | 12 |
|  |  | **(OR)** |  |  |  |
| 4. |  | Analyze the use of arithmetic, relational, and logical operators in MATLAB. Write a MATLAB script that uses these operators to manipulate matrices and evaluate conditions. Describe how operator precedence affects the outcome of expressions. | CO3 | An | 20 |
|  |  |  |  |  |  |
| 5. |  | Compare the PSIM simulation requirements and specifications for PWM inverters and Switched Reluctance Motors (SRM). Discuss the differences in control components and circuit design for each system, and analyze how these differences affect their operation and efficiency. | CO3 | An | 20 |
|  |  | **(OR)** |  |  |  |
| 6. |  | Analyze the role of control circuit components in the simulation of power electronic systems. Discuss how control circuits influence the performance and stability of systems like PWM inverters. | CO4 | An | 20 |
|  |  |  |  |  |  |
| 7. | a. | Explain the steps involved in MATLAB’s differential equation solver, to solve a simple differential equation related to electrical circuits, such as an RC or RL circuit. | CO4 | U | 8 |
|  | b. | Analyze the differences between static and dynamic models of power electronic switches. Explain how these models impact the accuracy and efficiency of simulations in circuit-oriented simulators. | CO5 | An | 12 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Analyze the differences between zero current switching (ZCS) and zero voltage switching (ZVS) inverters. Discuss how these switching techniques impact the performance, efficiency, and thermal management of resonant pulse inverters in simulation. | CO5 | An | 12 |
|  | b. | Evaluate the advantages of different SPICE models -Diode, BJT, IGBT, and TRIAC - for accurately simulating circuit behavior in power electronics applications. | CO5 | E | 8 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Describe the steps involved in using MATLAB and SIMULINK to simulate a basic power electronic circuit. | CO6 | U | 10 |
|  | b. | Evaluate the effectiveness of different simulation tools (MATLAB, PSIM, and PSPICE) for modeling power electronic systems. | CO6 | E | 10 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
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|  | **COURSE OUTCOMES** |
| CO1 | At the end of the course, the student will be able to: Handle various simulation mechanisms. |
| CO2 | Develop mathematical model for the system. |
| CO3 | Use the various functional blocks available in the simulation packages for the problem specified. |
| CO4 | Design and simulate any power electronic circuits. |
| CO5 | Investigate the performance of the model developed. |
| CO6 | Compare the performance of the developed model with other simulation tools. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | - | 20 | 20 | - | - | - | 40 |
| CO2 | - | - | 8 | - | - | - | 8 |
| CO3 | - | - | 12 | 40 | - | - | 52 |
| CO4 | - | 8 | - | 20 | - | - | 28 |
| CO5 | - | - | - | 24 | 8 | - | 32 |
| CO6 | - | 10 | - | - | 10 | - | 20 |
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**END SEMESTER EXAMINATION – NOV / DEC 2024**

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| --- | --- | --- | --- |
| **Course Code** | **17EE3031** | **Duration** | **3hrs** |
| **Course Title** | **NEURO-FUZZY CONTROLLERS FOR ELECTRIC DRIVES** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Compare and contrast feed forward and feedback (recurrent) neural networks, providing with examples for each type | CO1 | A | 10 |
|  | b. | Illustrate how the backpropagation algorithm adjusts weights in a multi-layer neural network during training, with the help of a diagram | CO1 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Describe the structure of a biological neurons and their artificial models | CO1 | A | 10 |
|  | b. | Design a basic single-layer neural network using Adaline for a binary classification problem. Explain the steps and key considerations in its setup and training. | CO2 | C | 10 |
|  |  |  |  |  |  |
| 3. | a. | Illustrate the architecture of a Kohonen Self-Organizing Map and outline the steps involved in its training algorithm. | CO2 | A | 10 |
|  | b. | Examine the architecture of Adaptive Resonance Theory (ART1) networks and outline the key steps in their algorithm for classifying binary input patterns. | CO2 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Illustrate the primary fuzzy operations (union, intersection, and complement) with examples, and explain their significance in fuzzy logic. | CO3 | A | 10 |
|  | b. | Evaluate the role of fuzzy measures in determining the degree of uncertainty and illustrate with examples how they aid in decision-making. | CO3 | E | 10 |
|  |  |  |  |  |  |
| 5. | a. | Construct if-then rules for a fuzzy control system (e.g., temperature regulation) and explain how they lead to approximate reasoning outcomes. | CO3 | C | 10 |
|  | b. | Evaluate the advantages of non-linear fuzzy control systems over traditional linear control systems, and illustrate with examples where non-linear fuzzy control is preferable. | CO4 | E | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Analyze the PID-like fuzzy logic controller (FLC) and discuss how it mimics the behavior of a traditional PID controller. | CO4 | A | 10 |
|  | b. | Describe the Sugeno fuzzy logic controller model and compare it with the Mamdani model in terms of output generation, computational efficiency, and application scenarios. | CO4 | U | 10 |
|  |  |  |  |  |  |
| 7. |  | Outline the steps involved in fuzzy identification and evaluate techniques like least squares, gradient descent, and clustering for fitting functions to data and extracting fuzzy rules. | CO5 | A | 20 |
|  |  | **(OR)** |  |  |  |
| 8. |  | Illustrate the role of fuzzy quantifiers in natural language processing, and explain their contribution to enhancing human-computer interaction. | CO5 | U | 20 |
| **COMPULSORY QUESTION** | | | | | |
| 9. |  | Evaluate the effectiveness of hybrid neuro-fuzzy controllers for BLDC motors and discuss the benefits of combining neural networks and fuzzy logic in motor drive applications. | CO6 | E | 20 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

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|  | **COURSE OUTCOMES** |
| CO1 | Explain the concept of Neural Networks and Fuzzy Systems. |
| CO2 | Apply the concepts of fuzzy logic for Non-linear analysis and system identification. |
| CO3 | Develop an estimator based on fuzzy logic/neural network. |
| CO4 | Develop a predictive technique with neural network/fuzzy logic using learning algorithms |
| CO5 | Design a Fuzzy Logic Controller for an Electric Drive. |
| CO6 | Design a Neuro Controller for an Electric Drive |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 10 | 20 | 10 |  |  |  | 40 |
| CO2 | 20 |  |  |  |  |  | 20 |
| CO3 | 10 | 20 |  |  |  |  | 30 |
| CO4 |  | 20 | 10 |  |  |  | 30 |
| CO5 |  | 10 | 20 |  |  |  | 30 |
| CO6 |  | 10 |  |  | 20 |  | 30 |
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**END SEMESTER EXAMINATION – NOV / DEC 2024**

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| **Course Code** | **18EE2001** | **Duration** | **3hrs** |
| **Course Title** | **ELECTRICAL CIRCUIT ANALYSIS** | **Max. Marks** | **100** |

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| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | Calculate the voltage across a 1.1kw toaster that produces a current of 10A. | | CO1 | A | 1 |
| 2. | Find the type of dependent source in given figure. | | CO1 | R | 1 |
| 3. | Identify the law associated with Mesh Analysis. | | CO2 | U | 1 |
| 4. | Identify whether the energy source is applicable for Superposition Theorem. | | CO2 | U | 1 |
| 5. | Calculate the Thevenin’s Resistance across terminals a and b of the circuit in the Figure. | | CO3 | A | 1 |
| 6. | Calculate the load impedance such that maximum power will be transferred from source to Load. | | CO3 | An | 1 |
| 7. | Predict the Laplace transform of an impulse signal. | | CO4 | A | 1 |
| 8. | State the convolution integral. | | CO4 | R | 1 |
| 9. | Show the condition for symmetrical netwoork interns of Y parameters. | | CO5 | U | 1 |
| 10. | List any one application of ABCD parameters. | | CO6 | R | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Find the equivalent resistance between the two points A and B shown in the figure. | | CO1 | An | 3 |
| 12. | Use the superposition theorem to find *v* in the circuit given below. | | CO2 | U | 3 |
| 13. | Derive the transient response of an RL circuit when it is switched to a unit step voltage source at time t=0. Assume that the initial current through the inductor is zero. | | CO3 | An | 3 |
| 14. | Calculate the total inductance of three coupled circuit shown in the figure. | | CO4 | U | 3 |
| 15. | Find the resonant frequency , Band width and Quality factor for the ideal series RLC circuit having L = 50 mH, C = 0.01 μF and Supply voltage V = 10 V. | | CO5 | An | 3 |
| 16. | Design a constant K low pass filter having a cut off frequency of 2 KHz to operate with a terminated load resistance of 500 ohm. | | CO6 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | |
| 17. |  | Solve the circuit using mesh analysis to find Power delivered by the 80V source to the circuit shown and Power dissipated in the 8Ω Resistance. | CO1 | A | 12 |
|  |  |  |  |  |  |
| 18. |  | Find the Nodal Voltages? Also find the current flowing through various resistances? | CO1 | A | 12 |
|  |  |  |  |  |  |
| 19. |  | Verify the reciprocity theorem across the terminals for the network shown. | CO2 | A | 12 |
|  |  |  |  |  |  |
| 20. |  | A series RL circuit with R = 100 Ω and L = 20 H has a DC voltage of 200 V applied through a switch at t = 0. Find (i) the equation for the current and voltages across the different elements (ii) the current at t= 0.5 Seconds (iii) the voltage drops and power across each component. | CO4 | A | 12 |
|  |  |  |  |  |  |
| 21. |  | Calculate the total resistance by applying network reduction techniques.  Getting Equivalent Resistance WIth delta and star transforms - Electrical  Engineering Stack Exchange | CO2 | A | 12 |
|  |  |  |  |  |  |
| 22. |  | Calculate the phase voltage, line voltage, line currents, power factor, and power drawn by a three-phase balanced star-connected load of (2 + j3) Ω connected across a 400V, three-phase balanced supply with a phase sequence of RYB. | CO3 | A | 12 |
|  |  |  |  |  |  |
| 23. |  | Compute the resonant frequency, Q factor, lower cut off frequency, upper cut off frequency and bandwidth of the following circuit specification. A series RLC circuit consists of 50 Ω resistor 0.2 H inductance and 10 μF capacitor with an applied voltage of 20V. | CO5 | A | 12 |
| **COMPULSORY QUESTION** | | | | | |
| 24. |  | Determine the impedance parameters of the network given in figure. | CO6 | A | 12 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

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|  | **COURSE OUTCOMES** |
| **CO1** | Name the various circuit elements, explain the behavior of circuit elements and circuits and analyze  the circuits using KVL, KCL, Mesh analysis and Nodal analysis techniques. |
| **CO2** | State various network theorems, explain it and use it for solving the problems of electric circuits and networks |
| **CO3** | Relate first order and second order differential equations to electric circuits and networks, explain it, solve it for obtaining the transient responses of RL, RC and RLC networks and categorize RLC Networks |
| **CO4** | Describe fundamental concepts used in single phase and three phase AC circuits and coupled circuits, explain these concepts, and solve problems pertaining to these circuits. |
| **CO5** | Explain the Laplace transform technique, transformed networks and resonance in electric circuits, use the Laplace transform technique for transforming a network to S domain and analyzing it, and examine the behavior of resonant circuits and assess the performance of tuned coupled circuits. |
| **CO6** | Calculate the network parameters, explain the network parameters and identify(analyze) the network parameters for a two-port network and construct interconnected networks. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | 1 | - | 25 | 3 | - | - | 29 |
| **CO2** | - | 5 | 24 | - | - | - | 29 |
| **CO3** | - | - | 13 | 4 | - | - | 17 |
| **CO4** | 1 | 3 | 13 | - | - | - | 17 |
| **CO5** | - | 1 | 12 | 3 | - | - | 16 |
| **CO6** | 1 | 3 | 12 | - | - | - | 16 |
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**END SEMESTER EXAMINATION – NOV / DEC 2024**

