

**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| **Course Code** | **14EE2009 / 17EE2005** | **Duration** | **3hrs** |
| **Course Name** | **ELECTRICAL MACHINE DESIGN** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | Indicate the material that is generally used in the design of electromagnetic machines. | | CO1 | U | 1 |
| 2. | Represent the circuit that is designed to dissipate heat produced in the machine. | | CO1 | U | 1 |
| 3. | Indicate the type of armature windings present in the DC machine armature. | | CO2 | U | 1 |
| 4. | A 4-pole DC machine has 36 armature conductors. Compute the pole pitch. | | CO2 | A | 1 |
| 5. | Relate copper loss and iron loss in an ideal transformer to have maximum efficiency at a load. | | CO3 | U | 1 |
| 6. | The rotor of the slip ring induction motor is connected to an AC source and the stator is short-circuited. If the rotating magnetic field rotates clockwise, indicate the rotation of the rotor. | | CO3 | U | 1 |
| 7. | A 400, 3-phase, 50 Hz, 4 pole induction motor takes a line current of 10 A with 0.86 pf lagging. Compute the stator input. | | CO4 | A | 1 |
| 8. | Represent the use of damper windings in synchronous generators. | | CO4 | U | 1 |
| 9. | Identify the factor that determines the difference between the types of armature windings. | | CO5 | U | 1 |
| 10. | Indicate the formula used to determine the area of the cross-section of each damper bar. | | CO6 | U | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Represent the significance of the magnetic and electrical loadings in a highly efficient electric machine. | | CO1 | U | 3 |
| 12. | List the main dimensions that play a major role in a rotating electric machine. | | CO2 | R | 3 |
| 13. | State the working principle of a transformer. | | CO3 | R | 3 |
| 14. | The full-load copper loss of a transformer is 1600 W. Calculate the copper loss at the half-load. | | CO4 | A | 3 |
| 15. | Determine the no-load current per cent of the full load current for the output of 37 KW. | | CO5 | A | 3 |
| 16. | List the significance of the Short Circuit Ratio. | | 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. | Explain the factors considered for the choice of electrical and magnetic loading. | CO1 | U | 12 |
|  |  |  |  |  |  |
| 18. | a. | Write down the design procedures for the commutator of the DC machine. | CO2 | A | 12 |
|  |  |  |  |  |  |
| 19. | a. | Calculate the overall dimensions, number of turns in primary and secondary winding of a 400kVA, 2000/400V, 50Hz, Single Phase Shell Type, Oil immersed, Self cooled transformer. The ratio of flux to full load ampere turn is 2.4x10-6. Assume: flux density in core = 1.3wb/m2, current density = 2.7A/mm2, window space factor = 0.26. The ratio of window height to window height is 2.5 and ratio of core depth to width of central limb is 2.5. The stacking factor is 0.9. | CO3 | A | 12 |
|  |  |  |  |  |  |
| 20. | a. | Discuss the rules for the selection of rotor slots for a squirrel cage induction rotor. Compare squirrel cage induction motors with wound rotor motors. | CO4 | U | 12 |
|  |  |  |  |  |  |
| 21. | a. | Explain the procedure involved in designing the number of cooling tubes for the transformer. | CO5 | U | 12 |
|  |  |  |  |  |  |
| 22. | a. | Describe the design procedure of turbo-alternators. | CO6 | U | 12 |
|  |  |  |  |  |  |
| 23. | a. | Develop the output equation of single-phase transformer and three-phase transformer. | CO3 | A | 12 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Relate the reluctance of smooth armature and slotted armature. Also, derive the expression for MMF of airgap. | CO6 | U | 12 |

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

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|  | **COURSE OUTCOMES** |
| **CO1** | Recognize the importance of magnetic and electric loadings. |
| **CO2** | Explain the design of main dimensions of DC and AC rotating machines. |
| **CO3** | Calculate the system parameters for proper design of field coils and armature coils and DC and AC rotating machines. |
| **CO4** | Select a proper winding design of armature coils and deduce the values of armature design parameters of DC and AC rotating machines. |
| **CO5** | Design a transformer and its cooling systems. |
| **CO6** | Predetermine the performances of the DC, AC rotating machines and transformers from the design data. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | - | 17 | - | - | - | - | 17 |
| **CO2** | 3 | 1 | 13 | - | - | - | 17 |
| **CO3** | 3 | 2 | 24 | - | - | - | 29 |
| **CO4** | - | 13 | 4 | - | - | - | 17 |
| **CO5** | - | 13 | 3 | - | - | - | 16 |
| **CO6** | 3 | 25 | - | - | - | - | 28 |
|  | | | | | | | **124** |



**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| **Course Code** | **14EE2010 / 17EE2006 / 18EE2010** | **Duration** | **3hrs** |
| **Course Name** | **POWER ELECTRONICS** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | The power electronic device GTO stands for \_\_\_\_\_\_\_\_\_\_. | | CO1 | R | 1 |
| 2. | Name a power electronic device that has highest switching frequency. | | CO1 | R | 1 |
| 3. | A three-phase, three-pulse, M-3 type controlled converter uses \_\_\_\_\_\_\_\_\_\_\_\_ number of SCRs. | | CO2 | R | 1 |
| 4. | In a single-phase half-wave converter, the average output voltage is maximum when SCR is triggered at ωt = | | CO2 | U | 1 |
| 5. | The primary function of an AC voltage regulator is to converter \_\_\_\_ voltage to \_\_\_\_ voltage without changing the frequency. | | CO3 | R | 1 |
| 6. | Give an example for one stage frequency converter. | | CO3 | A | 1 |
| 7. | In a DC chopper circuit, the output voltage is controlled by adjusting the \_\_\_\_\_\_\_\_ of the chopper switches. | | CO4 | R | 1 |
| 8. | In a step-down chopper circuit, the input voltage is 24 volts and the duty cycle of the chopper is 50%. Calculate the average output voltage. | | CO4 | R | 1 |
| 9. | In a PWM (Pulse Width Modulation) inverter, the width of the output pulses is varied to regulate the \_\_\_\_\_\_\_\_ of the output voltage. | | CO5 | U | 1 |
| 10. | Abbreviate SMPS. | | CO6 | U | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Sketch the V-I characteristics of TRIAC | | CO1 | R | 3 |
| 12. | Compare single phase full and semi controlled converter. | | CO2 | An | 3 |
| 13. | List the applications of cycloconverter. | | CO3 | R | 3 |
| 14. | Draw any one configuration of Two-quadrant DC Chopper. | | CO4 | U | 3 |
| 15. | Compare Voltage Source Inverter and Current Source Inverter. | | CO5 | An | 3 |
| 16. | Classify the HVDC System. | | 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 static and switching characteristics of IGBT with neat diagrams | CO1 | U | 7 |
| b. | Compare Power BJT and Power MOSFET. | CO1 | An | 5 |
|  |  |  |  |  |  |
| 18. | a. | Illustrate the working of single-phase dual converter with necessary diagrams and waveforms. | CO2 | U | 7 |
| b. | List the gate triggering methods for rectifiers. | CO2 | U | 5 |
|  |  |  |  |  |  |
| 19. | a. | Describe the working of single phase to single phase cycloconverter with neat diagrams. | CO3 | U | 7 |
| b. | Mention the applications of AC voltage regulator. | CO3 | U | 5 |
|  |  |  |  |  |  |
| 20. | a. | Estimate the duty ratio, load voltage and load current of the Type A Chopper with clear analysis. | CO4 | An | 12 |
|  |  |  |  |  |  |
| 21. | a. | Explain the 180-degree mode of operation of 3 phase voltage source inverter with necessary diagrams and waveforms. | CO5 | U | 12 |
|  |  |  |  |  |  |
| 22. | a. | Analyse the load voltage, load current, ripple factor of single-phase controlled rectifier with necessary diagrams and waveforms. | CO1 | An | 12 |
|  |  |  |  |  |  |
| 23. | a. | Explain the 120-degree mode of operation of 3 phase voltage source inverter with necessary diagrams and waveforms. | CO5 | U | 12 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | With neat diagrams and waveforms explain the working of super lift luo converter. | CO6 | U | 7 |
| b. | Compare the three major types of multilevel inverters. | CO6 | An | 5 |

