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Question Paper Code 13347

B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2024 (JAN - 2025)

First Semester

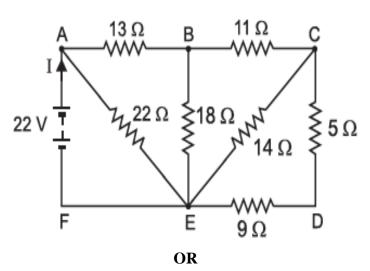
Computer Science and Business Systems 24ESEE101 - PRINCIPLES OF ELECTRICAL ENGINEERING

Regulations - 2024

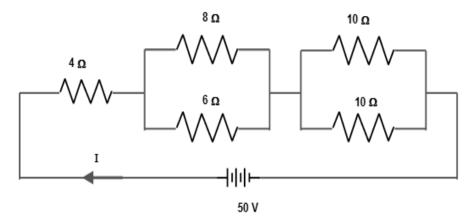
| PART - A (MCQ) (20 × 1 = 20 Marks) Answer ALL Questions 1. Which of the following is a passive element in an electric circuit? (a) Resistor (b) Capacitor (c) Inductor (d) Transistor 2. Which of the following is according to Kirchhoff's Voltage Law (KVL), the sum of the voltages around a closed loop is: (a) Equal to zero (b) Equal to the sum of the current sources (c) Equal to the total resistance (d) Equal to the supply voltage 3. In an ideal current source, the current is: (a) Dependent on the load (b) Constant regardless of the voltage across it (c) Variable with voltage (d) Zero when the load is open 4. According to the Maximum Power Transfer Theorem, maximum power is transferred to the load when the load resistance (b) Equal to the source resistance (c) Haif of the source resistance (d) Zero 5. Thevenin's theorem states that any linear network can be reduced to (a) A current source and parallel resistance (d) A current source and series resistance (c) A voltage source and parallel resistance (d) A current source and series resistance (b) Mash analysis uses voltage loops, while nodal analysis uses current loops (b) Mesh analysis is uses voltage loops, while nodal analysis uses current loops (d) Nodal analysis applies only to passive circuits (a) Power Factor (b) Form Factor (c) Frequency Factor (d) Peak Factor (a) Resistor (b) Inductor (c) Capacitor (d) Transformer 10. What is the form factor of a pure sinusoidal AC waveform? (a) Resistor (b) Inductor (c) Capacitor (d) Transformer 10. What happens to the electric field strength if the distance between two charged plates is doubled, while maintaining the same potential difference? (a) Electric field strength becomes zero (d) Electric field strength nalves (c) Electric field strength becomes zero (d) Electric field strength remains unchanged 11. When the distance between the plates of a capacitor if the resistance in the circuit is increased? (a) It doubles (b) It halves (c) It remains the same (d) It quadruples 12. What will happen to the discharg | Regulations - 2024 | | | |
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| 13. In the Hysteresis cycle, the value of H needed to make the intensity of magnetization zero 1 K1 CO5 is called: (a) Retentive force (b) Eddy current force (c) Coercive force (d) Lorentz Force | increased? | | | |
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| · · · · · · · · · · · · · · · · · · · | is called: | | | |
| K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create | (a) Retentive force (b) Eddy current force (c) Coercive force (d) Lorentz For | rce | | |
| | K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create | | <i>133</i> | 347 |

