| Reg. No. | | | | | | | | | | | | | | | |
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| Question Paper Code | 13772 |
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**B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2025**

First Semester

**Computer Science and Business Systems**

**24ESEE101 - PRINCIPLES OF ELECTRICAL ENGINEERING**

Regulations - 2024

Duration: 3 Hours | Max. Marks: 100

**PART - A (MCQ) (10 × 1 = 10 Marks)**

Answer ALL Questions

| | | Marks | K – Level | CO |
|---|---|---|---|---|
| 1. | Which of the following is an active element in an electric circuit?<br>(a) Resistor (b) Capacitor (c) Inductor (d) Transistor | 1 | K1 | CO1 |
| 2. | Infer the correct relationship for power in an electrical circuit, considering voltage and current.<br>(a) Power is the product of voltage and resistance<br>(b) Power is the product of current and resistance<br>(c) Power is the product of voltage and current<br>(d) Power is the product of current and capacitance | 1 | K2 | CO1 |
| 3. | Find nodal analysis, the reference node is also called the<br>(a) Mesh node (b) Super node (c) Ground node (d) Junction node | 1 | K1 | CO2 |
| 4. | Which theorem helps determine the maximum power that can be transferred from a source to a load?<br>(a) Thevenin's Theorem (b) Norton's Theorem<br>(c) Maximum Power Transfer Theorem (d) Superposition Theorem | 1 | K1 | CO2 |
| 5. | What is the form factor of a pure sinusoidal AC waveform?<br>(a) 1.11 (b) 0.707 (c) 1.41 (d) 2.22 | 1 | K1 | CO3 |
| 6. | Which component is used to store electrical energy in an electric field?<br>(a) Resistor (b) Inductor (c) Capacitor (d) Transformer | 1 | K1 | CO3 |
| 7. | What is the unit of electric field strength?<br>(a) Tesla (b) Newton per Coulomb (c) Farad (d) Ohm | 1 | K1 | CO4 |
| 8. | Which quantity is directly proportional to the energy stored in a capacitor?<br>(a) Voltage (b) Square of the voltage (c) Capacitance (d) Current | 1 | K1 | CO4 |
| 9. | What is the unit of mutual inductance?<br>(a) Tesla (b) Henry (c) Volt (d) Ampere | 1 | K1 | CO5 |
| 10. | Which material is commonly used in piezoelectric sensors to generate an electric charge?<br>(a) Silicon (b) Quartz (c) Copper (d) Iron | 1 | K1 | CO6 |

**PART - B (12 × 2 = 24 Marks)**

Answer ALL Questions

| | | Marks | K – Level | CO |
|---|---|---|---|---|
| 11. | Define Dependent Current source and draw its symbol. | 2 | K1 | CO1 |
| 12. | Find the power consumed by a 200Ω resistor when a current of 0.5A flows through it. | 2 | K1 | CO1 |
| 13. | List the steps to find Thevenin's voltage. | 2 | K1 | CO2 |
| 14. | Outline the condition for maximum power transfer in DC circuits. | 2 | K2 | CO2 |
| 15. | Define RMS value. | 2 | K1 | CO3 |
| 16. | Demonstrate the vector diagram for a pure inductance circuit. | 2 | K2 | CO3 |
| 17. | Define permittivity. | 2 | K1 | CO4 |
| 18. | Find the energy stored in a 20 μF capacitor charged to a voltage of 50V. | 2 | K1 | CO4 |
| 19. | Compare magnetic and electric circuits. | 2 | K2 | CO5 |

| | | | | | |
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| 20. | Define magnetic intensity. | 2 | K1 | CO5 |
| 21. | What is a dynamometer type wattmeter? | 2 | K1 | CO5 |
| 22. | Compare the merits and demerits of piezoelectric transducers. | 2 | K2 | CO6 |

**PART - C (6 × 11 = 66 Marks)**

Answer ALL Questions

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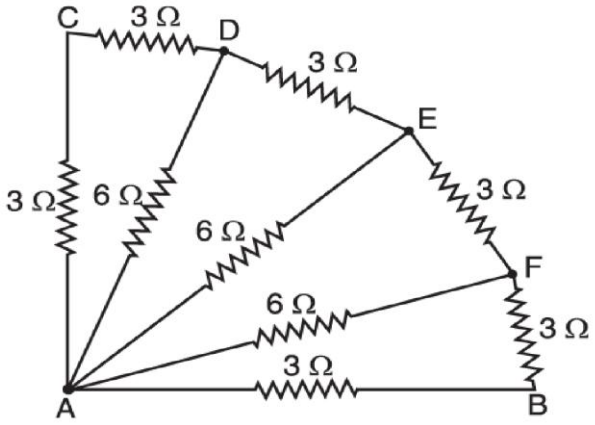
|---|---|---|---|---|---|
| 23. | a) (i) | Solve the circuit shown in figure and find the Equivalent resistance. | 6 | K3 | CO1 |