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

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|  | **COURSE OUTCOMES** |
| **CO1** | Understand the switching characteristics of power devices and select a suitable power device for power conversion. |
| **CO2** | Design a power converter with criteria (power, efficiency, ripple voltage and current, harmonic distortions, power factor). |
| **CO3** | Implement and verify the performance characteristics of power converters. |
| **CO4** | Interpret terminal characteristics of the components for designing the circuitry for power converters. |
| **CO5** | Estimate the required converters for renewable based applications. |
| **CO6** | Assess the quality of power by analyzing the factors such as harmonics, ripples, etc., |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | 5 | 7 | - | 17 | - | - | 29 |
| **CO2** | 1 | 13 | - | 3 | - | - | 17 |
| **CO3** | 4 | 12 | 1 | - | - | - | 17 |
| **CO4** | 2 | 3 | - | 12 | - | - | 17 |
| **CO5** | - | 25 | - | 3 | - | - | 28 |
| **CO6** | - | 11 | - | 5 | - | - | 16 |
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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| **Course Code** | **14EE2024 / 19EE2032** | **Duration** | **3hrs** |
| **Course Name** | **BASICS OF ELECTRIC AND HYBRID VEHICLE** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | The expression for Rolling resistance force given by \_\_\_\_\_\_\_\_\_\_\_\_. | | CO1 | R | 1 |
| 2. | The ratio of fuel consumption per unit time (in kg/hr) to power produced by engine (in kwh) is called \_\_\_\_\_\_. | | CO1 | R | 1 |
| 3. | In the year \_\_\_\_, Porsche showed his first hybrid car at the Paris exposition. | | CO2 | R | 1 |
| 4. | Give an example for greenhouse gas. | | CO2 | U | 1 |
| 5. | The synchronous speed of an AC machine, if the no. of poles (P) is 4 and frequency (f) is 50Hz is \_\_\_\_\_ rpm.. | | CO3 | R | 1 |
| 6. | Regenerative braking is not possible in a \_\_\_\_ motor. | | CO3 | A | 1 |
| 7. | The ideal aerodynamic shape is a \_\_\_\_\_\_, as achieved by a droplet of water freefalling in the atmosphere. | | CO4 | R | 1 |
| 8. | The expression for the effect of aerodynamic drag force (Fad) on a vehicle is given by \_\_\_\_\_\_\_\_\_\_\_. | | CO4 | R | 1 |
| 9. | The unit of specific power related to battery is \_\_\_\_\_, | | CO5 | U | 1 |
| 10. | In a battery management system, DoD means \_\_\_\_\_\_\_\_\_. | | CO6 | U | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Sketch the transmission of an automobile power train. | | CO1 | R | 3 |
| 12. | Name any three modern EV models/make. | | CO2 | R | 3 |
| 13. | List out the types of DC Motor. | | CO3 | R | 3 |
| 14. | Draw the Electric Drive Train Diagram. | | CO4 | U | 3 |
| 15. | Compare electric and hybrid vehicles. | | CO5 | A | 3 |
| 16. | Classify the energy/power management techniques in EV/HEV. | | 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. | Analyze the various parameters of total tractive effort that influences the performance of a vehicle with necessary diagrams and equations. | CO1 | An | 12 |
|  |  |  |  |  |  |
| 18. | a. | Describe the historical development of electric vehicles. | CO2 | U | 8 |
| b. | Analyse the social and environmental importance of hybrid and electric vehicles. | CO2 | An | 4 |
|  |  |  |  |  |  |
| 19. | a. | Elucidate the four-quadrant operation of chopper-based DC Motor with necessary diagrams and waveforms. | CO3 | U | 8 |
|  | b. | Compare Induction Motor with BLDC Motor. | CO3 | U | 4 |
|  |  |  |  |  |  |
| 20. | a. | Describe the power flow control in hybrid drive-train topologies with necessary diagrams | CO4 | U | 12 |
|  |  |  |  |  |  |
| 21. | a. | Illustrate the working of flywheel with necessary diagrams. | CO5 | U | 6 |
|  | b. | Compare Lithium Ion and Lithium Polymer batteries. | CO5 | U | 6 |
|  |  |  |  |  |  |
| 22. | a. | Examine the fuel cell-based energy storage and its analysis with necessary diagrams and equations. | CO5 | U | 12 |
|  |  |  |  |  |  |
| 23. | a. | Explain the series and parallel hybrid configuration with neat diagrams. | CO2 | U | 6 |
|  | b. | Analyze the major factors that decides the choice of electric propulsion system. | CO3 | An | 6 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | With neat diagrams explain the energy management system of hybrid electric vehicle. | CO6 | U | 12 |

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

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|  | **COURSE OUTCOMES** |
| **CO1** | Explain the functioning of the propulsion system in vehicles |
| **CO2** | Apply the knowledge for selecting suitable combinations of EHV propulsion system |
| **CO3** | Analyze the effect on the characteristic behaviours of EHV |
| **CO4** | Evaluate the performance of the propulsion system for a given scenario |
| **CO5** | Design an Electric Hybrid Propulsion system for a specific application |
| **CO6** | Develop an Energy Management system for Electric Vehicles. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | 5 | - | - | 12 | - | - | 17 |
| **CO2** | 4 | 15 | - | 4 | - | - | 23 |
| **CO3** | 4 | 12 | 1 | 6 | - | - | 23 |
| **CO4** | 2 | 15 | - | - | - | - | 17 |
| **CO5** | - | 25 | 3 | - | - | - | 28 |
| **CO6** | - | 16 | - | - | - | - | 16 |
|  | | | | | | | **124** |



**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | Write the expression for number of mesh currents for the network with B branches and N nodes. | | CO1 | U | 1 |
| 2. | Determine the voltage vx in the circuit given using Kirchhoff’s Voltage Law | | CO1 | An | 1 |
| 3. | A practical circuit is drawn as Thevenin’s equivalent circuit. The value of Thevenin’s equivalent resistance is 5Ω. Obtain the value of Load resistance for maximum power transfer between source to load. | | CO2 | A | 1 |
| 4. | Define form factor | | CO2 | R | 1 |
| 5. | A resistance R and inductance C are connected in series with the dc supply. Write down the expression for the time constant. | | CO3 | U | 1 |
| 6. | A series RLC circuit is connected with the dc supply. Write the condition for under damped condition. | | CO3 | U | 1 |
| 7. | Transform the phasor I=(6+j8)A to a sinusoid. | | CO4 | A | 1 |
| 8. | The Laplace transform of impulse signal is \_\_\_\_\_\_\_\_\_\_ | | CO5 | R | 1 |
| 9. | Write down the condition for symmetrical network interns of h parameters. | | CO6 | U | 1 |
| 10. | Mention any one application of ABCD parameters. | | CO6 | A | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Determine *V*D in the circuit given. | | CO1 | An | 3 |
| 12. | Define and explain Norton’s Theorem. | | CO2 | U | 3 |
| 13. | A series RL circuit with L=1H, R=10Ω, dc source voltage 40V. Assuming initial current through the inductor zero, the expression for the inductor current is i(t)=4(1-e-10t). Obtain the value of inductor current at t=0. | | CO3 | An | 3 |
| 14. | Find the amplitude, phase, period and frequency of the sinusoidal signal *v(t)=*100 sin (314t+450) | | CO4 | A | 3 |
| 15. | Find the initial and final values of time domain function i(t)=2(1-e-5t) | | CO5 | An | 3 |
| 16. | Given Z parameters as [z]=. Determine Y parameters. | | CO6 | A | 3 |
| **eART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | |
| 17. | a. | Determine the current through 800Ω resistor in the network shown in figure using mesh method. | CO1 | A | 12 |
|  |  |  |  |  |  |
| 18. | a. | In the figure shown, Find the value of the current I using superposition theorem. | CO2 | An | 12 |
|  |  |  |  |  |  |
| 19. | a. | The switch in circuit shown was in position1 for a long time to establish a steady state. It is moved from position 1 to position 2 at time t = 0. Obtain the expression foe the voltage across the capacitor at both positions of the switch. | CO3 | An | 12 |
|  |  |  |  |  |  |
| 20. | a. | Obtain the frequency (magnitude and phase) response of RC series circuit. Assume R=5Ω and C=0.5F. | CO5 | An | 12 |
|  |  |  |  |  |  |
| 21. | a. | Obtain the average value, rms value, form factor, crest factor of the given wave. | CO4 | A | 12 |
|  |  |  |  |  |  |
| 22. | a. | Steady state is reached in the circuit shown in figure when the switch is in position 1. At t=0, the switch is moved to position 2. Find the expression for the current at both positions of the switch using Laplace transformation method. | CO5 | An | 12 |
|  |  |  |  |  |  |
| 23. | a. | Determine the currents I1, I2 and I3in the network shown in figure using mesh method. | CO1 | A | 12 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Determine the admittance parameters of the network given in figure. | CO6 | An | 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, explainit, 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 | 24 | 4 |  |  | 29 |
| **CO2** | 1 | 3 | 1 | 12 |  |  | 17 |
| **CO3** |  | 2 |  | 15 |  |  | 17 |
| **CO4** |  |  | 16 |  |  |  | 16 |
| **CO5** | 1 |  |  | 27 |  |  | 28 |
| **CO6** |  | 1 | 4 | 12 |  |  | 17 |
|  | | | | | | | **124** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | Find the power, if a resistor has 3.5 V across it and 2mA current flowing through it. | | CO1 | R | 1 |
| 2. | A series circuit consists of 4.7 KΩ, 5.6 KΩ, 9 KΩ and 10 KΩ resistor. Indicate the resistor which has the more voltage across it. | | CO1 | U | 1 |
| 3. | Tell the condition for maximum power transfer from a source to the load. | | CO2 | R | 1 |
| 4. | Name the dual term of capacitance. | | CO2 | R | 1 |
| 5. | Report the power factor of a 3Ø system if (4+j5)Ω impedance is connected in balanced star load. | | CO3 | U | 1 |
| 6. | List the phase sequences of 3 phase system. | | CO3 | R | 1 |
| 7. | Convert the following time domain voltage to phasor domain voltage  V(t)=50cos(2000t+121.1o) | | CO4 | U | 1 |
| 8. | Find the poles and of the network function. | | CO4 | R | 1 |
| 9. | Define quality factor. | | CO5 | R | 1 |
| 10. | Define driving point impedance. | | CO6 | R | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Write the mesh equation for the circuit. | | CO1 | A | 3 |
| 12. | Explain Tellegen’s Theorem with neat diagram. | | CO2 | U | 3 |
| 13. | Construct the dual network of the following circuit. | | CO3 | A | 3 |
| 14. | List the properties of Laplace Transform used in network theory. | | CO4 | R | 3 |
| 15. | Determine the quality factor and resonant frequency of a coil for the series RLC circuit consisting of R=10 Ω, L=0.1H, C=10µF | | CO5 | A | 3 |
| 16. | Summarize the frequency selective filters with its characteristic diagrams. | | 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. |  | Calculate the current delivered by the source in the circuit shown in below. | CO1 | An | 12 |
|  |  |  |  |  |  |
| 18. |  | Apply Thevenin theorem to determine the current through 2Ω resistor in the circuit shown. | CO2 | A | 12 |
|  |  |  |  |  |  |
| 19. |  | Estimate the phase currents, line currents, power drawn by the load and power factor for the following:  A three-phase balanced star connected load of (5+j4) Ω is connected across a 400V, 3Ø balanced supply. Assume the phase sequence to be RYB. | CO3 | An | 12 |
|  |  |  |  |  |  |
| 20. |  | Determine the steady state response of series RL and series RC circuit using Laplace transform. | CO4 | A | 12 |
|  |  |  |  |  |  |
| 21. | a. | Estimate the steady state response using phasor method. | CO5 | An | 8 |
|  | b. | 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 | 4 |
|  |  |  |  |  |  |
| 22. |  | Determine the value of the load resistor at which maximum power will be transferred to the load. Also determine the maximum power that will be transferred. | CO2 | A | 12 |
|  |  |  |  |  |  |
| 23. |  | Make use of the mesh analysis technique to determine the current flowing through the branch CD. | CO1 | A | 12 |
| **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