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| --- | --- | --- | --- |
| **Course Code** | **18EE2002** | **Duration** | **3hrs** |
| **Course Title** | **NETWORK THEORY** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | If the circuit has ‘B’ branches and ‘N’ nodes including the reference node, then predict the number of linearly independent mesh equations (M). | | CO1 | A | 1 |
| 2. | Apply source transformation to find the voltage in the given circuit.  Description: electric-circuits-questions-answers-source-transformations-q4 | | CO1 | A | 1 |
| 3. | Identify the duality of Norton’s theorem. | | CO2 | U | 1 |
| 4. | State the condition for maximum power transfer from a source to the load. | | CO2 | R | 1 |
| 5. | A balanced mesh load of 20∠50⁰ is connected across a 400V, 3 – Ø balanced supply. Calculate the power factor. | | CO3 | A | 1 |
| 6. | State the relation between line voltage and phase voltage in a 3-phase star connected system. | | CO3 | R | 1 |
| 7. | Convert the following time domain voltage to phasor domain voltage.  V(t)=25 cos (200t+750) | | CO4 | U | 1 |
| 8. | Name the dual term of inductance. | | CO4 | R | 1 |
| 9. | Relate the Quality factor(Q), Bandwidth (BW) and Resonant Frequency (Fr). | | CO5 | U | 1 |
| 10. | Choose a filter that passes frequencies between two designated cut-off frequencies and attenuates all other frequencies | | CO6 | A | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Discover the Delta-equivalent circuit for the following circuit | | CO1 | A | 3 |
| 12. | State the superposition theorem. | | CO2 | R | 3 |
| 13. | A three phase balanced star-connected load having an impedance of (10+j25)Ω per phase is connected to a 3-phase 400 V , 50 Hz supply. Determine the line currents. | | CO3 | A | 3 |
| 14. | List the three properties of Laplace Transform. | | CO4 | R | 3 |
| 15. | Identify the scale factor, zeros and poles for the network function  V(s) = 20s  (s+5) (s+3) | | CO5 | U | 3 |
| 16. | The lower and higher cut-off frequencies of a band-pass filter are 3.5kHz and 20kHz. Determine its bandwidth. | | CO6 | A | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | |
| 17. |  | Analyze the given circuit using nodal analysis to compute the voltage across each current source. | CO1 | An | 12 |
|  |  |  |  |  |  |
| 18. |  | Determine the mesh currents in the circuit using mesh analysis. | CO1 | A | 12 |
|  |  |  |  |  |  |
| 19. | a. | Estimate the values of , and from the given circuit, if = 20 A, = 20 Ω, = 10 Ω. | CO1 | An | 8 |
|  | b. | Predict the value of RL, such that the power transferred to RL is maximum. | CO2 | A | 4 |
|  |  |  |  |  |  |
| 20. | a. | A three-phase balanced delta connected load of (3+j6) Ω is connected across a 400V, 3Ø balanced supply. Determine the phase currents, line currents and power factor. Assume the phase sequence to be RYB. Also calculate the power drawn by the load. | CO3 | A | 10 |
|  | b. | For the given circuit, predict the maximum power that can be transferred to the load resistor RL from the voltage source. | CO2 | A | 2 |
|  |  |  |  |  |  |
| 21. | a. | Apply Thevenin theorem to determine the Thevenin equivalent circuit across the terminal AB and the current through 4 Ω resistor for the given circuit.  basic-electrical-engineering-questions-answers-thevenins-theorem-q1 | CO2 | A | 6 |
|  | b. | If the 12Ω resistor draws a current of 1A as shown in the figure, predict the value of resistance R. | CO1 | A | 6 |
|  |  |  |  |  |  |
| 22. |  | Determine the steady state response of series RL and series RC circuit using Laplace Transform. | CO4 | A | 12 |
|  |  |  |  |  |  |
| 23. | a. | Estimate the resonant frequency, Q factor, lower cut off frequency, upper cut off frequency and bandwidth of the following circuit specification. A series RLC circuit consists of 50 Ω resistor 0.2 H inductance and 10 μF capacitor with an applied voltage of 20V. | CO5 | An | 10 |
|  | b. | Construct the dual network for the following circuit. | CO2 | C | 2 |
| **COMPULSORY QUESTION** | | | | | |
| 24. |  | Determine the open circuit impedance parameters of the network given below.  C:\Users\ALFRED KIRUBARAJ\Desktop\ECA_CBCS\p_2\3_4.png | CO6 | A | 12 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
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|  | **COURSE OUTCOMES** |
| **CO1** | Understand basics electrical circuits with nodal and mesh analysis |
| **CO2** | Apply the various electrical network theorems to analyze the circuits and networks. |
| **CO3** | Analyze three phase circuits |
| **CO4** | Apply Laplace Transform for steady state and transient analysis |
| **CO5** | Analyze the frequency domain techniques |
| **CO6** | Determine different network functions and Design filter circuits to satisfy design specifications |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | - | - | 23 | 20 | - | - | 43 |
| **CO2** | 4 | 1 | 12 | - | - | 2 | 19 |
| **CO3** | 1 | - | 14 | - | - | - | 15 |
| **CO4** | 4 | 1 | 12 | - | - | - | 17 |
| **CO5** | - | 4 | - | 10 | - | - | 14 |
| **CO6** | - | - | 16 | - | - | - | 16 |
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**END SEMESTER EXAMINATION – NOV / DEC 2024**

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| --- | --- | --- | --- |
| **Course Code** | **18EE3001** | **Duration** | **3hrs** |
| **Course Title** | **ENERGY ENGINEERING** | **Max. Marks** | **100** |

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| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Differentiate between conventional and non-conventional energy sources, highlighting key differences in origin, sustainability, and environmental impact. | CO1 | A | 10 |
|  | b. | Indicate the factors which influence the pattern of energy consumption | CO1 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Examine the differences between commercial and non-commercial energy forms. How do they influence energy access in urban versus rural areas? | CO1 | A | 10 |
|  | b. | Explain the origin of fossil fuels and summarize the time scale required for their formation. Why are they considered non-renewable? | CO2 | U | 10 |
|  |  |  |  |  |  |
| 3. |  | Explain Betz limit, and give a comprehensive overview of the factors and considerations involved in the site selection of a wind energy project. | CO3 | An | 20 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Illustrate the process of photovoltaic (PV) conversion of solar energy into electricity and identify the main types of solar cells used for this purpose. | CO3 | A | 10 |
|  | b. | Evaluate the factors influencing wind power generation at a given location, such as wind speed, topography, and environmental considerations. | CO3 | E | 10 |
|  |  |  |  |  |  |
| 5. | a. | Compare the types of solar thermal and photovoltaic energy systems, and analyze their respective applications in stand-alone power generation. | CO4 | C | 10 |
|  | b. | Evaluate the impact of hydrogen fuel cells in reducing greenhouse gas emissions, and assess their potential role in sustainable transportation | CO4 | E | 10 |
|  |  | **(OR)** |  |  |  |
| 6. |  | Identify the main issues related to integrating renewable energy sources (like solar and wind) into the power grid, and propose possible solutions for improving grid stability | CO4 | A | 20 |
|  |  |  |  |  |  |
| 7. |  | Illustrate the concept of stand-alone power generation using renewable energy sources and examine the advantages and challenges of such systems in remote areas. | CO5 | A | 20 |
|  |  | **(OR)** |  |  |  |
| 8. |  | Explain any three renewable energy systems and discuss their advantages and limitations in terms of energy production and environmental impact. | CO5 | U | 20 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Analyze the impact of Smart Grid components, such as smart meters and demand response systems, on energy consumption patterns and discuss how these components improve grid management. | CO6 | An | 10 |
|  | b. | Identify the potential risks associated with Smart Grid implementation, including cyber security and consumer privacy concerns, and propose protective measures to address these issues. | CO6 | A | 10 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
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|  | **COURSE OUTCOMES** |
| CO1 | Express the basic definitions and units of energy and the role of energy in economic development |
| CO2 | Narrate the national and Global energy scenario for Conventional and nonconventional energy  sources |
| CO3 | Illustrate the various renewable energy systems, performance and issues related to grid connections. |
| CO4 | Effectively manage the energy requirements by understanding the pollutions in the power plants  along with its control. |
| CO5 | Solve the environmental issues regarding the energy sources and its utilization in energy |
| CO6 | Outline on the evolution of Smart Grids and risks to the Smart Grid and its protective measures |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 10 | 20 | 10 |  |  |  | 40 |
| CO2 | 20 |  |  |  |  |  | 20 |
| CO3 | 10 | 20 |  |  |  |  | 30 |
| CO4 |  | 10 | 10 |  |  | 10 | 30 |
| CO5 |  | 10 | 20 |  | 10 |  | 40 |
| CO6 |  |  | 10 | 10 |  |  | 20 |
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**END SEMESTER EXAMINATION – NOV / DEC 2024**

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| --- | --- | --- | --- |
| **Course Code** | **18EE3022** | **Duration** | **3hrs** |
| **Course Title** | **ELECTRIC AND HYBRID VEHICLES** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | List the key environmental impacts of modern transportation and explain the significance of transitioning to electric vehicles. | CO1 | U | 5 |
|  | b. | Describe the basic configuration of an electric vehicle and discuss how each component contributes to vehicle performance. | CO1 | An | 15 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Assess the advantages and disadvantages of flywheels as energy storage devices in electric vehicles. Include aspects like maintenance, energy density, and potential applications. | CO3 | E | 5 |
|  | b. | Design a configuration for a hybrid electric vehicle that prioritizes both fuel efficiency and performance in urban settings. Describe your design choices, including the type of battery, fuel cell, or ultra capacitor used, and justify each choice based on performance criteria. | CO3 | C | 15 |
|  |  |  |  |  |  |
| 3. | a. | Analyze the trade-offs between speed control and torque control in DC motor drives within electric vehicles. | CO2 | An | 10 |
|  | b. | Evaluate the advantages and limitations of using DC motor drives for regenerative braking in hybrid vehicle. | CO2 | E | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Analyze the impact of motor speed variations on torque stability and power output in BLDC drives within electric vehicles | CO2 | An | 10 |
|  | b. | Propose an innovative control strategy for an induction motor drive to improve energy efficiency in high-speed driving for electric vehicles. | CO2 | C | 10 |
|  |  |  |  |  |  |
| 5. | a. | Compare different electric vehicle architectures in terms of weight distribution, cost, and efficiency. | CO5 | An | 5 |
|  | b. | Design a control strategy to dynamically adjust tractive effort based on real-time road and load conditions. | CO5 | C | 15 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Evaluate different design modifications to improve the aerodynamic performance of a standard electric vehicle. | CO4 | E | 10 |
|  | b. | Explain the impact of transmission losses on the overall efficiency of an electric drivetrain. | CO4 | U | 10 |
|  |  |  |  |  |  |
| 7. | a. | Describe the effect of driving patterns on range estimation for electric vehicles. | CO4 | U | 5 |
|  | b. | Assess the reliability of battery models in predicting range and battery life under high-load conditions. | CO4 | E | 15 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Given data on driving conditions, estimate the potential fuel savings of the Honda Insight in an urban vs. highway setting. | CO5 | An | 10 |
|  | b. | Calculate the expected annual fuel savings of the Chevrolet Spark EV for an average commuter compared to a gasoline equivalent. | C05 | An | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Outline the process of importing a standard driving cycle into a simulation environment. | CO6 | U | 10 |
|  | b. | Develop a basic simulation model that calculates the range of a fuel cell vehicle given specific driving conditions and hydrogen tank capacity. | CO6 | A | 10 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Realize the need of hybrid vehicles and electric vehicles |
| CO2 | State different types of drives used in electric and hybrid vehicles |
| CO3 | Use the energy on-board optimally |
| CO4 | Understand the merits and demerits of various mathematical models of electric and hybrid electric vehicles |
| CO5 | Design the EHV using the mathematical model |
| CO6 | Simulate and observe the behavior of the EHV. |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 |  | 5 |  | 15 |  |  | 20 |
| CO2 |  |  |  | 20 | 10 | 10 | 40 |
| CO3 |  |  |  |  | 5 | 15 | 20 |
| CO4 |  | 15 |  |  | 25 |  | 40 |
| CO5 |  |  |  | 25 |  | 15 | 40 |
| CO6 |  | 10 | 10 |  |  |  | 20 |
|  | | | | | | | **180** |

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**END SEMESTER EXAMINATION – NOV / DEC 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **19EE2003** | **Duration** | **3hrs** |
| **Course Title** | **RENEWABLE ENERGY SOURCES FOR HEALTH CARE** | **Max. Marks** | **100** |