| 14. | What is the unit of mutual inductance? | 1 | K1 | CO5 | | | |
|-----|--|----|------------|-----|--|--|--|
| | (a) Tesla (b) Henry (c) Volt (d) Ampere | | | | | | |
| 15. | Which of the following is a unit of magnetic flux? | 1 | <i>K1</i> | CO5 | | | |
| | (a) Tesla (b) Weber (c) Henry (d) Ampere | , | 77.1 | 005 | | | |
| 16. | What is the purpose of the laminated core in a transformer? | 1 | <i>K1</i> | CO5 | | | |
| | (a) To increase resistance (b) To reduce eddy current losses | | | | | | |
| 17 | (c) To increase inductance (d) To decrease capacitance | 1 | K1 | CO6 | | | |
| 1/. | What type of instrument is a watt-hour meter? (a) Indicating (b) Integrating (c) Recording (d) Oscillating | 1 | M | 000 | | | |
| 18 | Which material is commonly used in piezoelectric sensors to generate an electric charge? | 1 | K2 | CO6 | | | |
| 10. | (a) Silicon (b) Quartz (c) Copper (d) Iron | | | | | | |
| 19. | instruments are those which measure the total quantity of electricity delivered in a | 1 | <i>K</i> 2 | CO6 | | | |
| | particular time. | | | | | | |
| | (a) Absolute (b) Indicating (c) Recording (d) Integrating | | | | | | |
| 20. | Which device is used to measure current in a circuit? | 1 | <i>K</i> 2 | CO6 | | | |
| | (a) Voltmeter (b) Ammeter (c) Wattmeter (d) Thermocouple | | | | | | |
| | $PART - B (10 \times 2 = 20 Marks)$ | | | | | | |
| | Answer ALL Questions | | | | | | |
| 21. | Define Dependent Current source and draw its symbol. | 2 | K1 | CO1 | | | |
| 22. | 22. Write the formula for voltage and current division rule with suitable circuit. | | | | | | |
| | 23. List the steps to find Thevenin's voltage. | | | | | | |
| | 24. Outline the condition for maximum power transfer in DC circuits. | | | | | | |
| | 25. Write the expression for determining reactive and apparent power in a three-phase circuit. | | | | | | |
| | Define RMS value. | 2 | <i>K1</i> | CO3 | | | |
| | Define permittivity. | 2 | <i>K1</i> | CO4 | | | |
| | Give the expression for electric field strength due to a point charge and identify each | 2 | K2 | CO4 | | | |
| 20. | term. | | | | | | |
| 29. | Compare magnetic and electric circuits. | 2 | K2 | CO5 | | | |
| 30. | Outline How does an integrating instrument differ from a recording instrument in its function. | 2 | K2 | CO6 | | | |
| | | | | | | | |
| | PART - C $(6 \times 10 = 60 \text{ Marks})$ | | | | | | |
| 31. | Answer ALL Questions a) Solve the circuit shown in figure and find the value of current in the branch AF. | 10 | К3 | CO1 | | | |
| -1. | a, sorre die offent blie vir in rigure and rilla die value of eartein in die ofallell M. | | | | | | |

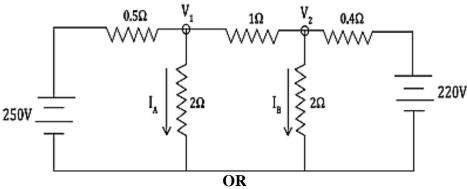
1. a) Solve the circuit shown in figure and find the value of current in the branch AF.



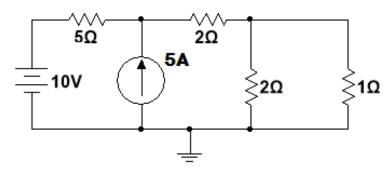
b) Calculate the total current I and total power dissipated in the given electrical 10 K3 COI network.



32. a) Apply nodal analysis method and identify the value of V_1 , V_2 and V_3 as shown in IO K3 CO2 Fig.



b) Apply Nortons Theorem; find the power loss in 1Ω resistor as shown in figure.



33. a) Explain and derive the average value, RMS value, form factor and peak factor for 10 K2 CO3 (i) half wave rectified alternating current and (ii) full wave rectified alternating current.

OR

- b) Explain the operation of RC series AC circuit with relevant phasor diagram and 10 K2 CO3 derive the formulas for phase angle, Impedance, Admittance and power. And also draw the power curve of RL Series AC circuit.
- 34. a) Explain the process of charging and discharging in capacitors. Derive the ¹⁰ K2 CO4 equations for voltage across the capacitor as a function of time during both charging and discharging in an RC circuit.

OR

b) Explain how permittivity affects the electric field in dielectrics. Derive the 10 K2 CO4 expression for the energy stored in a capacitor and explain the significance of each term in the formula.

35. a) Explain Faraday's Law of Electromagnetic Induction and derive the expression for 10 K2 CO5 the EMF induced in a coil when the magnetic flux changes with time.

OR

- b) Interpret in detail about the operation of a transformer and obtain the expression 10 K2 CO5 for transformation ratio with the help of its emf equation.
- 36. a) Explain the construction and working principle of Permanent Magnet Moving Coil 10 K2 CO6 (PMMC) instruments.

OR

b) Illustrate the working of a piezoelectric transducer using a functional block 10 K2 CO6 diagram.