|  |  |
| --- | --- |
|  | **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 | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 1 | 1 | 15 | 12 | - | - | 29 |
| CO2 | 2 | 3 | 24 | - | - | - | 29 |
| CO3 | 1 | 1 | 3 | 12 | - | - | 17 |
| CO4 | 4 | 1 | 12 | - | - | - | 17 |
| CO5 | 1 | - | 7 | 8 | - | - | 16 |
| CO6 | 1 | 3 | 12 | - | - | - | 16 |
|  | | | | | | | **124** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **18EE3016** | **Duration** | **3hrs** |
| **Course Name** | **DATA MINING IN RENEWABLE ENERGY 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. | Elaborate on various differences observed in data mining in terms of their structure, format, and characteristics. | CO1 | R | 10 |
|  | b. | Describe the key functionalities utilized in data mining applications and give the different types of data patterns that can be mined. | CO1 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Differentiate between operational database systems and Data Warehouses and give the significance of having a separate Data Warehouse. | CO2 | R | 10 |
|  | b. | Sketch the architecture of Data Warehouse and describe its function. | CO2 | U | 10 |
|  |  |  |  |  |  |
| 3. | a. | Illustrate the decision tree Induction method. | CO3 | R | 10 |
|  | b. | List the issues regarding pre-processing the data during classification and prediction. | CO3 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Categorize and describe the major clustering methods based on their Algorithmic strategy. | CO4 | A | 10 |
|  | b. | Describe the partitioning-based clustering approach. | CO4 | U | 10 |
|  |  |  |  |  |  |
| 5. | a. | List the important factors which influences the solar radiation, and how can they be incorporated into predictive models in solar radiation forecasting? | CO5 | A | 20 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Describe about any two algorithms used for mining frequent patterns. | CO2 | U | 10 |
|  | b. | Enumerate the need for preprocessing the data and discuss the details of the Data cleaning techniques and its significance. | CO2 | A | 10 |
|  |  |  |  |  |  |
| 7. | a. | Describe multidimensional Data Model and Illustrate how the Data Cubes are modelled from table and spreadsheets. | CO3 | U | 10 |
|  | b. | Differentiate the concepts of Data Integration and Data Transformation with suitable example. | CO4 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Explain the role of data analytics in identifying patterns and trends in solar power plant performance data. | CO4 | A | 10 |
|  | b. | Discuss the advantages and limitations of using classification cascades compared to traditional classification methods. | CO5 | U | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Describe the data mining techniques which is commonly used to enhance the accuracy of wind power forecasts. | CO6 | A | 10 |
|  | b. | Discuss the impact of weather forecasting accuracy on wind power prediction models. | CO6 | U | 10 |

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

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| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Understand the importance of data-driven performance optimization of renewable energy system. |
| CO2 | Exploit the vast data base available in the renewable energy sector and devise ways to make renewable energy a competitive source of supply. |
| CO3 | Classify and analysis the different type of data |
| CO4 | Prediction of data with error measures |
| CO5 | Apply data mining for the prediction of power from renewable energy sources |
| CO6 | Find the various research opportunities provided by this field. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 10 | 10 |  |  |  |  | 20 |
| CO2 | 10 | 20 | 10 |  |  |  | 40 |
| CO3 | 10 | 20 |  |  |  |  | 30 |
| CO4 | 10 | 20 | 20 |  |  |  | 50 |
| CO5 |  |  | 20 |  |  |  | 20 |
| CO6 |  | 10 | 10 |  |  |  | 20 |
|  | | | | | | | **180** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **18EE3018** | **Duration** | **3hrs** |
| **Course Name** | **POWER QUALITY ISSUES AND MITIGATION** | **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. |  | Apply power quality standards and electromagnetic compatibility (EMC) regulations to resolve power quality issues in an electrical system, ensuring optimal equipment performance and grid stability. | CO1 | A | 20 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Explain the various types of voltage sags, illustrating each with an appropriate vector diagram and accompanying equations to demonstrate their characteristics and impacts on electrical systems. | CO2 | U | 10 |
|  | b. | Describe capacitor switching transients and explore how capacitor switching transients can be amplified. | CO2 | U | 10 |
|  |  |  |  |  |  |
| 3. |  | Deliberate the construction and working principle of active and passive filters for harmonic mitigation. | CO3 | U | 20 |
|  |  | **(OR)** |  |  |  |
| 4. |  | Analyze the operational principles and diverse applications of DSTATCOM. Evaluate its efficacy in addressing power quality issues and enhancing grid stability. | CO4 | A | 20 |
|  |  |  |  |  |  |
| 5. | a. | Briefly describe the FFT Theory for harmonic extraction process. | CO5 | U | 10 |
|  | b. | Describe the Instantaneous Reactive Power (IRP) theory to extract the harmonic component with the suitable equations. | CO5 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Sketch the CBEMA & ITI curve and explain about events described in the curves. | CO1 | U | 10 |
|  | b. | Examine the source and effects of different categories of long duration voltage Variations. | CO2 | A | 10 |
|  |  |  |  |  |  |
| 7. |  | Examine the operational principles and varied applications of UPQC (Unified Power Quality Conditioner). Assess its effectiveness in rectifying power quality issues and enhancing overall grid stability | CO4 | A | 20 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Explain in detail about general procedure for harmonic distortion evaluation at the point of coupling, utility systems, customer facility and industrial facility. | CO5 | U | 10 |
|  | b. | Classify the various harmonic sources and explain briefly about it. | CO3 | U | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Outline the procedures required for power quality monitoring. Also describe the insights that can be derived from conducting surveys at monitoring sites. | CO6 | A | 10 |
|  | b. | Explain the working and usage of Harmonic Analyzer. | CO6 | U | 10 |

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

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|  | **COURSE OUTCOMES** |
| CO1 | Recognize the cause and source of power system disturbances. |
| CO2 | Calculate harmonic voltages and currents by analyzing all types of electrical systems loads and their power quality considerations. |
| CO3 | Suggest suitable mitigation scheme for some of the power quality issues. |
| CO4 | Examine the methods of reducing excessive harmonics using advanced modeling technique. |
| CO5 | Analyze the power quality issues using the Power quality indices. |
| CO6 | Design load compensators useful for mitigating power quality problems. |

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

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| --- | --- | --- | --- |
| **Course Code** | **18EE3019** | **Duration** | **3hrs** |
| **Course Name** | **DISTRIBUTED GENERATION AND MICRO GRID** | **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. | SLDs helps engineers to identify and mitigate potential issues such as overloads or faults in power systems- Justify. | CO1 | R | 10 |
|  | b. | Illustrate about the effects of solar PV, wind turbines, and microturbines in grid stability and reliability. | CO1 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Discuss about fast-start capabilities in micro turbines. | CO2 | R | 10 |
|  | b. | Describe the role of reciprocating engines in providing backup power and grid support services. | CO2 | U | 10 |
|  |  |  |  |  |  |
| 3. | a. | Discuss any two power electronics topologies which are commonly used in microturbine systems. | CO3 | R | 10 |
|  | b. | List the challenges that arise when integrating power electronics with reciprocating engines. | CO3 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Discuss the ways to ensure safe and effective grounding practices for DG installations. | CO4 | A | 10 |
|  | b. | Explain how the power electronics facilitate efficient reclosing after a fault occurred in the power system network. | CO4 | U | 10 |
|  |  |  |  |  |  |
| 5. |  | State the causes for grid unbalance, and explain the impact of power quality techniques which mitigate the unbalanced grid conditions. | CO5 | A | 20 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Describe about the power quality issues in Microgrid. | CO2 | U | 10 |
|  | b. | Design Distribution Generation system to meet power quality requirements. | CO2 | A | 10 |
|  |  |  |  |  |  |
| 7. | a. | Illustrate the Transient Response and Fault Behaviors in Distribution Generation systems. | CO3 | U | 10 |
|  | b. | Sketch and explain different current injection method for DG systems. | CO4 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Explain in Detail about different IEEE 1547 Standards for DG. | CO4 | A | 10 |
|  | b. | Sketch and explain about Small Hydro Power Generation Method. | CO5 | U | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Explain the role of power electronic converters in microgrids. | CO6 | A | 10 |
|  | b. | Illustrate the Power Electronics Topologies for the Battery Energy Storage Systems. | CO6 | U | 10 |