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| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | Identify the main purpose of current limit control in power electronics. | | CO1 | U | 1 |
| 2. | List three types of solar cells. | | CO1 | R | 1 |
| 3. | Indicate the purpose of thermal energy storage in solar applications. | | CO2 | U | 1 |
| 4. | Represent the type of collector commonly used in solar air heaters. | | CO2 | U | 1 |
| 5. | Write the purpose of solidification in biomedical waste management. | | CO3 | A | 1 |
| 6. | Indicate the role of disinfection in biomedical waste management. | | CO3 | U | 1 |
| 7. | Give the significance of the IEEE 1159 code in healthcare facilities. | | CO4 | U | 1 |
| 8. | Express the IEEE code used in the power system design of critical facilities. | | CO4 | U | 1 |
| 9. | Write one advantage of using solar-powered vaccine refrigerators in health clinics. | | CO5 | A | 1 |
| 10. | Indicate the primary function of auxiliaries in a turbine generation plant. | | CO6 | U | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Differentiate Buck converter from Boost converter. | | CO1 | U | 3 |
| 12. | Examine how thermal energy storage can improve the efficiency of solar cooling systems in commercial buildings. | | CO2 | A | 3 |
| 13. | Summarize the impact on public health due to the improper disposal of biomedical waste. | | CO3 | U | 3 |
| 14. | Report the importance of following FGI guidelines when designing power systems for hospitals and healthcare facilities. | | CO4 | U | 3 |
| 15. | Compare sterilization and pasteurization in terms of their application in healthcare. | | CO5 | An | 3 |
| 16. | List the types of waste that can be used in an incineration plant for power generation. | | CO6 | R | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | |
| 17. | a. | Analyze the impact of different earth-sun angles on solar energy collection and the performance of PV systems. | CO1 | An | 6 |
|  | b. | Explain the V-I characteristics of a photovoltaic (PV) cell. Describe how factors such as irradiance and temperature affect these characteristics. | CO1 | U | 6 |
|  |  |  |  |  |  |
| 18. |  | Elaborate on the working principles of flat plate and concentrating solar collectors with neat diagrams. | CO2 | U | 12 |
|  |  |  |  |  |  |
| 19. |  | Explain the steps involved in the transportation and disposal of biomedical waste. Include safety measures to ensure compliance with regulations. | CO3 | U | 12 |
|  |  |  |  |  |  |
| 20. | a. | Compare and contrast NFPA 101 with NFPA 110 in the context of healthcare facilities. | CO4 | An | 6 |
|  | b. | Analyze the role of NFPA 99 in maintaining electrical systems’ reliability and safety in healthcare settings. Discuss its impact on patient care. | CO4 | An | 6 |
|  |  |  |  |  |  |
| 21. |  | Describe the working principle of a solar autoclave and evaluate its advantages in healthcare settings, particularly in remote areas. | CO5 | U | 12 |
|  |  |  |  |  |  |
| 22. |  | Discuss the Perturb and Observe method for MPPT, including a flow diagram, and explain its advantages in solar energy systems. | CO1 | U | 12 |
|  |  |  |  |  |  |
| 23. |  | Describe the process of incineration in biomedical waste management with a neat sketch. | CO3 | U | 12 |
|  |  |  |  |  |  |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Design a hybrid power system for a mobile hospital, detailing the energy sources, storage, and power management techniques. | CO6 | C | 6 |
|  | b. | Examine the potential for using biomass as a renewable energy source in healthcare facilities, particularly focusing on water heating. | CO6 | A | 6 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
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|  | **COURSE OUTCOMES** |
| **CO1** | At the end of this course students will demonstrate the ability to: Describe the basic physics of solar power generation. |
| **CO2** | Summarize the solar thermal power generation technologies |
| **CO3** | Explain the bio and clinical waste to energy generation. |
| **CO4** | Describe the various electrical codes for Power station in a hospital. |
| **CO5** | Explain the various applications of Solar Power for a hospital. |
| **CO6** | Plan for the Emergency Power units for a hospital using Renewable Energy Sources. |

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| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | 1 | 22 | - | 6 | - | - | 29 |
| **CO2** | - | 14 | 3 | - | - | - | 17 |
| **CO3** | - | 28 | 1 | - | - | - | 29 |
| **CO4** | - | 5 | - | 12 | - | - | 17 |
| **CO5** | - | 12 | 1 | 3 | - | - | 16 |
| **CO6** | 3 | 1 | 6 | - | - | 6 | 16 |
|  | | | | | | | **124** |

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**END SEMESTER EXAMINATION – NOV / DEC 2024**

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| --- | --- | --- | --- |
| **Course Code** | **19EE2027** | **Duration** | **3hrs** |
| **Course Title** | **FUNDAMENTALS OF ELECTRICAL SAFETY** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | Define the term ECP. | | CO1 | R | 1 |
| 2. | List any two primary factors that determine the severity of an electric shock. | | CO1 | U | 1 |
| 3. | State OSHA's main responsibilities. | | CO2 | R | 1 |
| 4. | Sketch the equipotential zone form when a metallic electric pole experiences a fault current? | | CO3 | R | 1 |
| 5. | Classify types of electrical Conductors based on material. | | CO3 | U | 1 |
| 6. | Mention the consequences of non-compliance in the context of electrical safety. | | CO4 | R | 1 |
| 7. | IEC 60364 stands for \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. | | CO4 | R | 1 |
| 8. | Name any one electrical testing equipment’s. | | CO5 | R | 1 |
| 9. | State the process of verifying an electrical circuit using a continuity tester. | | CO6 | U | 1 |
| 10. | Mention any two roles of energy control programs. | | CO6 | U | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Classify step and touch potential. | | CO1 | U | 3 |
| 12. | Assume you witnessed someone getting an electric shock; how you will react? | | CO2 | An | 3 |
| 13. | Explain the importance of accurate wire size calculation. | | CO3 | U | 3 |
| 14. | Differentiate between NESC and NEC | | CO4 | U | 3 |
| 15. | Define the main Objectives of Regulatory Bodies? | | CO5 | R | 3 |
| 16. | Identify the factors to consider when selecting the appropriate PPE protection level. | | CO6 | An | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | |
| 17. |  | Create a self-evaluating checklist for electrical power distribution for a laboratory consisting of any 7 appliances and make a study report for presenting in next tailgate meeting. | CO1 | C | 12 |
|  |  |  |  |  |  |
| 18. | a. | List down and elaborate the reason for few primary causes of electrical shock in construction sites. | CO2 | U | 6 |
|  | b. | Contrast the consequences occurred due to arc blasts. | CO2 | R | 6 |
|  |  |  |  |  |  |
| 19. | a. | Identify and write down the key factors that influence the severity of an Arc-Flash. | CO3 | U | 8 |
|  | b. | With a neat diagram, explain different types of earthing. | CO3 | An | 4 |
|  |  |  |  |  |  |
| 20. | a. | Before starting an electrical machinery work, what are all the key parameters which needed to be checked? | CO4 | U | 6 |
|  | b. | Explain the most important points that should be covered at job briefings. | CO4 | R | 6 |
|  |  |  |  |  |  |
| 21. | a. | Elaborate the Objectives of Regulatory Bodies. | CO5 | R | 6 |
|  | b. | List the differences between conductors and insulators based on their properties with some examples. | CO1 | An | 6 |
|  |  |  |  |  |  |
| 22. | a. | Describe the six-step safety measures that must be adhered to in electrical safety processes. | CO5 | U | 6 |
|  | b. | Make a list on important functions of ANSI and IEC in electrical safety. | CO4 | R | 6 |
|  |  |  |  |  |  |
| 23. | a. | Mention the key benefits of electrical equipment maintenance. | CO6 | An | 6 |
|  | b. | List why barriers are needed in electrical safety? | CO5 | R | 6 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Draw the schematic diagram for Earth Loop Path due to Earth Fault in TNS system. | CO6 | U | 6 |
|  | b. | How electricians test continuity of protective conductors and list the Benefits of Continuity Testing? | CO6 | R | 6 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| **CO1** | Describe the effects of electrical hazards on human body. |
| **CO2** | Discover the potential of electrical hazard in the workplace. |
| **CO3** | Identify the right safety procedure/method for the electrical accident that happened. |
| **CO4** | Comprehend on the function of electrical safety equipment’s. |
| **CO5** | Apply the appropriate electrical safety code prescribed by the regulatory bodies. |
| **CO6** | Test the electrical safety systems and apply them in real-time applications. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | 1 | 4 | - | 6 | - | 12 | 23 |
| **CO2** | 7 | 6 | - | 3 | - | - | 16 |
| **CO3** | 1 | 12 | - | 4 | - | - | 17 |
| **CO4** | 14 | 9 | - | - | - | - | 23 |
| **CO5** | 16 | 6 | - | - | - | - | 22 |
| **CO6** | 6 | 8 | - | 9 | - | - | 23 |
|  | | | | | | | **124** |

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**END SEMESTER EXAMINATION – NOV / DEC 2024**

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| --- | --- | --- | --- |
| **Course Code** | **19EE2040** | **Duration** | **3hrs** |
| **Course Title** | **AI FOR ELECTRIC AND HYBRID VEHICLES** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | Name any two environments in which AI agents operate. | | CO1 | R | 1 |
| 2. | Define the term ‘heuristic’ in AI. | | CO1 | R | 1 |
| 3. | Indicate the primary purpose of a closed list in search algorithms. | | CO2 | U | 1 |
| 4. | Represent the algorithm in which the open list is typically sorted by the estimated cost. | | CO2 | U | 1 |
| 5. | Write one application of Bayesian networks. | | CO3 | A | 1 |
| 6. | Determine the probability of drawing an Ace from a deck of 52 playing cards. | | CO3 | A | 1 |
| 7. | Indicate the purpose of value iteration in a Markov Decision Process (MDP). | | CO4 | U | 1 |
| 8. | Name the two main components of a Partially Observable MDP (POMDP) | | CO4 | R | 1 |
| 9. | Represent the purpose of the Q-value in Q-learning. | | CO5 | U | 1 |
| 10. | In battery modeling, indicate the purpose of modeling the battery's state of charge (SOC). | | CO6 | U | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Give an overview of tree and graph structures and their relevance in AI. | | CO1 | U | 3 |
| 12. | Differentiate between depth-first search (DFS) and breadth-first search (BFS). | | CO2 | U | 3 |
| 13. | Write the mathematical representations of joint probability and conditional probability. | | CO3 | A | 3 |
| 14. | Compare deterministic MDP with stochastic MDP. | | CO4 | U | 3 |
| 15. | Discuss the main goal of adaptive dynamic programming in reinforcement learning. | | CO5 | U | 3 |
| 16. | List two key differences between Q-learning and SARSA in reinforcement learning. | | CO6 | R | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | |
| 17. | a. | Discuss the role and importance of agents and environments in AI. | CO1 | An | 6 |
|  | b. | Explain state-space representation in problem-solving with an example. | CO1 | U | 6 |
|  |  |  |  |  |  |
| 18. | a. | Design a Tic-Tac-Toe game using the Minimax algorithm. | CO2 | C | 6 |
|  | b. | Employ a Breadth-First Search (BFS) on the following graph, beginning from vertex ‘S’. | CO2 | A | 6 |
|  |  |  |  |  |  |
| 19. |  | Describe the structure and components of a Bayesian network. | CO3 | U | 12 |
|  |  |  |  |  |  |
| 20. |  | Given a simple MDP with 3 states and corresponding reward functions, apply the value iteration method to compute the optimal policy. Explain each step of the process. | CO4 | A | 12 |
|  |  |  |  |  |  |
| 21. |  | Differentiate between Passive and Active Reinforcement Learning in terms of policy improvement. Discuss when each approach is more suitable for different applications. | CO5 | U | 12 |
|  |  |  |  |  |  |
| 22. |  | Given the initial state of an 8-puzzle problem and the final state to be reached. Compute the most cost-effective path to reach the final state from the initial state using the A\* Algorithm. | CO2 | A | 12 |
|  |  |  |  |  |  |
| 23. |  | A factory produces 5% of its products with machine A, 10% with machine B, and 85% with machine C. The defect rates for each machine are as follows:  Machine A: 1% of the products are defective  Machine B: 3% of the products are defective  Machine C: 2% of the products are defective  If a product is found to be defective, determine the probability that it was produced by Machine A? Use Bayes' Theorem to calculate the conditional probability. | CO3 | A | 12 |
|  |  |  |  |  |  |
| **COMPULSORY QUESTION** | | | | | |
| 24. |  | Explain how battery modeling contributes to the optimization of energy storage systems in electric vehicles and renewable energy applications. | CO6 | U | 12 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| **CO1** | At the end of this course, students will demonstrate the ability to: Understand the basic structure of AI. |
| **CO2** | Formulate search algorithms for AI |
| **CO3** | Build Bayesian network for typical processes. |
| **CO4** | Formulate Markov decision process. |
| **CO5** | Know the concept of reinforcement learning. |
| **CO6** | Apply reinforcement learning for vehicle power management. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | 2 | 9 | - | 6 | - | - | 17 |
| **CO2** | - | 5 | 18 | - | - | 6 | 29 |
| **CO3** | - | 12 | 17 | - | - | - | 29 |
| **CO4** | 1 | 4 | 12 | - | - | - | 17 |
| **CO5** | - | 16 | - | - | - | - | 16 |
| **CO6** | 3 | 13 | - | - | - | - | 16 |
|  | | | | | | | **124** |



**END SEMESTER EXAMINATION – NOV / DEC 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **20EE1001** | **Duration** | **3hrs** |
| **Course Title** | **BASIC ELECTRICAL AND COMPUTER ENGINEERING** | **Max. Marks** | **100** |