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

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|  | **COURSE OUTCOMES** |
| CO1 | Define the concept of distributed generation and Impact of DG on Transmission System |
| CO2 | Classify the various distributed generation sources and energy storage |
| CO3 | Outline the general and the power electronic topologies for distributed generation and its interface |
| CO4 | Describe various distributed generation protection scheme |
| CO5 | Analyze the power quality issues of distributed generation. |
| CO6 | Compare the different microgrid architectures and discuss on the risks of 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 | 10 |  |  |  |  | 20 |
| CO2 | 10 | 20 | 10 |  |  |  | 40 |
| CO3 | 10 | 20 |  |  |  |  | 30 |
| CO4 | 10 | 20 | 20 |  |  |  | 50 |
| CO5 |  |  | 20 |  |  |  | 20 |
| CO6 |  | 10 | 10 |  |  |  | 20 |
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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **18EE3022** | **Duration** | **3hrs** |
| **Course Name** | **ELECTRIC AND HYBRID VEHICLES** | **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. | With neat diagrams explain the series, parallel, series-parallel, and complex hybrid configurations of Hybrid Vehicle. | CO1 | U | 20 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Analyze the design and performance of C-dump and Bi-filar converters for SRMs, considering their advantages, drawbacks, and applications, to understand their contributions to SRM efficiency and operation. | CO2 | An | 20 |
|  |  |  |  |  |  |
| 3. | a. | Apply the concept of total tractive effort by illustrating the variations of components that affects the electric vehicle performance. | CO3 | A | 20 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Examine the battery electric vehicle (BEV) modeling principles, dissecting battery characteristics, vehicle dynamics, and powertrain efficiency to optimize performance and energy efficiency. | CO4 | An | 20 |
|  |  |  |  |  |  |
| 5. | a. | Analyze the unique attributes of the hybrid EV Honda Insight through a case study, exploring its technological advancements and market impact to understand its competitive edge in the automotive industry. | CO5 | An | 20 |
| b. | Compare Audi E-tron and BMW iX electric vehicles. |  |  |  |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Explain the four-quadrant operation of chopper-based DC Motor with necessary diagrams and waveforms. | CO2 | U | 14 |
|  | b. | Outline the basic SRM drive system. | CO2 | R | 6 |
|  |  |  |  |  |  |
| 7. | a. | Describe the historical development of Electric Vehicle. | CO1 | U | 14 |
| b. | Distinguish Lithium ion and Lithium Polymer Batteries. | CO1 | An | 6 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | If the μrr is 0.015,m=1500Kg, g=9.81m/s2 and v=100km/h, calculate the rolling drag Frr and power needed to overcome rolling Prr. | CO3 | A | 6 |
| b. | For an Electric Vehicle (EV), if the gear ratio (G) is 6, total tractive effort is 30N and radius of the tyre is 10 m, find the motor torque. | CO3 | A | 4 |
| c. | Find the energy released in a flywheel, if I(moment of inertia) = 2, and ω(angular velocity) = 2 radians per second. Also calculate the energy released when flywheel reduces from 4 to 2 rad/sec. | CO4 | A | 4 |
| d. | Discuss the effect of transmission efficiency and consideration of vehicle mass towards the performance of electric vehicle. | CO4 | U | 6 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Give the step-by-step procedure for Range Estimation of Electric car using MATLAB. | CO6 | A | 20 |

**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 & Hybrid Vehicles. |
| CO3 | Use the energy on-board optimally. |
| CO4 | Understand the merits and demerits of various mathematical models of Electric and hybrid Vehicle. |
| CO5 | Design the EHV using the mathematical Model. |
| CO6 | Simulate and observe the behavior of the EHV. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | - | 34 | - | 6 | - | - | 40 |
| CO2 | 6 | 14 | - | 20 | - | - | 40 |
| CO3 | - | - | 30 | - | - | - | 30 |
| CO4 | - | 6 | 4 | 20 | - | - | 30 |
| CO5 | - | - | - | 20 | - | - | 20 |
| CO6 | - | - | 20 | - | - | - | 20 |
|  | | | | | | | **180** |



**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **19EE2003** | **Duration** | **3hrs** |
| **Course Name** | **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. | Name the semiconductor material mostly used for solar cells. | | CO1 | R | 1 |
| 2. | Identify the equipment used to measure the solar radiation flux. | | CO1 | U | 1 |
| 3. | Name the fluid present in evacuated flat-plate solar collectors. | | CO2 | R | 1 |
| 4. | List the types of thermal energy systems. | | CO2 | R | 1 |
| 5. | Indicate the time duration in which the untreated bio‐medical waste can be kept stored. | | CO3 | U | 1 |
| 6. | Give an example of a waste treatment method not applicable to biomedical wastes. | | CO3 | U | 1 |
| 7. | Indicate the percentage of hospital waste that is considered to be infectious according to WHO. | | CO4 | U | 1 |
| 8. | Show the significance of FGI guidelines for the design of power systems for hospitals and health care. | | CO4 | U | 1 |
| 9. | Define solar autoclave. | | CO5 | R | 1 |
| 10. | Indicate the main composition of biogas. | | CO6 | U | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | List different types of solar cells. | | CO1 | R | 3 |
| 12. | Show the two factors affecting the performance of the flat plate collector system. | | CO2 | U | 3 |
| 13. | Summarize the effect of building heating. | | CO3 | U | 3 |
| 14. | Write the significance of National Electrical Code NFPA 780. | | CO4 | U | 3 |
| 15. | Illustrate the process of Incineration in brief. | | CO5 | U | 3 |
| 16. | Compare and contrast bio-waste with clinical waste. | | 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. |  | Describe the equivalent circuit and the electrical characteristics of the solar cell. | CO1 | U | 12 |
|  |  |  |  |  |  |
| 18. |  | Explain Maximum PowerPoint Tracking (MPPT) with a block diagram. Make use of the flowchart, to explain the Perturb and Observe (P&O) Algorithm used in PV MPPT. | CO2 | U | 12 |
|  |  |  |  |  |  |
| 19. |  | Explain the various stages of biomedical waste management with proper diagrams. | CO3 | U | 12 |
|  |  |  |  |  |  |
| 20. | a. | List the IEEE 519 guidelines for power quality in critical facilities. Show the functionalities of the national electrical code NFPA 70. | CO4 | R | 8 |
|  | b. | Write short notes on disposal and disinfection. | CO4 | U | 4 |
|  |  |  |  |  |  |
| 21. | a. | Design a solar-powered Health clinic with the following critical loads.   |  |  |  | | --- | --- | --- | | **S. No** | **EQUIPMENT** | **POWER RATING(Watts)** | | 1 | Computer | 200 | | 2 | Lights | 70 | | 3 | Fans | 75 | | 4 | Patient Monitor | 35 | | 5 | Volumetric Infusion Pump | 40 | | 6 | Vaccine Refrigerator | 340 | | 7 | Electrosurgical Unit | 1150 | | CO5 | A | 12 |
|  |  |  |  |  |  |
| 22. | a. | With the help of neat diagrams, explain the V-I characteristics of a PV cell. | CO1 | U | 12 |
|  |  |  |  |  |  |
| 23. | a. | Discuss the working of a solar-powered compressor-type vaccine refrigerator. | CO5 | U | 12 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Explain the working of a hybrid power system for the mobile hospital with a proper block diagram. | CO6 | U | 12 |

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

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| **CO1** | 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** | 4 | 25 | - | - | - | - | 29 |
| **CO2** | 2 | 15 | - | - | - | - | 17 |
| **CO3** | - | 17 | - | - | - | - | 17 |
| **CO4** | 8 | 9 | - | - | - | - | 17 |
| **CO5** | 1 | 15 | 12 | - | - | - | 28 |
| **CO6** | - | 16 | - | - | - | - | 16 |
|  | | | | | | | **124** |



**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **19EE2023** | **Duration** | **3hrs** |
| **Course Name** | **SUBSTATION DESIGN** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | What are the types of substations? | | CO1 | U | 1 |
| 2. | Name two types of air-insulated substations. | | CO1 | R | 1 |
| 3. | List the elements of ITAP. | | CO2 | R | 1 |
| 4. | What is the primary purpose of a circuit breaker? | | CO2 | R | 1 |
| 5. | Define accidental ground circuit. | | CO3 | U | 1 |
| 6. | Name a measure to enhance cybersecurity in substations. | | CO3 | R | 1 |
| 7. | Mention any two challenges in substation automation. | | CO4 | U | 1 |
| 8. | What is the role of SCADA in substations? | | CO4 | R | 1 |
| 9. | Define risk management in the context of substations. | | CO5 | U | 1 |
| 10. | Abbreviate AAA in Cyber Security. | | CO6 | R | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | List the advantages of gas-insulated substations. | | CO1 | U | 3 |
| 12. | Explain the applications of voltage sensor. | | CO2 | U | 3 |
| 13. | Describe the potential cyber threats in substations and measures to enhance cybersecurity. | | CO3 | An | 3 |
| 14. | Relate touch and step voltages with neat diagram. | | CO4 | U | 3 |
| 15. | Differentiate Threat Assessment and Risk Assessment. | | CO5 | An | 3 |
| 16. | What is the role of substations in smart grids? | | 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. | Suggest the suitable main types of equipment and accessories used for 66kV step up Substation? And explain briefly. | CO1 | R | 6 |
|  | b. | Compare relay and circuit breaker based on its working. | CO1 | U | 6 |
|  |  |  |  |  |  |
| 18. | a. | What are the different types of substations? Describe the advantages and disadvantages of each type? | CO2 | U | 5 |
|  | b. | With neat diagram, explain the Air Insulated and Gas Insulated substations? | CO2 | C | 7 |
|  |  |  |  |  |  |
| 19. | a. | Describe different bus/switching configurations in substations. How do they impact the overall design? | CO3 | R | 12 |
|  |  |  |  |  |  |
| 20. | a. | Analyze different bus/switching configurations in substations. What factors influence the selection of a specific configuration? | CO4 | An | 8 |
|  | b. | List down the different types of sensors used in substation automation and its functions. | CO3 | U | 4 |
|  |  |  |  |  |  |
| 21. | a. | Evaluate the reasons for substation grounding systems and their impact on safety and reliability. Provide an example of an accidental ground circuit and how it can be mitigated. | CO5 | A | 8 |
|  | b. | Draw the architecture of an IEC 61850. | CO4 | C | 4 |
|  |  |  |  |  |  |
| 22. | a. | Illustrate the Structure of a SCADA Communication Protocol with examples. | CO4 | R | 7 |
|  | b. | Draw the bus bar arrangements in substations. | CO5 | C | 5 |
|  |  |  |  |  |  |
| 23. | a. | Interpret the following:   1. Earthing screen 2. Overhead ground wires 3. Lightning arresters or surge diverters | CO6 | R | 6 |
|  | b. | What is the role of Mobile Substation and how it is formed? | CO6 | U | 6 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Elaborate the role of substations in smart grid. | CO6 | A | 12 |