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| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | In a Thermal power plant, \_\_\_\_\_\_ is used to rise the temperature of the steam that comes out of the boiler. | | CO1 | R | 1 |
| 2. | Define earthing. | | CO1 | R | 1 |
| 3. | In a DC machine, \_\_\_\_\_ can be minimized by laminations. | | CO2 | U | 1 |
| 4. | If P = 4 and f= 50Hz, find the synchronous speed of an AC machine. | | CO2 | Ap | 1 |
| 5. | In a Raspberry Pi \_\_\_ bit processor is used. | | CO3 | R | 1 |
| 6. | Name the terminals of MOSFET | | CO3 | R | 1 |
| 7. | Suggest any two essential sensors for food industry. | | CO4 | R | 1 |
| 8. | Identify the Country that introduced the concept of Industry 4.0 | | CO4 | R | 1 |
| 9. | 1 Gigabyte (GB) is equal to \_\_\_\_\_ MB. | | CO5 | R | 1 |
| 10. | \_\_\_\_\_ is a sub-set of AI technique which use statistical methods to enable machines to improve with experience. | | CO6 | U | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Differentiate the safety components: earthing and fuse. | | CO1 | An | 3 |
| 12. | Compare stepper motor with servo motor. | | CO2 | An | 3 |
| 13. | Mention the major functionalities of an embedded system. | | CO3 | R | 3 |
| 14. | List the three major components of cyber physical systems. | | CO4 | R | 3 |
| 15. | Highlight any three differences between RAM with ROM. | | CO5 | An | 3 |
| 16. | Investigate the significance of IoT in Food Industries. | | CO6 | E | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | |
| 17. | a. | Describe the working principle of an induction-type energy meter with a clear diagram. | CO1 | U | 8 |
| b. | Sketch the diagram of fluorescent tube diagram. | CO1 | R | 4 |
|  |  |  |  |  |  |
| 18. | a. | With neat diagram explain the working of DC Motor. | CO2 | U | 8 |
| b. | Compare BLDC motor with Brushed DC Motor. | CO2 | An | 4 |
|  |  |  |  |  |  |
| 19. | a. | Explain the operation of the AND, OR, NOT, NOR, NAND logic gates with the help of truth tables. | CO3 | U | 8 |
| b. | Differentiate Arduino and Raspberry Pi. | CO3 | An | 4 |
|  |  |  |  |  |  |
| 20. | a. | With neat diagram explain the working of Ultrasound Scanner. | CO4 | U | 8 |
| b. | Sketch the diagram of Soil Moisture Sensor Circuit. | CO4 | R | 4 |
|  |  |  |  |  |  |
| 21. |  | Analyze the characteristics of basic network topologies and include relevant diagrams. | CO5 | An | 12 |
|  |  |  |  |  |  |
| 22. | a. | With neat diagram explain the working of Three phase Induction Motor. | CO2 | U | 8 |
| b. | Mention the applications of BLDC Motor. | CO2 | R | 4 |
|  |  |  |  |  |  |
| 23. | a. | Describe the working of stair-case wiring with a neat wiring diagram. | CO1 | U | 8 |
| b. | Compare Lithium Ion and Lithium Polymer Batteries. | CO1 | An | 4 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | With neat diagram explain the need of Smart Grid in the present scenario. | CO6 | U | 8 |
| b. | Mention the applications of AI. | CO6 | R | 4 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| **CO1** | Identify the basics and usage of electric grids, power supply, wiring and safety in domestic and commercial electrical areas. |
| **CO2** | Apply the working of electrical machines in daily life and other applications. |
| **CO3** | Recognize the need of electronic circuits in digital circuits and devices. |
| **CO4** | Identify the characteristics and applications of sensors and transducers. |
| **CO5** | Classify the role of computers in daily and commercial applications. |
| **CO6** | Understand the latest concepts in the computer and electrical trends. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **Ap** | **An** | **E** | **C** | **Total** |
| **CO1** | 6 | 16 | - | 7 | - | - | 29 |
| **CO2** | 4 | 17 | 1 | 7 | - | - | 29 |
| **CO3** | 4 | 9 | - | 4 | - | - | 17 |
| **CO4** | 6 | 11 | - | - | - | - | 17 |
| **CO5** | 1 | - | - | 15 | - | - | 16 |
| **CO6** | 4 | 9 | - | - | 3 | - | 16 |
|  | | | | | | | **124** |

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**END SEMESTER EXAMINATION – NOV / DEC 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **20EE1003** | **Duration** | **3hrs** |
| **Course Title** | **SENSORS AND MEASUREMENT TECHNIQUES IN BIOTECHNOLOGY** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | Write the unit of electric current. | | CO1 | R | 1 |
| 2. | If a charge of 20C requires 10J to move from point A to point B, determine potential difference between points A and B. | | CO1 | A | 1 |
| 3. | Identify the torque which makes the pointer to move over the scale in an indicating instrument. | | CO2 | R | 1 |
| 4. | Which block is used to measure the D.C current in a digital multi meter? | | CO2 | R | 1 |
| 5. | Mention any one material used in capacitive touch screen. | | CO3 | R | 1 |
| 6. | What is the role of ultrasonic vibration and ceramic crystal arrangement in inkjet recorder? | | CO3 | U | 1 |
| 7. | Name any one acoustic property that can be sensed by acoustic sensor. | | CO4 | U | 1 |
| 8. | Define the range of a sensor. | | CO4 | U | 1 |
| 9. | Give an example for temperature transducer. | | CO5 | R | 1 |
| 10. | State any one the technologies that supports smart sensors. | | CO6 | U | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Write Faraday’s law of electromagnetic induction. Mention its applications. | | CO1 | U | 3 |
| 12. | Justify the need of brake magnet in induction type energy meter. | | CO2 | U | 3 |
| 13. | Identify the advantages of LCD display. | | CO3 | U | 3 |
| 14. | Define calibration. Why calibration is essential in measurements? | | CO4 | U | 3 |
| 15. | State any three medical applications of humidity sensors. | | CO5 | U | 3 |
| 16. | List the intelligent functions that can be carried away by smart sensors. | | CO6 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q.No 17 to 23, Q.No 24 is Compulsory)** | | | | | |
| 17. | a. | Define resistance. How will you find the value of the resistance from the colour code? | CO1 | A | 6 |
|  | b. | Find the unknown currents using Kirchhoff’s current law.  i)  ii) | CO1 | An | 6 |
|  |  |  |  |  |  |
| 18. | a. | With a neat diagram of PMMC instrument, explain its working principle. | CO2 | U | 6 |
|  | b. | Draw the schematic of Wheatstone bridge. Explain how it is used for measuring unknown resistance. | CO2 | U | 6 |
|  |  |  |  |  |  |
| 19. |  | Explain the role of each block in a digital energy meter with a schematic. | CO2 | U | 12 |
|  |  |  |  |  |  |
| 20. | a. | Illustrate the waveform display mechanism of a digital storage oscilloscope (DSO). | CO3 | U | 6 |
|  | b. | Outline the recording mechanism used in servo recorder. | CO3 | U | 6 |
|  |  |  |  |  |  |
| 21. | a. | Interpret the importance of accuracy and precision in measuring instruments. | CO4 | U | 6 |
|  | b. | Summarize the characteristics, construction and working Photo Resistor. | CO4 | U | 6 |
|  |  |  |  |  |  |
| 22. | a. | Describe the schematic of Biosensors and write the role of each component. | CO4 | U | 6 |
|  | b. | Explore the importance of E-Nose in biotechnology. Present the layout of E-Nose. | CO4 | U | 6 |
|  |  |  |  |  |  |
| 23. |  | With simple diagram, explain the working of capacitive proximity sensor. State few industrial applications of capacitive proximity sensor. | CO5 | U | 12 |
| **COMPULSORY QUESTION** | | | | | |
| 24. |  | Smart sensors can be applied for health monitoring and diagnosis. Justify with a functional diagram. | CO6 | A | 12 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Understand the basic circuit components. |
| CO2 | Describe working of the electronic measuring instruments. |
| CO3 | Know the different display and recording devices. |
| CO4 | Identify sensors and instruments needed for measurement and control. |
| CO5 | Know the working principle and the characteristics of different transducers. |
| CO6 | Choose suitable smart sensors for various biotechnology applications. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / BL | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 1 | 3 | 7 | 6 |  |  | 17 |
| CO2 | 2 | 27 |  |  |  |  | 29 |
| CO3 | 1 | 16 |  |  |  |  | 17 |
| CO4 |  | 29 |  |  |  |  | 29 |
| CO5 | 1 | 15 |  |  |  |  | 16 |
| CO6 | 1 | 3 | 12 |  |  |  | 16 |
|  | | | | | | | **124** |

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**END SEMESTER EXAMINATION – NOV / DEC 2024**

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| **Course Code** | **20EE2001** | **Duration** | **3hrs** |
| **Course Name** | **ELECTRIC VEHICLE DESIGN** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | The ratio of electric motor power to the sum of electric motor power and IC engine power is defined as \_\_\_\_\_\_. | | CO1 | R | 1 |
| 2. | A process that uses waste energy to produce heat or electricity is called \_\_\_\_\_\_\_\_. | | CO1 | R | 1 |
| 3. | \_\_\_\_\_\_ device is preferred for DC Chopper operation due to its high switching frequency. | | CO2 | R | 1 |
| 4. | The \_\_\_\_\_\_sensor is used in BLDC motor to analyse the rotor position. | | CO2 | R | 1 |
| 5. | The State of Discharge (SoD) of a fully charged battery is \_\_\_\_\_. | | CO3 | R | 1 |
| 6. | The SOD value of a fully charged battery is\_\_\_\_\_. | | CO3 | R | 1 |
| 7. | The main factors controlling co-efficient of rolling resistance (μrr) are the type of \_\_\_\_\_ and the tyre \_\_\_\_\_\_. | | CO4 | U | 1 |
| 8. | The expression for the effect of aerodynamic drag force (Fad) on a vehicle is given by \_\_\_\_\_\_\_\_\_\_\_. | | CO4 | R | 1 |
| 9. | A device which gives an electrical output by detecting the changes in quantities or events can be defined as a \_\_\_\_\_\_\_\_. | | CO5 | U | 1 |
| 10. | Define Machine Learning. | | CO6 | U | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Mention the types of batteries used in EV. | | CO1 | R | 3 |
| 12. | List the types of Induction Motor. | | CO2 | R | 3 |
| 13. | Draw the Electric Drive Train Diagram. | | CO3 | U | 3 |
| 14. | Sketch the dynamic model of a DC Motor. | | CO4 | U | 3 |
| 15. | Mention any three optimization methods used in AI. | | CO5 | U | 3 |
| 16. | Provide a comparative analysis of the electric vehicles Audi E-tron and BMW iX. | | CO6 | An | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | |
| 17. | a. | Describe the historical development of Electric Vehicle. | CO1 | U | 8 |
| b. | Distinguish Lithium ion and Lithium Polymer Batteries. | CO1 | U | 4 |
|  |  |  |  |  |  |
| 18. |  | Explain the operation of C-Dump Converter for Switched Reluctance Motor (SRM) with neat diagram and waveforms. | CO2 | U | 12 |
|  |  |  |  |  |  |
| 19. | a. | Determine the aero dynamic and rolling resistance design consideration of vehicle with necessary equations and diagrams. | CO3 | U | 8 |
| b. | If the μrr is 0.010, m=500Kg, g=9.81m/s2 and v=100km/h, calculate the rolling drag Frr and power needed to overcome rolling Prr. | CO3 | Ap | 4 |
|  |  |  |  |  |  |
| 20. |  | Deliberate the DC Motor modelling with necessary diagrams and equations. | CO4 | U | 12 |
|  |  |  |  |  |  |
| 21. |  | Illustrate the history, system model and operation level of a self-driving car. | CO5 | U | 12 |
|  |  |  |  |  |  |
| 22. | a. | Elucidate the total tractive effort in the analysis of an electric vehicle performance modelling with necessary diagrams. | CO3 | U | 8 |
| b. | Compare BLDC Motor with Brushed DC Motor with respect to performance. | CO2 | An | 4 |
|  |  |  |  |  |  |
| 23. | a. | Explain the benefits of AI based EV compared to conventional PI control of EV with necessary diagrams. | CO5 | U | 8 |
| b. | Outline the basic SRM drive system. | CO2 | U | 4 |
| **COMPULSORY QUESTION** | | | | | |
| 24. |  | With a case study, analyze the EV Models “Nissan Leaf” and “GM EV1” | CO6 | An | 12 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| **CO1** | Realize the need of Electric vehicles |
| **CO2** | State different types of Electric & Hybrid Vehicles |
| **CO3** | Use the energy on-board optimally |
| **CO4** | Understand the design and mathematical modelling of EV and drives |
| **CO5** | Analyze the latest control techniques for vehicle control |
| **CO6** | Simulate and observe the behavior of the EV |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **Ap** | **An** | **E** | **C** | **Total** |
| **CO1** | 5 | 12 | - | - | - | - | 17 |
| **CO2** | 5 | 16 | - | 4 | - | - | 25 |
| **CO3** | 2 | 19 | 4 | - | - | - | 25 |
| **CO4** | 1 | 16 | - | - | - | - | 17 |
| **CO5** | - | 24 | - | - | - | - | 24 |
| **CO6** | - | 1 | - | 15 | - | - | 16 |
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**END SEMESTER EXAMINATION – NOV / DEC 2024**

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| --- | --- | --- | --- |
| **Course Code** | **23EE1002** | **Duration** | **3hrs** |
| **Course Title** | **FUNDAMENTALS OF ELECTRICAL AND COMPUTER ENGINEERING** | **Max. Marks** | **100** |

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| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | A single-phase AC supply operates at 230V with a current of 5A. Calculate the power consumed by the load. | | CO1 | A | 1 |
| 2. | Indicate the battery that is used in UPS. | | CO1 | U | 1 |
| 3. | Differentiate servo motor from DC motor. | | CO2 | An | 1 |
| 4. | Give a practical application of the stepper motor. | | CO2 | U | 1 |
| 5. | Sketch the symbol of the PN diode. | | CO3 | R | 1 |
| 6. | Give examples of common semiconductor materials used in electronics. | | CO3 | U | 1 |
| 7. | Indicate the role of sensor in a X-ray machine. | | CO4 | U | 1 |
| 8. | Name the sensor commonly used in aircraft to measure altitude. | | CO4 | R | 1 |
| 9. | Identify what ‘IP’ stands for in ‘IP address’. | | CO5 | R | 1 |
| 10. | Represent the technique in blockchain that ensures data integrity. | | CO6 | U | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | A household energy meter shows a consumption of 100kWh for a billing period. Apply the given tariff of 5 Rs/kWh to calculate the total bill amount. | | CO1 | A | 3 |
| 12. | Give an example to illustrate Lenz’s Law principle. | | CO2 | U | 3 |
| 13. | Summarize the functions of embedded system. | | CO3 | U | 3 |
| 14. | Write the key characteristics of Industry 4.0 that differentiate it from previous industrial revolutions. | | CO4 | A | 3 |
| 15. | MAC address typically associated with software- Justify. | | CO5 | E | 3 |
| 16. | Indicate the key features of 5G technology. | | CO6 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | |
| 17. | a. | Explain the working principle of an induction-type energy meter with a well-labeled diagram. | CO1 | U | 8 |
|  | b. | Compare single-phase and three-phase power systems. Highlighting their applications and advantages. | CO1 | An | 4 |
|  |  |  |  |  |  |
| 18. |  | Elucidate the construction and working principle of a 3-phase Induction motor with the help of a neat diagram. | CO2 | U | 12 |
|  |  |  |  |  |  |
| 19. |  | Sketch a neat diagram of the construction of a Bipolar Junction Transistor (BJT) and explain its working principle. | CO3 | U | 12 |
|  |  |  |  |  |  |
| 20. |  | Explain the working principle of a water level controller. Discuss the various types of sensors used in this application. | CO4 | U | 12 |
|  |  |  |  |  |  |
| 21. |  | Compare LAN, WAN, and MAN. Analyze the factors that affect data transmission speeds in WANs compared to LANs and MANs. | CO5 | An | 12 |
|  |  |  |  |  |  |
| 22. | a. | Illustrate the operation of the AND, OR, NOT, and NOR, gates using the truth table. | CO3 | U | 8 |
|  | b. | Compare the construction of the PN diode with the Zener diode. | CO3 | An | 4 |
|  |  |  |  |  |  |
| 23. |  | Describe the operation of a hydropower plant. Explain the key processes involved in electricity generation with a well-labelled diagram. | CO1 | U | 12 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Represent how cloud computing supports the functionality of IoT systems. Discuss the role of cloud infrastructure in data storage, processing, and real-time analytics for IoT devices. | CO6 | U | 8 |
|  | b. | Sketch and label a diagram of a smart grid system. Explain how different components work together in energy distribution. | CO6 | U | 4 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| **CO1** | Identify the basics and usage of electric grids, power supply, wiring and safety in domestic and commercial electrical areas |
| **CO2** | Apply the working of electrical machines in daily life and other applications. |
| **CO3** | Recognize the need of electronic circuits in digital circuits and devices. |
| **CO4** | Categorize the characteristics and applications of sensors and transducers. |
| **CO5** | Classify the role of computers in daily and commercial applications. |
| **CO6** | Comprehend the latest concepts in the computer and electrical trends. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | - | 21 | 4 | 4 | - | - | 29 |
| **CO2** | - | 16 | - | 1 | - | - | 17 |
| **CO3** | 1 | 24 | - | 4 | - | - | 29 |
| **CO4** | 1 | 13 | 3 | - | - | - | 17 |
| **CO5** | - | 1 | - | 12 | 3 | - | 16 |
| **CO6** | - | 16 | - | - | - | - | 16 |
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**END SEMESTER EXAMINATION – NOV / DEC 2024**

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| **Course Code** | **23EE1005** | **Duration** | **3hrs** |
| **Course Title** | **DESIGN THINKING AND INNOVATION** | **Max. Marks** | **100** |

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| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | Define innovation. | | CO1 | R | 1 |
| 2. | Doing what others have not done is an example for \_\_\_\_\_\_\_\_\_\_\_. | | CO1 | R | 1 |
| 3. | Find the common word: health - taker – less | | CO2 | A | 1 |
| 4. | Compare red hat and white hat person. | | CO2 | U | 1 |
| 5. | Facebook is different from myspace.com – Justify | | CO3 | U | 1 |
| 6. | Name the three characters of Walt Disney method of brain storming. | | CO3 | R | 1 |
| 7. | Give an example for genetic excuse given by a fixed mindset person | | CO4 | A | 1 |
| 8. | Identify the opposite of “Plan A did not work. | | CO4 | A | 1 |
| 9. | Formulate Albert Einstein’s path to success. | | CO5 | A | 1 |
| 10. | Elaborate on the uses of a water wheel. | | CO6 | A | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Identify the characteristics of a creative person with a block diagram. | | CO1 | U | 3 |
| 12. | What if light travelled slower than sound? | | CO2 | A | 3 |
| 13. | Compare the success rate of idea first and need first innovation with a block diagram. | | CO3 | An | 3 |
| 14. | Road to success is bumpy – justify with an example. | | CO4 | A | 3 |
| 15. | Describe empathy. | | CO5 | R | 3 |
| 16. | Differentiate a traditional thinker and a design thinker. | | CO6 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | |
| 17. |  | Identify the ways to boost a person’s entrepreneurial creativity. | CO1 | U | 12 |
|  |  |  |  |  |  |
| 18. |  | Enumerate the three major components of creativity with example.  (Passion+ Knowledge & Experience+ Method) | CO2 | U | 12 |
|  |  |  |  |  |  |
| 19. |  | Elucidate the seven myths of innovation with one example each. | CO3 | A | 12 |
|  |  |  |  |  |  |
| 20. |  | Compare new-new and new-old approach of entrepreneurial venture with two example each. | CO4 | An | 12 |
|  |  |  |  |  |  |
| 21. |  | Examine the five components critical in developing emotional intelligence. | CO5 | U | 12 |
|  |  |  |  |  |  |
| 22. |  | Apply SCAMPER technique to a coffee mug and draw a mind map for the same. | CO2 | A | 12 |
|  |  |  |  |  |  |
| 23. |  | Identify the ten growth mindset statements. | CO5 | A | 12 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Identify the six core principles of design thinking. | CO6 | U | 6 |
|  | b. | Give any 3 success stories of design thinking. | CO6 | A | 6 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
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|  | **COURSE OUTCOMES** |
| **CO1** | Comprehend the basic vocabulary and concepts of creativity study. |
| **CO2** | Evaluate materials relevant to innovations in educational and business settings based on case studies. |
| **CO3** | Analyse strategies for creative innovation, including product and pedagogical design. |
| **CO4** | Develop creative projects that provide an innovative solution to real‐world problems. |
| **CO5** | Apply effective strategies for designing innovative projects in collaboration with team members. |
| **CO6** | Estimate the strengths and weakness of different start-ups. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | 2 | 15 |  |  |  |  | 17 |
| **CO2** |  | 13 | 16 |  |  |  | 29 |
| **CO3** | 1 | 1 | 12 | 3 |  |  | 17 |
| **CO4** |  |  | 5 | 12 |  |  | 17 |
| **CO5** | 3 | 12 | 13 |  |  |  | 28 |
| **CO6** |  | 9 | 7 |  |  |  | 16 |
|  | | | | | | | **124** |

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**END SEMESTER EXAMINATION – NOV / DEC 2024**

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| --- | --- | --- | --- |
| **Course Code** | **23EE1008** | **Duration** | **3hrs** |
| **Course Title** | **ELECTRIC CIRCUITS AND ELECTRONIC DEVICES** | **Max. Marks** | **100** |

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| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | Indicate the device that is used to store electric energy and release it later. | | CO1 | U | 1 |
| 2. | State Kirchhoff’s current law. | | CO1 | R | 1 |
| 3. | Identify the importance of phase angle in alternating current circuits. | | CO2 | U | 1 |
| 4. | Define apparent power in the AC circuit. | | CO2 | R | 1 |
| 5. | Give an example of a device that converts mechanical energy into electrical energy. | | CO3 | U | 1 |
| 6. | Indicate the motor that is used in toys. | | CO3 | R | 1 |
| 7. | Sketch the symbol of the photodiode. | | CO4 | A | 1 |
| 8. | Give two examples of semiconductor materials. | | CO4 | U | 1 |
| 9. | Indicate the function of the proximity sensor. | | CO5 | U | 1 |
| 10. | List the components used as filters in a power supply. | | CO6 | U | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Differentiate a conductor from an insulator. | | CO1 | U | 3 |
| 12. | Three-phase supply is preferred over single-phase supply in recent days homes - Justify. | | CO2 | E | 3 |
| 13. | State the working principle of a DC generator. | | CO3 | R | 3 |
| 14. | List the applications of the Zener diode. | | CO4 | R | 3 |
| 15. | Differentiate sensors from actuators. | | CO5 | U | 3 |
| 16. | Represent the functions of voltage regulator. | | CO6 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | |
| 17. | a. | Using Kirchhoff’s Law, compute the total current (IT). | CO1 | A | 6 |
|  | b. | Differentiate active components from passive components. Explain three different passive components in detail. | CO1 | U | 6 |
|  |  |  |  |  |  |
| 18. |  | Compute the peak value, average value, RMS value, form factor, and peak factor for the given sinusoidal signal. | CO2 | A | 12 |
|  |  |  |  |  |  |
| 19. |  | Discuss the construction and working of the DC motor with a neat diagram. | CO3 | U | 12 |
|  |  |  |  |  |  |
| 20. |  | Explain the working of the PN junction diode in forward and reverse bias with a suitable illustration and its VI characteristics. | CO4 | U | 12 |
|  |  |  |  |  |  |
| 21. |  | Sketch neatly and explain the operation of linear variable differential transformers (LVDT). | CO5 | U | 12 |
|  |  |  |  |  |  |
| 22. |  | Discuss the operation, biasing, modes, and characteristics of bipolar junction transistors with relevant diagrams. | CO4 | U | 12 |
|  |  |  |  |  |  |
| 23. |  | Explain the construction and working of the transformer with suitable diagrams. | CO3 | U | 12 |
| **COMPULSORY QUESTION** | | | | | |
| 24. |  | Examine the operation of a half-wave rectifier through a circuit diagram, waveform and comprehensive explanation. | CO6 | U | 12 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
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|  | **COURSE OUTCOMES** |
| **CO1** | Compute the electric circuit parameters for simple problems. |
| **CO2** | Comprehend the working principles and applications of electrical machines. |
| **CO3** | Analyse the characteristics of analog electronic devices |
| **CO4** | Infer the operating principles of measuring instruments. |
| **CO5** | Deduce the function of sensors and transducers. |
| **CO6** | Demonstrate the working principle of SMPS. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | 1 | 10 | 6 | - | - | - | 17 |
| **CO2** | 1 | 1 | 12 | - | 3 | - | 17 |
| **CO3** | 4 | 25 | - | - | - | - | 29 |
| **CO4** | 3 | 25 | 1 | - | - | - | 29 |
| **CO5** | - | 16 | - | - | - | - | 16 |
| **CO6** | - | 16 | - | - | - | - | 16 |
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**END SEMESTER EXAMINATION – NOV / DEC 2024**

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| **Course Code** | **23EE2001** | **Duration** | **3hrs** |
| **Course Title** | **ELECTRICAL CIRCUIT ANALYSIS** | **Max. Marks** | **100** |