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

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| **CO1** | Develop Substation Layouts |
| **CO2** | Select Switching Configuration |
| **CO3** | Design Air Insulated and Gas Insulated Substation |
| **CO4** | Interface Communication Techniques |
| **CO5** | Monitor and Control the Substation Operation |
| **CO6** | Adopt Substation Technology Advances in future. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** |  |  |  |  |  |  |  |
| **CO2** |  |  |  |  |  |  |  |
| **CO3** |  |  |  |  |  |  |  |
| **CO4** |  |  |  |  |  |  |  |
| **CO5** |  |  |  |  |  |  |  |
| **CO6** |  |  |  |  |  |  |  |
|  | | | | | | | **124** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)**  **(Answer all the questions)** | | | | | |
| 1. | Which IEC Standard is used to define electrical appliance classifications? | | CO1 | R | 1 |
| 2. | What should you check for while inspecting tools to discover if they are damaged? | | CO1 | U | 1 |
| 3. | What does GFCI stand for? | | CO2 | R | 1 |
| 4. | What is the purpose of calculating the exact wire size? | | CO2 | U | 1 |
| 5. | Job briefings are also known as\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. | | CO3 | R | 1 |
| 6. | List down the different energy control program based on main categories. | | CO3 | R | 1 |
| 7. | The term abrasion resistance means. \_\_\_\_\_\_\_\_\_ | | CO4 | U | 1 |
| 8. | What are the common challenges in electrical equipment maintenance? | | CO4 | U | 1 |
| 9. | Expand the term ASTM. | | CO5 | R | 1 |
| 10. | How does an electrical circuit get verified by a continuity tester? | | CO6 | U | 1 |
| **PART – B (6 X 3 = 18 MARKS)**  **(Answer all the questions)** | | | | | |
| 11. | If a person has been victimized by an electric shock by you, what are all the basic first aids that you should give? | | CO1 | An | 3 |
| 12. | How to choose the right PPE protection level? | | CO2 | U | 3 |
| 13. | Distinguish between grounding and guarding. | | CO3 | An | 3 |
| 14. | List and categorize the energy control programs according to their core components. | | CO4 | R | 3 |
| 15. | What are the roles and responsibilities of regulatory bodies? | | CO5 | R | 3 |
| 16. | List the most effective techniques for maintaining electrical equipment. | | 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. | Determine and list the main elements that affect how severe an Arc-Flash is. | CO1 | R | 6 |
|  | b. | Identify and write down the key factors that influence the severity of Arc-Blast. | CO1 | A | 6 |
|  |  |  |  |  |  |
| 18. | a. | Recall and explain key electrical safety nomenclatures. | CO1 | R | 6 |
|  | b. | List down few primary causes of electrical shock in construction sites. | CO1 | R | 6 |
|  |  |  |  |  |  |
| 19. | a. | Describe the six-step safety measures that must be adhered to in electrical safety processes. | CO2 | U | 6 |
|  | b. | What are the most important points that should be discussed at a tailgate meeting? | CO2 | R | 6 |
|  |  |  |  |  |  |
| 20. |  | Describe a possible approach for determining if a circuit needs to be worked while it is energized. | CO3 | E | 12 |
|  |  |  |  |  |  |
| 21. | a. | How to have a best practice for ensuring electrical safety? | CO4 | R | 7 |
|  | b. | Explain the need for warning signs in electrical safety. | CO4 | E | 5 |
|  |  |  |  |  |  |
| 22. | a. | Make a list on important functions of ANSI and IEC in electrical safety. | CO5 | R | 7 |
|  | b. | Identify and write the highlighted responsibilities and Rights of Employers according to OSHA. | CO5 | A | 5 |
|  |  |  |  |  |  |
| 23. |  | Calculate the wire size in AWG for a single-phase power supply operating at 220 V with a 3% acceptable voltage drop. The single copper conductor runs for 100m with a maximum peak current of 25A and an operating temperature of 50°C. Copper has a resistivity of at 20°C. Refer below table for to AWG conversion.   |  |  |  |  | | --- | --- | --- | --- | | American Wire Gauge (AWG) | Diameter (inches) | Diameter (mm) | Cross Sectional Area (mm2) | | 0000 | 0.46 | 11.68 | 107.16 | | 000 | 0.4096 | 10.40 | 84.97 | | 00 | 0.3648 | 9.27 | 67.40 | | 0 | 0.3249 | 8.25 | 53.46 | | 1 | 0.2893 | 7.35 | 42.39 | | 2 | 0.2576 | 6.54 | 33.61 | | 3 | 0.2294 | 5.83 | 26.65 | | 4 | 0.2043 | 5.19 | 21.14 | | 5 | 0.1819 | 4.62 | 16.76 | | 6 | 0.162 | 4.11 | 13.29 | | 7 | 0.1443 | 3.67 | 10.55 | | 8 | 0.1285 | 3.26 | 8.36 | | 9 | 0.1144 | 2.91 | 6.63 | | 10 | 0.1019 | 2.59 | 5.26 | | 11 | 0.0907 | 2.30 | 4.17 | | 12 | 0.0808 | 2.05 | 3.31 | | 13 | 0.072 | 1.83 | 2.63 | | 14 | 0.0641 | 1.63 | 2.08 | | 15 | 0.0571 | 1.45 | 1.65 | | 16 | 0.0508 | 1.29 | 1.31 | | 17 | 0.0453 | 1.15 | 1.04 | | 18 | 0.0403 | 1.02 | 0.82 | | 19 | 0.0359 | 0.91 | 0.65 | | 20 | 0.032 | 0.81 | 0.52 | | 21 | 0.0285 | 0.72 | 0.41 | | 22 | 0.0254 | 0.65 | 0.33 | | 23 | 0.0226 | 0.57 | 0.26 | | 24 | 0.0201 | 0.51 | 0.20 | | 25 | 0.0179 | 0.45 | 0.16 | | 26 | 0.0159 | 0.40 | 0.13 | | CO5 | E | 12 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Draw the schematic diagram for earth Loop Path due to Earth Fault in TT 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