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| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | What is the dual of node in electrical circuit? | | CO1 | R | 1 |
| 2. | If a charge of 30mC passes through a point in 2ms, determine the current. | | CO1 | A | 1 |
| 3. | State the relationship between Thevenin’s and Norton’s equivalent circuits. | | CO2 | U | 1 |
| 4. | Mention any one application of superposition theorem. | | CO2 | R | 1 |
| 5. | A 100mH inductor is connected in series with a 200Ω resistor. Find the time constant. | | CO3 | A | 1 |
| 6. | Define steady state response. | | CO3 | U | 1 |
| 7. | Two inductors with inductance 1.5H and 2H are connected in series opposing configuration with mutual inductance 0.5 H. Find the equivalent inductance. | | CO4 | An | 1 |
| 8. | Write the condition for parallel resonance. | | CO4 | U | 1 |
| 9. | Represent capacitor in frequency domain. | | CO5 | U | 1 |
| 10. | State the condition of a reciprocal network in terms of admittance parameters. | | CO6 | U | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Define dependent source. List the different types of dependent sources. | | CO1 | U | 3 |
| 12. | Explain compensation theorem. | | CO2 | U | 3 |
| 13. | A series RLC circuit with R=5Ω, L=0.1 H and C=500µF is subjected to a step voltage. Find the nature of the transient response. | | CO3 | An | 3 |
| 14. | With the help of phasor diagram, derive the relationship between phase and line voltages of a three phase star connected system. | | CO4 | A | 3 |
| 15. | For the given circuit find the transfer function. Also, find the poles and zeros. | | CO5 | An | 3 |
| 16. | Draw the equivalent circuit representation of a two port network in terms of hybrid parameters. | | CO6 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q.No 17 to 23, Q.No 24 is Compulsory)** | | | | | |
| 17. | a. | Define inductance. How v and i are related in an inductor? | CO1 | U | 4 |
|  | b. | Find the branch currents using node analysis. | CO1 | An | 8 |
|  |  |  |  |  |  |
| 18. | a. | Define electric circuit and explain its components. | CO1 | U | 4 |
|  | b. | For the given circuit, find the mesh current equations in matrix form by inspection. Also, obtain the mesh currents. | CO1 | An | 8 |
|  |  |  |  |  |  |
| 19. |  | Apply superposition theorem to find current through 3Ω resistor. | CO2 | A | 12 |
|  |  |  |  |  |  |
| 20. |  | Apply Thevenin’s theorem to find current through 4Ω resistor. | CO2 | A | 12 |
|  |  |  |  |  |  |
| 21. |  | In the given circuit, the switch is closed at t=0. Find the expression for transient current and transient voltage across the capacitor. Find the time taken for the capacitor to charge 50% and 70%. of the final value. | CO3 | An | 12 |
|  |  |  |  |  |  |
| 22. |  | A coil of resistance 5Ω and inductance 120mH is connected in series with a 100μF capacitor. This series combination is connected to a 230V, 50 Hz supply. Calculate (i) the impedance of the circuit, (ii) the current in the circuit, (iii) the voltage across each component, (iv) the circuit phase angle (v) power factor of the circuit (vi) real power, reactive power and apparent power. Also, draw the phasor diagram and power triangle. | CO4 | An | 12 |
|  |  |  |  |  |  |
| 23. |  | Find the current through the inductor in frequency domain by applying Laplace transform. Supply voltage is represented by . R=5Ω, L=800mH and C=2F | CO5 | A | 12 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Draw the parallel connection of two port networks and derive the overall admittance parameters. | CO6 | An | 4 |
|  | b | Find the impedance parameters of the given two port network. | CO6 | An | 8 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

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|  | **COURSE OUTCOMES** |
| CO1 | Analyse the circuits using Mesh analysis and Nodal analysis techniques. |
| CO2 | Apply network theorems for solving the problems of electric circuits and networks. |
| CO3 | Formulate the transient behavior of RL, RC and RLC networks as differential equations. |
| CO4 | Explain fundamental concepts of single phase and three phase AC circuits. |
| CO5 | Utilize Laplace transforms to find the transient response of circuits. |
| CO6 | Solve the two-port networks for network parameters. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | 1 | 11 | 1 | 16 |  |  | 29 |
| **CO2** | 1 | 4 | 24 |  |  |  | 29 |
| **CO3** |  | 1 | 1 | 15 |  |  | 17 |
| **CO4** |  | 1 | 3 | 13 |  |  | 17 |
| **CO5** |  | 1 |  | 15 |  |  | 16 |
| **CO6** |  | 4 |  | 12 |  |  | 16 |
|  | | | | | | | **124** |

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**END SEMESTER EXAMINATION – NOV / DEC 2024**

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| --- | --- | --- | --- |
| **Course Code** | **23EE2002** | **Duration** | **3hrs** |
| **Course Title** | **ANALOG ELECTRONIC CIRCUITS** | **Max. Marks** | **100** |

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| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | Define depletion region. | | CO1 | U | 1 |
| 2. | Draw the output waveform of a full-wave rectifier. | | CO6 | U | 1 |
| 3. | Write the transistor current equation. | | CO1 | R | 1 |
| 4. | State one desirable property of MOSFET. | | CO4 | U | 1 |
| 5. | Draw the symbol of P-Channel E-MOSFET. | | CO1 | U | 1 |
| 6. | Noise level is low in JFET compared to that of BJT. Justify. | | CO2 | An | 1 |
| 7. | Write the two ways of sampling the output signal in feedback amplifiers. | | CO3 | A | 1 |
| 8. | Calculate the frequency of the three stage RC Phase-Shift Oscillator if R=100kΩ,C=0.01µF | | CO6 | An | 1 |
| 9. | Define the dark current of a photodetector. | | CO5 | U | 1 |
| 10. | List any two applications of optocouplers. | | CO5 | R | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Draw the reverse bias characteristics of a Zener diode. Mention how this characteristics is utilized for practical application. | | CO1 | A | 3 |
| 12. | Derive the expression for current gain of a BJT amplifier with the help of h-parameters. | | CO3 | An | 3 |
| 13. | A JFET has a drain current of 4 mA. If *IDSS* is 8 mA and *Vgs(off)* is -6 volts, find the values of *Vgs* and *Vp* | | CO4 | A | 3 |
| 14. | An amplifier has voltage gain with negative feedback of 100. If the gain without feedback changes by 20% and the gain with feedback should not vary more than 2%, determine the value of open-loop gain and feedback ratio. | | CO2 | A | 3 |
| 15. | List the desirable properties of crystal oscillators. | | CO6 | R | 3 |
| 16. | Examine the characteristics of GaAs semiconductor devices and map them with their applications. | | CO5 | An | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | |
| 17. | a. | How will you analyze the clamper circuit? Give step-by-step procedure. | CO1 | An | 5 |
|  | b. | Draw the block diagram of a regulated power supply. Analyze the role of each block with waveforms. | CO6 | An | 7 |
|  |  |  |  |  |  |
| 18. |  | A silicon transistor is used with fixed bias. *VCC*=8 volts, *RC*=3kΩ, *RB*=600 kΩ and *β*=150. Find the Q-point. Draw the DC load line. Also, find the stability factor and comment about the stability. | CO2 | A | 12 |
|  |  |  |  |  |  |
| 19. |  | With neatly drawn drain and transfer characteristics, explain different operating regions of N-Channel JFET. | CO1 | U | 12 |
|  |  |  |  |  |  |
| 20. |  | For the given MOSFET Amplifier, find *Rin,* R*out* and A*V* using small signal model. Device constant = 0.4×10-3, threshold voltage = 2 volts, *rd* =300Ω. Also, find the peak value of the output voltage. | CO4 | A | 12 |
|  |  |  |  |  |  |
| 21. |  | With the help of small signal model of the MOSFET, derive the expression for input resistance, output resistance and voltage gain of a common gate MOSFET amplifier. | CO4 | An | 12 |
|  |  |  |  |  |  |
| 22. | a. | An amplifier has voltage gain of 400, lower cut-off frequency of50Hz, higher cut-off frequency of200kHz and a distortion of 10% without feedback. Determine the values of voltage gain, lower cut-off frequency, higher cut-off frequency and distortion with feedback, if the feedback ratio is 0.01. | CO3 | A | 5 |
|  | b. | Explain about current-shunt connection in feedback amplifiers. | CO2 | U | 7 |
|  |  |  |  |  |  |
| 23. |  | Draw the circuit of Colpitts oscillator. Analyze its working with respect to the condition for oscillation. | CO6 | An | 12 |
| **COMPULSORY QUESTION** | | | | | |
| 24. |  | Explain the construction, working, characteristics and applications of photo diodes. | CO5 | U | 12 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

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|  | **COURSE OUTCOMES** |
| **CO1** | Understand the characteristics and applications of electronic devices such as diode, BJTs, FET MOSFETs and op-amp |
| **CO2** | Compare various biasing methods for the BJT and MOSFET amplifiers |
| **CO3** | Construct BJT and MOSFET based amplifier circuits with various configurations. |
| **CO4** | Calculate the small signal modelling parameters for a given equivalent circuit. |
| **CO5** | Develop applications using special electronic devices |
| **CO6** | Simulate various electronic circuits and analyze its performance |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | 1 | 14 | 3 | 5 |  |  | 23 |
| **CO2** |  | 7 | 15 | 1 |  |  | 23 |
| **CO3** |  |  | 6 | 3 |  |  | 9 |
| **CO4** |  | 1 | 15 | 12 |  |  | 28 |
| **CO5** |  | 13 |  | 4 |  |  | 17 |
| **CO6** | 3 | 1 |  | 20 |  |  | 24 |
|  | | | | | | | **124** |

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**END SEMESTER EXAMINATION – NOV / DEC 2024**

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| **Course Code** | **23EE2003** | **Duration** | **3hrs** |
| **Course Title** | **DIGITAL ELECTRONICS** | **Max. Marks** | **100** |

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| **Q.**  **No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)**  **(Answer all the questions)** | | | | | |
| 1. | State DeMorgan’s theorem. | | CO1 | R | 1 |
| 2. | Convert the given gray code 10011 into binary number. | | CO2 | U | 1 |
| 3. | Define data distributor. | | CO3 | R | 1 |
| 4. | Identify the combinational circuit that converts binary information from 2n input lines to n output lines. | | CO3 | U | 1 |
| 5. | Sketch the graphic symbol of SR flip flop. | | CO4 | A | 1 |
| 6. | Infer the characteristic equation of D flip flop. | | CO4 | An | 1 |
| 7. | Identify the basic building block of a combinational circuit. | | CO3 | U | 1 |
| 8. | Determine the number of flip flops required to design 4-bit synchronous down-counter. | | CO4 | A | 1 |
| 9. | Interpret the steps recommended for designing an asynchronous system. | | CO5 | U | 1 |
| 10. | Develop the Verilog code for 4 x 2 Encoder. | | CO6 | A | 1 |
| **PART – B (6 X 3 = 18 MARKS)**  **(Answer all the questions)** | | | | | |
| 11. | Visualize a 2 input OR gate and NOT gate using NAND gate. | | CO1 | R | 3 |
| 12. | Illustrate the logical expression for a Half adder using K-map. | | CO2 | An | 3 |
| 13. | Compare level and edge triggering. | | CO4 | U | 3 |
| 14. | List the applications of shift register. | | CO4 | R | 3 |
| 15. | Construct the excitation table of T flip-flop. | | CO5 | A | 3 |
| 16. | Categorize the types of Verilog modelling with suitable examples. | | CO6 | An | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q.No. 17 to 23, Q.No. 24 is Compulsory)** | | | | | |
| 17. | a. | Solve the following Boolean expression using K-Map method.  F (A, B, C, D) = Σ m(0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10) + Σd (11, 13, 15) by using K-map. | CO2 | A | 6 |

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|  | b. | Predict the following Boolean expression using K-map method | CO2 | A | 6 |
|  |  |  |  |  |  |
| 18. |  | Design a 1 x 8 Demultiplexer from its truth table and draw the logic diagram. | CO3 | A | 12 |
|  |  |  |  |  |  |
| 19. |  | Design and draw the timing diagram of a 3-bit asynchronous counter and its operation. | CO4 | A | 12 |
|  |  |  |  |  |  |
| 20. | a. | Enumerate in detail the design and working of 4-bit SIPO shift register. | CO4 | U | 8 |
|  | b. | Categorize the different types of triggering techniques in clock pulse with respect to its speed. | CO4 | An | 4 |
|  |  |  |  |  |  |
| 21. |  | Design a sequence detector that detect the sequence of 1001 using T flip flop. | CO5 | A | 12 |
|  |  |  |  |  |  |
| 22. |  | Differentiate Encoder and Decoder with its functions and represent the truth table and circuit diagram for both. | CO1 | An | 12 |
|  |  |  |  |  |  |
| 23. |  | Explain a 2-bit magnitude comparator with its truth table and logical equation using k-map. | CO2 | A | 12 |
| **COMPULSORY QUESTION** | | | | | |
| 24. |  | Deign a full adder and half subtractor using the dataflow modelling in Verilog HDL code. | CO6 | A | 12 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

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|  | **COURSE OUTCOMES** |
| CO1 | Employ Boolean algebra concepts to design digital circuits, demonstrating the ability to simplify logical expressions, create truth tables, and implement logic functions using gates. |
| CO2 | Design combinational logic circuits to perform specific functions. |
| CO3 | Examine sequential circuits, considering timing constraints and understanding state transitions. |
| CO4 | Implement the Design procedure of Synchronous & Asynchronous Sequential Circuits. |
| CO5 | Classify the principles of memory and Programmable Logic Devices (PLD) in digital systems |
| CO6 | Use simulation tools such as Verilog HDL to model and verify the functionality of digital circuits. |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 4 | - | - | 12 | - | - | 16 |
| CO2 | - | 1 | 24 | 3 | - | - | 28 |
| CO3 | 1 | 5 | 12 | - | - | - | 18 |
| CO4 | 3 | 8 | 14 | 5 | - | - | 30 |
| CO5 | - | 1 | 15 | - | - | - | 16 |
| CO6 | - | - | 13 | 3 | - | - | 16 |
|  | | | | | | | **124** |

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**END SEMESTER EXAMINATION – NOV / DEC 2024**

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| --- | --- | --- | --- |
| **Course Code** | **23EE2004** | **Duration** | **3hrs** |
| **Course Title** | **COMPUTATIONAL ELECTROMAGNETIC FIELDS** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)**  **(Answer all the questions)** | | | | | |
| 1. | Define Cross or Vector product. | | CO1 | R | 1 |
| 2. | The result of the dot product is a \_\_\_\_\_\_\_\_\_\_ quantity. | | CO1 | R | 1 |
| 3. | \_\_\_\_\_\_ will never form a closed loop. | | CO2 | R | 1 |
| 4. | Unit of electric flu density is given by \_\_\_\_\_\_\_ | | CO2 | R | 1 |
| 5. | Permittivity of the free space is \_\_\_\_\_\_\_\_\_ F/m. | | CO3 | R | 1 |
| 6. | Define stoke’s Theorem. | | CO3 | R | 1 |
| 7. | Write poisson’s and laplace ’s equations. | | CO4 | R | 1 |
| 8. | The ratio of the magnitude of conduction current density to displacement current density of the medium is known as \_\_\_\_\_\_\_ | | CO4 | R | 1 |
| 9. | Define skin depth in electro magnetic wave. | | CO5 | R | 1 |
| 10. | The art of subdividing the structure into a convenient number of smaller elements is known as \_\_\_\_\_\_\_\_\_\_\_ | | CO5 | U | 1 |
| **PART – B (6 X 3 = 18 MARKS)**  **(Answer all the questions)** | | | | | |
| 11. | The two vector quantities are given by  Calculate (+) x (). | | CO1 | A | 3 |
| 12. | Define capacitance and capacitors. | | CO2 | R | 3 |
| 13. | State Biot -Savarts law. | | CO3 | R | 3 |
| 14. | Distinguish between solenoid and toroid. | | CO4 | U | 3 |
| 15. | Mention the properties of uniform plane wave. | | CO5 | U | 3 |
| 16. | Explain the concept of meshing in the finite element method. | | CO6 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q.No. 17 to 23, Q.No. 24 is Compulsory)** | | | | | |
| 17. |  | Find the relationship between Cartesian coordinate system and spherical Coordinate system. | CO1 | A | 12 |
|  |  |  |  |  |  |
| 18. | a. | The Force between two charges is 200 N. If the distance between the charges is doubled then find the force between these two charges. | CO2 | A | 6 |
|  | b. | Determine the capacitance equation of a two-dielectric medium. | CO2 | U | 6 |
|  |  |  |  |  |  |
| 19. |  | Derive the expression for the magnetic field due to a rectangular current-carrying loop at the center of the loop. | CO3 | A | 12 |
|  |  |  |  |  |  |
| 20. |  | Apply Ampère’s Law to find Maxwell’s First Equation and evaluate its Implications. Also find out its point form. | CO4 | A | 12 |
|  |  |  |  |  |  |
| 21. |  | Find the magnetic field intensity (H) due to finite and infinite conductor. | CO3 | A | 12 |
|  |  |  |  |  |  |
| 22. | a. | Derive the wave equation in lossy dielectric medium and also find the value of its propagation and attenuation constant. | CO5 | A | 6 |
|  | b. | Derive the expression for Wave Equation in electric field. | CO5 | A | 6 |
|  |  |  |  |  |  |
| 23. | a. | Evaluate the inductance of solenoid of 2500 turns wound uniformly over a length 0.5 m on a cylindrical paper tube 4cm in diameter. The medium is air. | CO2 | A | 6 |
|  | b. | Determine the magnetic field intensity (H) of a circular conductor. | CO3 | A | 6 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Explain Variational and Galerkin Methods used in FEM analysis with suitable example. Apply these methods and explain the automotive crash simulation. | CO6 | A | 6 |
|  | b. | Differentiate Finite Element Method (FEM) and Finite Difference Method (FDM) under various aspects of electromagnetic wave properties. | CO6 | A | 6 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

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|  | **COURSE OUTCOMES** |
| CO1 | Explain the computational techniques for computing fields. |
| CO2 | Apply the techniques to simple real-life problems. |
| CO3 | Formulate and implement the finite-difference Time-domain method. |
| CO4 | Identify conventional and state-of-the-art computational electromagnetic techniques for modelling rotating machines and Actuators. |
| CO5 | Apply electromagnetic wave theories and tools for the applications of wave propagation, radiation, scattering, and in particular, wireless communications. |
| CO6 | Explain the systematically numerical techniques for solving generalized practical electromagnetic problems |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 2 |  | 15 |  |  |  | 17 |
| CO2 | 5 | 6 | 12 |  |  |  | 23 |
| CO3 | 5 |  | 30 |  |  |  | 35 |
| CO4 | 2 | 3 | 12 |  |  |  | 17 |
| CO5 | 1 | 4 | 12 |  |  |  | 17 |
| CO6 |  | 3 | 12 |  |  |  | 15 |
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**END SEMESTER EXAMINATION – NOV / DEC 2024**

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| **Course Code** | **23EE2031** | **Duration** | **3hrs** |
| **Course Title** | **OBJECT ORIENTED PROGRAMMING** | **Max. Marks** | **100** |

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| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | List the three access specifiers in object-oriented programming. | | CO1 | R | 1 |
| 2. | Predict the output of the following C++ code:  #include <iostream>  using namespace std;  int main()  {  char c1='A';  char c2='\f';  cout<<c1<<c2<<c1<<endl;  return 0;  } | | CO2 | An | 1 |
| 3. | Explain the purpose of type conversion in C++. | | CO1 | A | 1 |
| 4. | Analyze the output of the code segment below:  #include <iostream>  using namespace std;  int main()  {  cout<<"Hello World";  main();  return 0;  } | | CO2 | An | 1 |
| 5. | Determine the output of the following code segment:  #include <iostream>  using namespace std;  class Rectangle {  public:  int length, breadth;  Rectangle(int l, int b) {  length = l;  breadth = b;  cout << length \* breadth << endl;  }  };  int main() {  Rectangle rect(5, 6);  return 0;  } | | CO3 | A | 1 |
| 6. | List any two types of inheritance in C++. | | CO3 | R | 1 |
| 7. | Identify the error in the following C++ code:  #include <iostream>  using namespace std;  int main() {  int a = 5;  char b="hi";  cout << a << b << endl;  return 0;  } | | CO1 | R | 1 |
| 8. | Explain the purpose of the ‘delete’ operator in C++. | | CO4 | An | 1 |
| 9. | Describe the purpose of the ‘ofstream’ class in file handling. | | CO6 | A | 1 |
| 10. | Explain the concept of function overloading in C++. | | CO5 | A | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Construct a C++ program to illustrate the significance of logical operators. | | CO2 | A | 3 |
| 12. | Explain the significance of classes and objects with an example program. | | CO3 | A | 3 |
| 13. | Differentiate between static and dynamic memory allocation in C++. | | CO3 | An | 3 |
| 14. | Explain how protected inheritance differs from private inheritance in object-oriented programming. | | CO4 | An | 3 |
| 15. | Find errors in the following code segment and debug them.  #include <iostream>  using namespace std;  class Rectangle {  private:  int length, width;  public:  Rectangle(int l, int w) : length(l), width(w) {}  void displayArea(Rectangle r);  };  void Rectangle::displayArea(Rectangle r) {  cout << "Area: " << r.length \* r.width << endl;  }  int main() {  Rectangle rect(10, 5);  displayArea(rect);  return 0;  } | | CO5 | E | 3 |
| 16. | Explain the order of constructor execution in multilevel inheritance. | | CO6 | A | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | |
| 17. | a. | Develop a C++ program to implement a simple ATM system using a switch-case statement. | CO2 | A | 9 |
|  | b. | Explain the significance of signed and unsigned data types in C++. | CO2 | A | 3 |
|  |  |  |  |  |  |
| 18. | a. | Describe any two looping statements in C++ and provide examples. | CO1 | U | 6 |
|  | b. | Develop a C++ program to print the following pattern:  1  1 2  1 2 3  1 2 3 4 | CO3 | A | 6 |
|  |  |  |  |  |  |
| 19. |  | Explain the concept of abstraction in C++. Write a C++ program to demonstrate it. | CO3 | A | 12 |
|  |  |  |  |  |  |
| 20. | a. | Create a class called ‘Car’ and define properties like ‘model’, ‘engine\_capacity’, and ‘price’ to examine the importance of constructors and destructors in C++. Implement the class's default and parameterized constructors. Describe how instances of Car can be created using these constructors. | CO3 | C | 9 |
|  | b. | Explain the concept of array of objects in C++. | CO3 | A | 3 |
|  |  |  |  |  |  |
| 21. | a. | Apply the concept of function overloading and implement a C++ program to overload the + operator for two complex number objects. | CO5 | A | 9 |
|  | b. | Develop a C++ program using classes and objects to display the elements of a 2D array. | CO3 | A | 3 |
|  |  |  |  |  |  |
| 22. |  | Construct a C++ program using multiple inheritance, where a derived class inherits properties from two base classes. | CO4 | C | 12 |
|  |  |  |  |  |  |
| 23. | a. | Explain stream classes and stream errors in detail. | CO6 | A | 9 |
|  | b. | Apply and implement the concept of virtual member functions with pointers in C++. | CO4 | A | 3 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Describe the concept of friend functions in C++ and their relationship with classes. Provide a C++ program with examples of friend functions and explain how they can access private members of a class. | CO6 | U | 6 |
|  | b. | Analyze the use of function templates in C++. | CO5 | An | 6 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
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|  | **COURSE OUTCOMES**  Students will be able to: |
| **CO1** | Define the object-oriented programming concepts. |
| **CO2** | Select the relevant object-oriented concepts to implement a real time application. |
| **CO3** | Demonstrate the application of polymorphism in various ways. |
| **CO4** | Illustrate the use of advanced features of C++ such as templates, exceptions, and multiple inheritances. |
| **CO5** | Create applications using inheritance in C++. |
| **CO6** | Explain file management and string manipulation. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | 2 | 6 | 1 | - | - | - | 9 |
| **CO2** | - | - | 15 | 2 | - | - | 17 |
| **CO3** | 1 | - | 28 | 3 | - | 9 | 41 |
| **CO4** | - | - | 3 | 4 | - | 12 | 19 |
| **CO5** | - | - | 10 | 6 | 3 | - | 19 |
| **CO6** | - | 6 | 13 | - | - | - | 19 |
|  | | | | | | | **124** |

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**END SEMESTER EXAMINATION – NOV / DEC 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **23EE2072** | **Duration** | **3hrs** |
| **Course Title** | **DIY SKILLS IN ENGINEERING** | **Max. Marks** | **100** |