|  |  |
| --- | --- |
|  | **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. |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 19 | 1 | 6 | 3 | - | - | 29 |
| CO2 | 7 | 10 | - | 3 | - | - | 20 |
| CO3 | 2 | - | - | - | 12 | - | 14 |
| CO4 | 10 | 2 | - | - | - | - | 12 |
| CO5 | 4 | - | 5 | - | 12 | - | 21 |
| CO6 | 9 | 7 | - | - | - | - | 16 |
|  | | | | | | | **124** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **Marks** |
| **PART – A (10 X 1 = 10 MARKS)**  **(Answer all the questions)** | | | | | |
| 1. | Name the AI agent that perceives and acts upon the environment. | | CO1 | R | 1 |
| 2. | Identify the robot that can change its own trajectory as per the external conditions. | | CO1 | U | 1 |
| 3. | State the significance of having problem formulation after goal formulation. | | CO1 | R | 1 |
| 4. | Identify the search algorithm that does not use any information about the problem or the current state to guide its search. | | CO2 | U | 1 |
| 5. | Indicate the purpose of using closed and open list in search algorithm. | | CO2 | U | 1 |
| 6. | State the probability of A and B both occurring considering A and B as two independent events. | | CO3 | R | 1 |
| 7. | Relate the variables represented in a Bayesian network. | | CO3 | U | 1 |
| 8. | Identify the iteration technique used in dynamic programming algorithm to find the optimal policy for an MDP. | | CO4 | U | 1 |
| 9. | Indicate the use of adaptive dynamic programming. | | CO5 | U | 1 |
| 10. | Relate the uniqueness of series configuration in an EV. | | CO6 | U | 1 |
| **PART – B (6 X 3 = 18 MARKS)**  **(Answer all the questions)** | | | | | |
| 11. | Turning test approach is the foundation of AI-Justify | | CO1 | E | 3 |
| 12. | List the advantages of breadth-first search. | | CO2 | R | 3 |
| 13. | Write the formula for conditional probability. | | CO3 | A | 3 |
| 14. | Indicate the goal of Markov decision process. | | CO4 | U | 3 |
| 15. | Differentiate between passive and active reinforcement learning. | | CO5 | U | 3 |
| 16. | Discuss on SARSA reinforcement learning. | | 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 terms scope, agents, environments and problem formulation with respect to AI. | CO1 | U | 6 |
|  | b. | Consider the graph shown in the figure below, comprising of five vertices labelled A through E, interconnected by the edges shown. Examine the figure and answer the following question:  List all the paths that you found from vertex A to E (assuming no vertex is visited more than once in a path). | CO1 | A | 6 |
|  |  |  |  |  |  |
| 18. | a. | Construct the Game search algorithm for the Tic Tac-toe game. | CO2 | A | 12 |
|  |  |  |  |  |  |
| 19. | a. | Explain node representation and the principles used for probabilistic inference in Bayesian Network with an example. | CO3 | U | 12 |
|  |  |  |  |  |  |
| 20. | a. | Construct a decision-making model in situations where outcomes are partly random and partly under the control of a decision-maker using Markov Decision Process. | CO4 | A | 12 |
|  |  |  |  |  |  |
| 21. | a. | Explain model-free and model based reinforcement learning. | CO5 | U | 12 |
|  |  |  |  |  |  |
| 22. | a. | Organize the working of the breadth-first search algorithm by considering the given state diagram.  https://media.geeksforgeeks.org/wp-content/uploads/bfs-5.png | CO1 | An | 12 |
|  |  |  |  |  |  |
| 23. | a. | Explicate the A\* algorithm with an example. | CO2 | U | 12 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | With a block diagram, explain the energy management modelling for an electric vehicle. | CO6 | U | 12 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | 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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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)**  **(Answer all the questions)** | | | | | |
| 1. | Star ratings indicate the \_\_\_\_\_\_\_\_ efficiency of the product. | | CO1 | U | 1 |
| 2. | Name any two types of wiring found in homes. | | CO1 | R | 1 |
| 3. | Suggest a suitable motor for a table fan. | | CO2 | R | 1 |
| 4. | The \_\_\_\_\_\_\_\_\_ motor is a type of electric motor that can operate on either AC or DC power supply. | | CO2 | U | 1 |
| 5. | The terminals of BJT are \_\_\_\_\_\_\_\_. | | CO3 | R | 1 |
| 6. | Define microcontroller. | | CO3 | R | 1 |
| 7. | Suggest any two sensors` for water level measurement. | | CO4 | U | 1 |
| 8. | Ethernet uses \_\_\_\_ topology. | | CO4 | U | 1 |
| 9. | Name any two operating systems used in Laptop. | | CO5 | R | 1 |
| 10. | \_\_\_\_\_ is a sub-set of Machine Learning which make the computation of multi-layer neural network feasible. | | CO6 | R | 1 |
| **PART – B (6 X 3 = 18 MARKS)**  **(Answer all the questions)** | | | | | |
| 11. | An alternating sinusoidal voltage quantity is given by v = 200 sin 314𝑡. Obtain Vavg & Vrms. | | CO1 | An | 3 |
| 12. | List the limitations of BLDC Motor. | | CO2 | U | 3 |
| 13. | Compare BJT and MOSFET. | | CO3 | U | 3 |
| 14. | Highlight any three essential technologies of Industry 4.0. | | CO4 | R | 3 |
| 15. | Define LAN, MAN and WAN. | | CO5 | U | 3 |
| 16. | Investigate the significance of IoT in Food Industries | | 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. | Explain the working principle of induction type Energy meter with a neat diagram. | CO1 | U | 8 |
|  | b. | Describe the working of stair-case wiring with a neat wiring diagram. | CO1 | U | 4 |
|  |  |  |  |  |  |
| 18. | a. | Describe the construction and working principle of DC motor with the help of a neat diagram. | CO2 | U | 12 |
|  |  |  |  |  |  |
| 19. | a. | Articulate the operation of PN junction diode using the suitable circuit diagram. | CO3 | U | 6 |
|  | b. | Explain the NPN transistor operation using the appropriate diagram. | CO3 | U | 6 |
|  |  |  |  |  |  |
| 20. | a. | Describe the soil moisture sensor circuit with neat diagram. | CO4 | U | 8 |
|  | b. | Distinguish sensors and transducers. | CO4 | R | 4 |
|  |  |  |  |  |  |
| 21. | a. | Examine the features of basic network topologies with necessary diagrams. | CO5 | U | 8 |
|  | b. | Compare MAC and IP address. | CO5 | An | 4 |
|  |  |  |  |  |  |
| 22. | a. | Calculate the energy consumed per month by the following electrical appliances.   |  |  |  |  |  | | --- | --- | --- | --- | --- | | S.N | Load | Quantity | Wattage | Operating hours/day | | 1 | Fluorescent lamp | 5 | 40W | 5 | | 2 | Ceiling Fan | 4 | 60W | 10 | | 3 | Refrigerator | 1 | 100W | 24 | | 4 | Air Conditioner | 1 | 1200W | 6 | | 5 | Mixer | 1 | 400W | 0.5 | | 6 | LED Television | 1 | 100W | 7 | | CO1 | A | 12 |
|  |  |  |  |  |  |
| 23. | a. | Analyze the top skills to be relevant in Industry 4.0 | CO4 | U | 6 |
|  | b. | Discuss the future of electric vehicles. | CO2 | A | 6 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | With a neat block diagram, explain the working of the smart grid. | CO6 | U | 6 |
|  | b. | Summarize the benefits of 5G technology and Big data. | CO6 | U | 6 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL

|  |  |
| --- | --- |
|  | **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 Taxonomy** | | | | | | | |
| **CO / P** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 1 | 13 | 12 | 3 | - | - | 29 |
| CO2 | 1 | 16 | 6 | - | - | - | 23 |
| CO3 | 2 | 15 | - | - | - | - | 17 |
| CO4 | 7 | 16 | - | - | - | - | 23 |
| CO5 | 1 | 11 | - | 4 | - | - | 16 |
| CO6 | 1 | 12 | 3 | - | - | - | 16 |
|  | | | | | | | **124** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | The unit of electric charge is **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.** | | CO1 | R | 1 |
| 2. | If a charge of 50µC passes a given point in a circuit in a time of 100ms, determine the current in the circuit. | | CO1 | A | 1 |
| 3. | \_\_\_\_\_\_\_\_\_ torque makes the pointer to show the definite position quickly without any oscillations. | | CO2 | U | 1 |
| 4. | Digital Multi-meter is a \_\_\_\_\_\_\_\_ sensing meter. | | CO2 | R | 1 |
| 5. | Write any one application of DSO. | | CO3 | R | 1 |
| 6. | A \_\_\_\_\_\_\_\_\_\_\_\_ is a system which mimics the function of a human nose to identify a particular odour. | | CO4 | U | 1 |
| 7. | Give example for inverse transducer. | | CO4 | U | 1 |
| 8. | Say True or False: Strain gauge works on the principle of variation of inductance. | | CO5 | R | 1 |
| 9. | Write any one advantage of WSN based smart power Monitoring system. | | CO6 | R | 1 |
| 10. | The combination of sensors and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is termed as smart sensors. | | CO6 | U | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Compare series and parallel circuits. | | CO1 | U | 3 |
| 12. | Classify the measuring instruments with example. | | CO2 | U | 3 |
| 13. | Write the role of liquid crystals in LCD display. | | CO3 | U | 3 |
| 14. | With simple diagram, explain the working of resistive touch screen display | | CO4 | U | 3 |
| 15. | List the applications of Capacitive Proximity sensor. | | CO5 | U | 3 |
| 16. | Write down the name of the smart sensors available for smart agriculture. | | 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. | Write down the Kirchhoff’s Voltage Law for the following circuit and calculate the following,  i) Current in a given circuit. ii) Voltage drop across all resistors. | CO1 | A | 6 |
|  | b. | Define the following terminology available in magnetic circuit with proper equation,   1. Magnetic flux 2. Magnetic flux density 3. Reluctance | CO1 | R | 6 |
|  |  |  |  |  |  |
| 18. | a. | Discuss about the different torques required for the operation of instruments. | CO2 | U | 6 |
|  | b. | Draw the block diagram of Digital Multi-Meter. Mention the role of each block. | CO2 | U | 6 |
|  |  |  |  |  |  |
| 19. | a. | With neat block diagram, elucidate the construction and working principle of Electronic Energy Meter. | CO2 | U | 12 |
|  |  |  |  |  |  |
| 20. | a. | Draw the constructional diagram of CRT. Explain each part clearly. | CO3 | U | 6 |
|  | b. | Write short notes on various writing mechanisms available in PMMC writing system. | CO3 | R | 6 |
|  |  |  |  |  |  |
| 21. | a. | With neat diagram explain the construction, working and applications of LDR. | CO4 | U | 6 |
|  | b. | Discuss about the parameters of sensor/transducer. | CO4 | U | 6 |
|  |  |  |  |  |  |
| 22. | a. | Classify the types of transducer and define it. | CO4 | R | 6 |
|  | b. | Draw the schematic of Biosensors. Write the role of each component. | CO4 | U | 6 |
|  |  |  |  |  |  |
| 23. | a. | With simple diagram, explain the working of capacitive humidity sensor. | CO5 | U | 6 |
|  | b. | Strain gauge is an essential sensor for ensuring safety. Justify. | CO5 | U | 6 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Describe the architecture of a smart sensor with a neat block diagram and demonstrate the role of smart sensor in health care. | CO6 | A | 12 |

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|  | **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 | 7 | 3 | 7 |  |  |  | 17 |
| CO2 | 1 | 28 |  |  |  |  | 29 |
| CO3 | 7 | 9 |  |  |  |  | 16 |
| CO4 | 6 | 23 |  |  |  |  | 29 |
| CO5 | 1 | 15 |  |  |  |  | 16 |
| CO6 | 1 | 4 | 12 |  |  |  | 17 |
|  | | | | | | | **124** |



**END SEMESTER EXAMINATION – APRIL / MAY 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. | Give an example for a greenhouse gas. | | CO1 | R | 1 |
| 2. | The unit of specific power related to battery is \_\_\_\_\_, | | CO1 | R | 1 |
| 3. | The \_\_\_\_\_\_\_\_ device is preferred for DC Chopper operation due to its high switching frequency. | | CO2 | R | 1 |
| 4. | Regenerative braking is not possible in a \_\_\_\_ motor. | | CO2 | U | 1 |
| 5. | The expression for Rolling resistance force given by \_\_\_\_\_\_\_\_\_\_\_\_. | | CO3 | R | 1 |
| 6. | The ideal aerodynamic shape is a \_\_\_\_\_\_, as achieved by a droplet of water freefalling in the atmosphere | | CO3 | A | 1 |
| 7. | When regenerative braking is used a certain amount of the energy is recovered; the maximum practical limit on the recovery of kinetic energy is about \_\_\_\_ %**.** | | CO4 | R | 1 |
| 8. | The expression for the effect of aerodynamic drag force (Fad) on a vehicle is given by \_\_\_\_\_\_\_\_\_\_\_. | | CO4 | R | 1 |
| 9. | Transducers are sometimes referred to as \_\_\_\_\_\_ converters. | | CO5 | U | 1 |
| 10. | \_\_\_\_\_\_\_\_\_\_ is a technique which enables machines to mimic human behavior. | | CO6 | U | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Name any three modern EV models/make. | | CO1 | R | 3 |
| 12. | Outline the basic SRM drive system. | | CO2 | U | 3 |
| 13. | Calculate the power required to drive a teardrop-shaped body in clear air, taking air density (*ρ*) to be 1.23 kgm−3, Cd = 0.04 of cross-section (A) as 1m2 travelling at a velocity (v) 100 kmph (27.8m s−1). | | CO3 | A | 3 |
| 14. | Draw the Electric Drive Train Diagram. | | CO4 | U | 3 |
| 15. | Enumerate three optimization techniques employed within the field of artificial intelligence. | | CO5 | A | 3 |
| 16. | Identify three sensors commonly employed in autonomous vehicles. | | 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. | Deliberate the parallel hybrid and series-parallel hybrid configuration of hybrid vehicle with necessary diagrams. | CO1 | U | 8 |
| b. | Analyze the necessity of Fuel Cells in the current automotive scenario. | CO1 | An | 4 |
|  |  |  |  |  |  |
| 18. | a. | Explain the four-quadrant operation of chopper-based DC Motor with necessary diagrams and waveforms. | CO2 | U | 8 |
| b. | Distinguish BLDC Motor with Induction Motor. | CO2 | U | 4 |
|  |  |  |  |  |  |
| 19. |  | Examine the design considerations of Electric Vehicles, particularly focusing on aerodynamics, rolling resistance, transmission efficiency, and the influence of vehicle mass. | CO3 | U | 12 |
|  |  |  |  |  |  |
| 20. |  | Discuss the acceleration performance parameters with respect to modelling of vehicle acceleration. | CO4 | U | 12 |
|  |  |  |  |  |  |
| 21. |  | Illustrate the advantages of AI-based control systems in Electric Vehicles compared to conventional Proportional-Integral (PI) control methods, accompanied by relevant diagrams. | CO5 | U | 12 |
|  |  |  |  |  |  |
| 22. | a. | Describe a Converter for Switched Reluctance Motor (SRM) with neat diagram and waveforms. | CO2 | U | 8 |
| b. | Compare Switched Reluctance Motor and BLDC Motor. | CO2 | U | 4 |
|  |  |  |  |  |  |
| 23. | a. | Explain the concept of flywheel with necessary diagram. | CO1 | U | 8 |
|  | b. | Brief out Ultra capacitors. | CO1 | U | 4 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Enumerate the case study on Nissan Leaf. | CO6 | U | 8 |
| b. | Compare any two latest EV models with respect to its efficiency. | CO6 | An | 4 |

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

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|  | **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** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | 5 | 20 | - | 4 | - | - | 29 |
| **CO2** | 1 | 28 | - | - | - | - | 29 |
| **CO3** | 1 | 12 | 4 | - | - | - | 17 |
| **CO4** | 2 | 15 | - | - | - | - | 17 |
| **CO5** | - | 13 | 3 | - | - | - | 16 |
| **CO6** | - | 9 | 3 | 4 | - | - | 16 |
|  | | | | | | | **124** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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

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| **Q. No.** | **Questions** | | **CO** | **BL** | **Marks** |
| **PART – A (10 X 1 = 10 MARKS)**  **(Answer all the questions)** | | | | | |
| 1. | Indicate the unit used in the energy meter to display the quantity of electrical energy consumed by the user. | | CO1 | U | 1 |
| 2. | State Kirchoff’s current law. | | CO1 | R | 1 |
| 3. | List the benefits of the BLDC motor. | | CO2 | R | 1 |
| 4. | Indicate the motor used in home fans. | | CO2 | U | 1 |
| 5. | Differentiate conductor and insulator. | | CO3 | U | 1 |
| 6. | Represent the significance of the microcontroller circuit. | | CO3 | U | 1 |
| 7. | List the applications of sensors. | | CO4 | R | 1 |
| 8. | Name one sensor used in the automatic irrigation system. | | CO4 | R | 1 |
| 9. | Show the importance of MAC address in a network. | | CO5 | U | 1 |
| 10. | List one application of the machine learning technique. | | CO6 | R | 1 |
| **PART – B (6 X 3 = 18 MARKS)**  **(Answer all the questions)** | | | | | |
| 11. | Sketch the basic structure of UPS. | | CO1 | A | 3 |
| 12. | Describe the application of motors in electric vehicles. | | CO2 | U | 3 |
| 13. | Sketch the output of the half wave rectifier circuit. | | CO3 | A | 3 |
| 14. | Differentiate sensors and transducers. | | CO4 | U | 3 |
| 15. | Write short notes on communication using WLAN and Bluetooth. | | CO5 | U | 3 |
| 16. | Discuss the role of IoT in day-to-day activities. | | 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. | Represent the importance of energy meter and discuss the functioning of electromechanical energy meter. | CO1 | U | 12 |
|  |  |  |  |  |  |
| 18. | a. | With neat diagram explain the working of three-phase induction motor. | CO2 | U | 12 |
|  |  |  |  |  |  |
| 19. | a. | Interpret the operation of various logic gates with its symbol and truth table. | CO3 | U | 12 |
|  |  |  |  |  |  |
| 20. | a. | Describe the procedure for automatically turning on and off a pump motor by monitoring the water level inside the water tank. | CO4 | U | 12 |
|  |  |  |  |  |  |
| 21. | a. | Name the three basic network topologies and explain them giving all the relevant features. | CO5 | R | 12 |
|  |  |  |  |  |  |
| 22. | a. | Articulate the operation of the PN junction diode using the suitable circuit diagram and VI characteristics. | CO3 | A | 12 |
|  |  |  |  |  |  |
| 23. | a. | Sketch neatly and explain the working of the Hydro Power Plant. | CO1 | A | 12 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | With a neat diagram, explain the working of the smart grid. Also, compare the smart grid with the conventional grid. | CO6 | U | 12 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL

|  |  |
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|  | **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 Taxonomy** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 1 | 13 | 15 | - | - | - | 29 |
| CO2 | 1 | 16 | - | - | - | - | 17 |
| CO3 | - | 14 | 15 | - | - | - | 29 |
| CO4 | 2 | 15 | - | - | - | - | 17 |
| CO5 | 12 | 4 | - | - | - | - | 16 |
| CO6 | 1 | 3 | 12 | - | - | - | 16 |
|  | | | | | | | **124** |



**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| **Course Code** | **23EE1005** | **Duration** | **3hrs** |
| **Course Name** | **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 creativity. | | CO1 | R | 1 |
| 2. | Combine the following elements.  Tent + TV remote control | | CO1 | A | 1 |
| 3. | Find the common word: cottage - swiss – cake | | CO2 | A | 1 |
| 4. | Compare white hat and blue hat person. | | CO2 | U | 1 |
| 5. | Altavista is not as successful as Google – justify. | | CO3 | U | 1 |
| 6. | Sketch the structure of an empathy mapping. | | CO3 | R | 1 |
| 7. | Give an example for past circumstance excuse given by a fixed mindset person | | CO4 | A | 1 |
| 8. | Give the opposite of “He/She is so smart, I can never be that smart” | | CO4 | A | 1 |
| 9. | Formulate J K Rowling’s path to success. | | CO5 | A | 1 |
| 10. | Deduce the formulae for Design Thinking. | | CO6 | U | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Mention the steps to personal creativity. | | CO1 | U | 3 |
| 12. | What if phones could tell the mood of the other person? | | CO2 | A | 3 |
| 13. | Compare articulated and unarticulated needs with respect to mobile phone. | | CO3 | An | 3 |
| 14. | Road to success is bumpy – justify with an example. | | CO4 | A | 3 |
| 15. | Define empathy. | | CO5 | R | 3 |
| 16. | Outline the design thinking mindset. | | 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. |  | Explain Fish Philosophy with a successful implementation. | CO1 | U | 12 |
|  |  |  |  |  |  |
| 18. |  | Apply SCAMPER technique to a tea spoon and draw a mind map for the same. | CO2 | A | 12 |
|  |  |  |  |  |  |
| 19. |  | Demonstrate the 6-Step Roadmap to a Proof of Concept (POC). | CO3 | U | 12 |
|  |  |  |  |  |  |
| 20. |  | Compare Bootstrapping and Franchise method of entrepreneurial venture with its pros and cons. | CO4 | An | 12 |
|  |  |  |  |  |  |
| 21. |  | Examine the five components critical in developing emotional intelligence. | CO5 | U | 12 |
|  |  |  |  |  |  |
| 22. |  | Enumerate the three major components of creativity with example.  (Passion+ Knowledge & Experience+ Method) | CO2 | U | 12 |
|  |  |  |  |  |  |
| 23. |  | Differentiate fixed mindset and growth mindset with respect to six features. | 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

|  |  |
| --- | --- |
|  | **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** | 1 | 15 | 1 |  |  |  | 17 |
| **CO2** |  | 13 | 16 |  |  |  | 29 |
| **CO3** | 1 | 13 |  | 3 |  |  | 17 |
| **CO4** |  |  | 5 | 12 |  |  | 17 |
| **CO5** | 3 | 12 | 13 |  |  |  | 28 |
| **CO6** |  | 10 | 6 |  |  |  | 16 |
|  | | | | | | | **124** |