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| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)**  **(Answer all the questions)** | | | | | |
| 1. | Expand the term "PASS" method related to fire extinguisher. | | CO1 | U | 1 |
| 2. | Electrical accidents can be prevented by using \_\_\_\_\_\_\_\_ tools and turning off power before work. | | CO1 | R | 1 |
| 3. | Name the type of extinguisher that are suitable for open air Condition. | | CO2 | R | 1 |
| 4. | A \_\_\_\_\_\_\_ is a device used to protect an electrical circuit from damage caused by overload or short circuit. | | CO2 | R | 1 |
| 5. | A \_\_\_\_\_\_\_ circuit is one in which electrical components are connected end-to-end, forming a single path for current flow. | | CO3 | R | 1 |
| 6. | Differentiate between HDD (Hard Disk Drive) and SSD (Solid State Drive) in terms of speed. | | CO3 | U | 1 |
| 7. | Name the component responsible for cooling the engine. | | CO4 | R | 1 |
| 8. | \_\_\_\_\_\_\_\_ cable connects the power supply to the motherboard. | | CO4 | R | 1 |
| 9. | In contract law, the term \_\_\_\_\_\_\_\_\_\_ refers to the act of agreeing to the terms of an offer. | | CO5 | U | 1 |
| 10. | The Indian Penal Code (IPC) is divided into \_\_\_\_\_ sections, grouped into \_\_\_\_\_chapters. | | CO5 | U | 1 |
| **PART – B (6 X 3 = 18 MARKS)**  **(Answer all the questions)** | | | | | |
| 11. | Describe three basic first aid techniques for workplace injuries and explain when each technique should be applied. | | CO1 | U | 3 |
| 12. | Identify the main causes of frequent light bulb burnout and the steps to prevent it. | | CO2 | U | 3 |
| 13. | Develop a comprehensive diagnostic procedure for identifying transmission failure in a four-wheeler. | | CO3 | A | 3 |
| 14. | List three types of ports commonly found on a computer cabinet. | | CO4 | R | 3 |
| 15. | Scenario: A shopper slips and falls in a grocery store due to a wet floor, resulting in an injury. The shopper sues the store for negligence. Explain the key points to argue for each legal scenario mentioned above. | | CO5 | R | 3 |
| 16. | Define "corrosion" in the context of mechanical engineering. | | CO6 | R | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q.No. 17 to 23, Q.No. 24 is Compulsory)** | | | | | |
| 17. | a. | Analyze the significance of selecting proper tools for specific tasks in electrical work and explain how incorrect tool selection can lead to accidents. Include examples to support your answer. | CO1 | An | 6 |
|  | b. | Explain the importance of first aid training in the workplace and propose a basic first aid response plan for common injuries (e.g., cuts, burns, sprains) to enhance worker safety. | CO1 | A | 6 |
|  |  |  |  |  |  |
| 18. |  | Identify and explain the common causes of electrical faults in household appliances such as refrigerators, mixers, and washing machines. How can these faults be diagnosed and repaired? | CO2 | A | 12 |
|  |  |  |  |  |  |
| 19. | a. | Identify any three key factors that contribute to car AC compressor failure. | CO3 | A | 6 |
|  | b. | Identify any three common radiator problem that occurs in a car, also explain about the solution for each problem. | CO3 | A | 6 |
|  |  |  |  |  |  |
| 20. | a. | Describe the function of the SMPS (Switched-Mode Power Supply) which is used in a computer with neat block diagram. | CO4 | U | 6 |
|  | b. | Illustrate the basic layout of a typical domestic wiring system, including live, neutral, and ground wires. | CO2 | U | 6 |
|  |  |  |  |  |  |
| 21. |  | Describe the process of soldering electronic components onto a PCB. What are the key considerations to ensure a strong and reliable solder joint? Include the types of solder and tools required, as well as safety precautions. | CO4 | U | 12 |
|  |  |  |  |  |  |
| 22. | a. | Discuss the significance of workers' rights laws in promoting a safe and fair work environment. | CO5 | U | 6 |
|  | b. | Provide three examples that illustrate how tort law applies in various situations and how individuals or companies may be held liable for causing harm. | CO5 | A | 6 |
|  |  |  |  |  |  |
| 23. | a. | Name any three national and International patent and illustrate about the novelty in those patents. | CO5 | U | 6 |
|  | b. | List any three Personal Protective Equipment (PPE) and explain its function. | CO1 | U | 6 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Identify any three common faults that often occur in electrical systems and discuss their associated issues along with potential solutions. | CO6 | U | 6 |
|  | b. | Describe three frequently occurring faults in chemical engineering processes, including their underlying causes and possible solutions. | CO6 | A | 6 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Identify safety sign and prevent the electrical accidents. |
| CO2 | Classify the problems related to electrical appliances. |
| CO3 | Categorize mechanical devices and identify its faults. |
| CO4 | Recognize and replace various parts of electronic appliances and computers. |
| CO5 | Apply for legal procedures related to the workplace. |
| CO6 | Examine and resolve frequently occurring faults in engineering fields |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 1 | 10 | 6 | 6 |  |  | 23 |
| CO2 | 2 | 9 | 12 |  |  |  | 23 |
| CO3 | 1 | 1 | 15 |  |  |  | 17 |
| CO4 | 5 | 18 |  |  |  |  | 23 |
| CO5 | 3 | 12 | 6 |  |  |  | 23 |
| CO6 | 3 | 6 | 6 |  |  |  | 15 |
|  | | | | | | | **124** |



**END SEMESTER EXAMINATION – NOV / DEC 2024**

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| --- | --- | --- | --- |
| **Course Code** | **23EE2073** | **Duration** | **3hrs** |
| **Course Title** | **DIGITAL FORENSICS** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | Identify the physical evidence leading to a murder conviction (John Toms, England) in 1784. | | CO1 | R | 1 |
| 2. | Define principle of linkage. | | CO1 | R | 1 |
| 3. | Differentiate Compiler and Linker with respect to execution of conditional control statements. | | CO2 | R | 1 |
| 4. | Complete the diagram  Object File  Source File | | CO2 | U | 1 |
| 5. | Mention any one major responsibility of a First Responding Officer in a crime scene. | | CO3 | A | 1 |
| 6. | Diagrammatically represent one outdoor technique used for measuring the evidence. | | CO3 | A | 1 |
| 7. | Name the feature in windows that can hold the copies of files that has been deleted. | | CO4 | R | 1 |
| 8. | Define thumbnails. | | CO4 | R | 1 |
| 9. | Identify the secret message “ Susan eats truffles. Under pressure that helps everything before Owing Major Bullwinkle”. | | CO5 | A | 1 |
| 10. | Recall the email analysis tool used in digital forensics. | | CO6 | R | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Name the system used for the examination of fingerprints. | | CO1 | A | 3 |
| 12. | Binary number system is used in computers – Justify. | | CO2 | U | 3 |
| 13. | Differentiate real and demonstrative evidence with one example each. | | CO3 | An | 3 |
| 14. | Compare hibernate and sleep mode with respect to power usage. | | CO4 | U | 3 |
| 15. | Identify any three types of physical techniques used to hide a secret message. | | CO5 | An | 3 |
| 16. | Devise any 3 features of Aid4Mail forensic tool. | | CO6 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | |
| 17. |  | Elucidate the five core stages of a digital forensics investigation process. | CO1 | U | 12 |
|  |  |  |  |  |  |
| 18. |  | With an example demonstrate the seven parts of an Email header and identify the importance of Email header analysis. | CO2 | A | 12 |
|  |  |  |  |  |  |
| 19. |  | Explain the three methods of sketching with necessary diagram. | CO3 | U | 12 |
|  |  |  |  |  |  |
| 20. |  | Demonstrate the print spooling feature of windows operating system. | CO4 | U | 12 |
|  |  |  |  |  |  |
| 21. |  | Message digest is an effective method used for verification of digital evidences – Justify with an example | CO5 | A | 12 |
|  |  |  |  |  |  |
| 22. |  | Mention any 12 types of commonly occurring cyber crimes. | CO3 | A | 12 |
|  |  |  |  |  |  |
| 23. |  | Paraphrase the checklist of computer forensic analysis and discovery of electronic evidences. | CO5 | U | 12 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Summarize the basic steganography model with a block diagram and compare it with combined crypto-steganography in terms of its efficiency. | CO6 | An | 6 |
|  | b. | Interpret the three types of steganography with one example each. | CO6 | A | 6 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
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|  | **COURSE OUTCOMES** |
| **CO1** | Illustrate Forensic science and Digital Forensic concepts |
| **CO2** | Determine various digital forensic operandi and motive behind cyber-attacks. |
| **CO3** | Interpret the cyber pieces of evidence, digital forensic process model and their legal perspective. |
| **CO4** | Demonstrate various forensic tools to investigate the cybercrime. |
| **CO5** | Categorize the digital pieces of evidence. |
| **CO6** | Analyze the digital evidence used to commit cyber offences. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | 2 | 12 | 3 |  |  |  | 17 |
| **CO2** | 1 | 4 | 12 |  |  |  | 17 |
| **CO3** |  | 12 | 14 | 3 |  |  | 29 |
| **CO4** | 2 | 15 |  |  |  |  | 17 |
| **CO5** |  | 12 | 13 | 3 |  |  | 28 |
| **CO6** | 1 | 3 | 6 | 6 |  |  | 16 |
|  | | | | | | | **124** |



**END SEMESTER EXAMINATION – NOV / DEC 2024**

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| --- | --- | --- | --- |
| **Course Code** | **24EE2081** | **Duration** | **3hrs** |
| **Course Title** | **SENSORS AND MEASUREMENT TECHNIQUES IN BIOTECHNOLOGY** | **Max. Marks** | **100** |

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| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | If the total time-period (T) of an alternating quantity is 20ms, its frequency is \_\_\_\_. | | CO1 | A | 1 |
| 2. | Find the resistance value whose colour code is red, black, orange. | | CO1 | R | 1 |
| 3. | In a 7-segment display, LED segment is in a figure \_\_\_\_ pattern to the display numbers (0-9) and some letters. | | CO2 | R | 1 |
| 4. | \_\_\_\_\_\_\_ torque makes the pointer to show the definite position quickly without any oscillations, in operation of instruments | | CO2 | U | 1 |
| 5. | Give an example for Transducer. | | CO3 | R | 1 |
| 6. | Mention a key characteristic of chemical sensors. | | CO3 | R | 1 |
| 7. | At the airport security checkpoints, \_\_\_\_\_ machines are used to view the contents of bags. | | CO4 | R | 1 |
| 8. | Ultrasound scanner uses \_\_\_\_\_\_\_\_\_\_ effect for its operation. | | CO4 | R | 1 |
| 9. | Identify a key application of intelligent sensors in smart power monitoring systems. | | CO5 | U | 1 |
| 10. | Name an essential component of a smart sensor. | | CO6 | R | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | State the Fleming’s Right-hand Rule. | | CO1 | R | 3 |
| 12. | Write the any three types of digital recorders. | | CO2 | R | 3 |
| 13. | Classify the Sensors based on the conversion phenomenon. | | CO3 | U | 3 |
| 14. | List the any three commonly used sensors for measuring water levels. | | CO4 | R | 3 |
| 15. | Discuss the contributions of smart sensors to patient monitoring in healthcare. | | CO5 | U | 3 |
| 16. | Examine the contribution of big data analytics in enhancing sensor functionalities in biotechnology. | | CO6 | An | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | |
| 17. | a. | State and justify the Kirchhoff’s Laws and Ohm’s Law with necessary circuits. | CO1 | U | 8 |
| b. | For the network shown in figure, calculate the effective resistance and hence the supply current. | CO1 | A | 4 |
|  |  |  |  |  |  |
| 18. | a. | Explain the working of digital voltmeter (DVM) with necessary diagram. | CO2 | U | 8 |
| b. | Compare CRO with DSO with respect to its functionality. | CO2 | An | 4 |
|  |  |  |  |  |  |
| 19. |  | Illustrate the general working, types, and characteristics of Biosensor with necessary diagrams. | CO3 | U | 12 |
|  |  |  |  |  |  |
| 20. | a. | Explain the working of Water Level Indicator with neat diagram. | CO4 | U | 8 |
|  | b. | Sketch the operational diagram of an Ultrasound Scanner. | CO4 | U | 4 |
|  |  |  |  |  |  |
| 21. |  | Investigate a case study on the implementation of a WSN-based smart power monitoring system, highlighting its outcomes and advantages. | CO5 | E | 12 |
|  |  |  |  |  |  |
| 22. | a. | Identify the operation, types, advantages of Nano Bio Sensors using in Biotechnology with neat diagram. | CO3 | U | 8 |
| b. | List the applications of Biosensors. | CO3 | R | 4 |
|  |  |  |  |  |  |
| 23. | a. | Four resistors of 5 Ω, 4 Ω, 5 Ω and 6 Ω are connected in series across 20V supply. Find the equivalent resistance, current and voltage across each resistor and power. | CO1 | Ap | 6 |
|  | b. | Illustrate the working of Digital Energy Meter with neat diagram. | CO2 | U | 6 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Deliberate the working principle, types, and applications of wearable biosensors. Highlight the benefits and challenges associated with their use in healthcare and fitness monitoring. | CO6 | An | 8 |
| b. | Mention the applications of Lab-on-a-Chip Technology. | CO6 | R | 4 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
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|  | **COURSE OUTCOMES** |
| **CO1** | Recall and describe the fundamental principles underlying sensor technology in biotechnology |
| **CO2** | Demonstrate an understanding of various types of measuring instruments used in biotechnology and differentiate between their operating mechanisms |
| **CO3** | Apply sensor principles to design and develop biosensing systems for specific biotechnological applications, such as medical diagnostics or environmental monitoring |
| **CO4** | Synthesize knowledge of sensor technology and biotechnological principles to propose innovative solutions for real-world challenges in healthcare, agriculture, or environmental sustainability |
| **CO5** | Development and deployment of sensor-based technologies in biotechnology |
| **CO6** | Apply sensor calibration technique for accurate measurements |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **Ap** | **An** | **E** | **C** | **Total** |
| **CO1** | 4 | 8 | 11 | - | - | - | 23 |
| **CO2** | 4 | 15 | - | 4 | - | - | 23 |
| **CO3** | 6 | 23 | - | - | - | - | 29 |
| **CO4** | 5 | 12 | - | - | - | - | 17 |
| **CO5** | - | 4 | - | - | 12 | - | 16 |
| **CO6** | 5 | - | - | 11 | - | - | 16 |
|  | | | | | | | **124** |