**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| **Course Code** | **23EE1008** | **Duration** | **3hrs** |
| **Course Name** | **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. | State Kirchoff’s voltage law. | | CO1 | R | 1 |
| 2. | Indicate two active electronic devices. | | CO1 | U | 1 |
| 3. | Define the power factor in the AC circuit. | | CO2 | R | 1 |
| 4. | Represent the advantage of a three-phase supply in homes. | | CO2 | U | 1 |
| 5. | Express the primary function of a servo motor in an electrical system. | | CO3 | U | 1 |
| 6. | List the applications of stepper motors. | | CO3 | R | 1 |
| 7. | Differentiate P-type semiconductors from N-type semiconductors. | | CO4 | U | 1 |
| 8. | Sketch the symbol of the Zener diode. | | CO4 | A | 1 |
| 9. | List the applications of piezoelectric sensors. | | CO5 | U | 1 |
| 10. | Indicate an electronic equipment used to display the waveforms. | | CO6 | U | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Compare and contrast semiconductors and conductors. | | CO1 | U | 3 |
| 12. | Relate the average value and RMS value of a sinusoidal signal. | | CO2 | U | 3 |
| 13. | State the working principle of the transformer. | | CO3 | R | 3 |
| 14. | Write short notes on the Arduino processor. | | CO4 | U | 3 |
| 15. | Compare and contrast analog and digital transducers. | | CO5 | U | 3 |
| 16. | State the working principle of switch mode power supply | | 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. | Using Kirchhoff’s Law, compute the total current (i). | CO1 | A | 6 |
|  | b. | Sketch the symbols and explain the functions of the resistor, capacitor, and inductor. | CO1 | A | 6 |
|  |  |  |  |  |  |
| 18. |  | Compute the peak value, average value, RMS value, form factor, and peak factor for the given sinusoidal signal. | CO2 | A | 12 |
|  |  |  |  |  |  |
| 19. |  | With the necessary diagram, explain the construction and working of the three-phase induction motor. | CO3 | U | 12 |
|  |  |  |  |  |  |
| 20. |  | Discuss the operation of the AND, OR, NOT, NOR, and NAND gates using the truth table. | CO4 | U | 12 |
|  |  |  |  |  |  |
| 21. |  | Sketch the block diagram of the automatic irrigation system. Explain the role of each block. | CO5 | A | 12 |
|  |  |  |  |  |  |
| 22. |  | Represent few optoelectronic devices. Explain the working principle of photodiode and LED. | CO4 | U | 12 |
|  |  |  |  |  |  |
| 23. |  | Discuss the construction and working of the DC generator with a neat diagram. | CO3 | U | 12 |
| **COMPULSORY QUESTION** | | | | | |
| 24. |  | Discuss how a full-wave rectifier converts alternating current (AC) into direct current (DC) and compare its advantages and disadvantages with those of a half-wave rectifier. | 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 | 4 | 12 | - | - | - | 17 |
| **CO2** | 1 | 4 | 12 | - | - | - | 17 |
| **CO3** | 4 | 25 | - | - | - | - | 29 |
| **CO4** | - | 28 | 1 | - | - | - | 29 |
| **CO5** | - | 4 | 12 | - | - | - | 16 |
| **CO6** | 3 | 13 | - | - | - | - | 16 |
|  | | | | | | | **124** |



**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| **Course Code** | **23EE2001** | **Duration** | **3hrs** |
| **Course Name** | **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 capacitor? | | CO1 | R | 1 |
| 2. | If a charge of 30C requires 60J to move from point A to point B, determine potential difference between the points A and B. | | CO1 | An | 1 |
| 3. | Write the relationship between Vth, Rth and IN. | | CO2 | R | 1 |
| 4. | Mention any one application of maximum power transfer theorem. | | CO2 | R | 1 |
| 5. | A 15μF capacitor is connected in series with a 47 kΩ resistor. Find the time constant. | | CO3 | A | 1 |
| 6. | Define transient response. | | CO3 | U | 1 |
| 7. | Two inductors with inductance 3H and 2H are connected in series aiding configuration with mutual inductance 0.5H. Find the equivalent inductance. | | CO4 | An | 1 |
| 8. | Write the condition for series resonance. | | CO4 | U | 1 |
| 9. | Represent inductor in frequency domain. | | CO5 | U | 1 |
| 10. | State the condition of a reciprocal network in terms of impedance parameters. | | CO6 | U | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Define electrical circuit. Mention its components. | | CO1 | U | 3 |
| 12. | Explain reciprocity theorem. | | CO2 | U | 3 |
| 13. | A series RLC circuit with R=100Ω, L=0.1 H and C=100µF is subjected to a step voltage. Find the nature of the transient response. | | CO3 | An | 3 |
| 14. | Draw the phasor diagram of phase and line voltages of a three phase star connected system. | | CO4 | U | 3 |
| 15. | Outline the usage of convolution integral in electric circuit analysis. | | CO5 | A | 3 |
| 16. | Write the network equations of a two port network in terms of ABCD parameters. Also, mention the condition for symmetrical network in terms of ABCD 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 capacitance. How v and i are related in the capacitor? | CO1 | U | 4 |
|  | b. | Find the branch currents using mesh analysis.  Network Theory - Mesh Analysis | CO1 | An | 8 |
|  |  |  |  |  |  |
| 18. | a. | Classify the sources in electrical circuits. | CO1 | U | 4 |
|  | b. | For the given circuit, find the node voltage equations in matrix form by inspection. Also, obtain the node voltages. | CO1 | An | 8 |
|  |  |  |  |  |  |
| 19. |  | Apply superposition theorm to find the current through 6Ω resistor. | CO2 | A | 12 |
|  |  |  |  |  |  |
| 20. |  | Apply Norton’s theorem to find the current through 4Ω resistor. | CO2 | A | 12 |
|  |  |  |  |  |  |
| 21. |  | A voltage of 200 volts is applied by closing a switch at t=0 to a RL branch with R=100Ω and L=20H. Find the expression for transient current and transient voltage across the inductor. Also, find the time taken for the inductor current to reach 35% and 75% of the final value. | CO3 | An | 12 |
|  |  |  |  |  |  |
| 22. |  | A coil of resistance 15Ω and inductance 100mH is connected in series with a 120μF capacitor. This series combination is connected to a 300V, 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=10Ω, L=500mH and C=5F | CO5 | A | 12 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Draw the series connection of two port networks and derive the overall impedance parameters. | CO6 | An | 4 |
|  | b. | Find the admittance 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 behaviour 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 |  | 17 |  |  | 29 |
| **CO2** | 2 | 3 | 24 |  |  |  | 29 |
| **CO3** |  | 1 | 1 | 15 |  |  | 17 |
| **CO4** |  | 4 |  | 13 |  |  | 17 |
| **CO5** |  | 1 | 15 |  |  |  | 16 |
| **CO6** |  | 4 |  | 12 |  |  | 16 |
|  | | | | | | | **124** |



**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | Name the first city in USA that used photography in criminal investigation. – San Francisco. | | CO1 | U | 1 |
| 2. | State law of progressive change. | | CO1 | R | 1 |
| 3. | Identify two examples of utility software. | | CO2 | A | 1 |
| 4. | Differentiate Compiler and Linker with respect memory requirements. | | CO2 | An | 1 |
| 5. | Mention the four components of documenting a crime scene. | | CO3 | U | 1 |
| 6. | Diagrammatically represent one indoor technique used for measuring the evidence. | | CO3 | A | 1 |
| 7. | Define file carving. | | CO4 | R | 1 |
| 8. | Name the feature that helps windows to go back in time. | | CO4 | R | 1 |
| 9. | Identify the secret message in the image given below. | | CO5 | A | 1 |
| 10. | Recall the network analysis tool used in digital forensics. | | CO6 | R | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Name the instrument used for the comparison of tool marks. | | CO1 | An | 3 |
| 12. | Convert 43110 to Binary, Hexadecimal and Octal number system. | | CO2 | U | 3 |
| 13. | Differentiate physical and biological evidence with one example each. | | CO3 | An | 3 |
| 14. | Compare hibernate and sleep mode with respect to resumption. | | CO4 | An | 3 |
| 15. | Give an example for chaffing and winnowing. | | CO5 | An | 3 |
| 16. | Identify any 3 features of SINTELIX 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. | a. | Enumerate in detail the seven principle of forensic science. | CO1 | U | 12 |
|  |  |  |  |  |  |
| 18. | a. | With a pyramid diagram interpret the hierarchy of memory organization of a computer. | CO2 | U | 12 |
|  |  |  |  |  |  |
| 19. | a. | Demonstrate the step by step procedure to maintain a chain of custody log in order to secure and present an evidence in court. | CO3 | A | 12 |
|  |  |  |  |  |  |
| 20. | a. | Articulate the importance of metadata in terms of creation, modification and accessing. | CO4 | U | 12 |
|  |  |  |  |  |  |
| 21. | a. | Illustrate with an example the application of message digest used for verification of digital evidence. | CO5 | An | 12 |
|  |  |  |  |  |  |
| 22. | a. | Identify the information to be mentioned when seizing the Digital device and name any 6 digital evidences that could be found at a crime scene. | CO3 | A | 12 |
|  |  |  |  |  |  |
| 23. | a. | Enumerate the different forms of applying information warfare. | CO5 | A | 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

|  |  |
| --- | --- |
|  | **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. |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | 1 | 13 |  | 3 |  |  | 17 |
| **CO2** |  | 15 | 1 | 1 |  |  | 17 |
| **CO3** |  | 1 | 25 | 3 |  |  | 29 |
| **CO4** | 2 | 12 |  | 3 |  |  | 17 |
| **CO5** |  |  | 13 | 15 |  |  | 28 |
| **CO6** | 1 | 3 | 6 | 6 |  |  | 16 |
|  | | | | | | | **124** |