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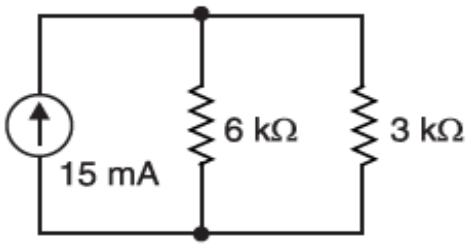
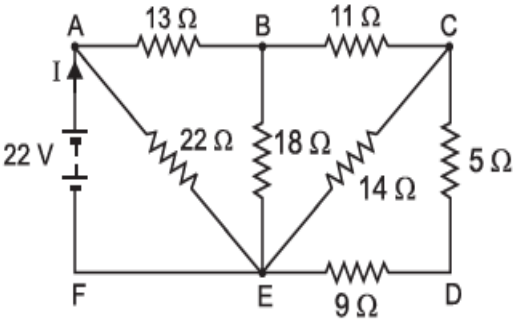
| | (ii) | Solve the circuit shown in figure and find the current in 6KΩ resistor by converting current source into voltage source. | 5 | K3 | CO1 |

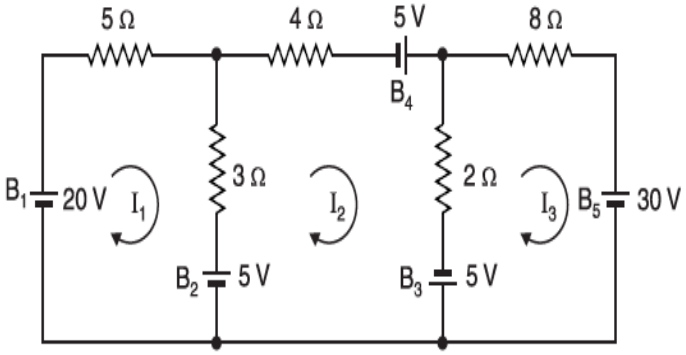



**OR**

| | | | | | |
|---|---|---|---|---|---|
| | b) | Solve the circuit shown in figure and find the value of current in the branch AF. | 11 | K3 | CO1 |

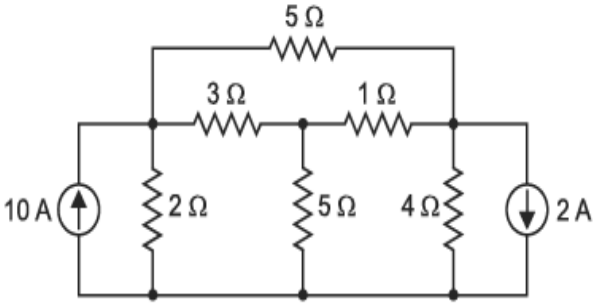



| | | | | | |
|---|---|---|---|---|---|
| 24. | a) | Apply mesh analysis method to calculate the currents flowing through each loop in the given circuit. | 11 | K3 | CO2 |



**OR**

b) Apply nodal analysis method to calculate the currents flowing through each resistor in the given circuit. *11 K3 CO2*




25. a) Explain and derive the average value, RMS value, form factor and peak factor for (i) half wave rectified alternating current and (ii) full wave rectified alternating current. *11 K2 CO3*

**OR**

b) Explain the operation of RC series AC circuit with relevant phasor diagram and derive the formulas for phase angle, Impedance, Admittance and power. And also draw the power curve of RL Series AC circuit. *11 K2 CO3*

26. a) Develop an expression for energy stored in a capacitor and analyze the factors that affect the energy stored in capacitor. *11 K3 CO4*

**OR**

b) Develop the expression for charging and discharging of capacitor with relevant diagrams and waveforms. *11 K3 CO4*

27. a) Explain the construction an working principle of a single-phase transformer. *11 K2 CO5*

**OR**

b) Explain Faraday's Law of Electromagnetic Induction and derive the expression for the EMF induced in a coil when the magnetic flux changes with time. *11 K2 CO5*

28. a) Explain the construction and working principle of Permanent Magnet Moving Coil (PMMC) instruments. *11 K2 CO6*

**OR**

b) Illustrate the working of a piezoelectric transducer using a functional block diagram. *11 K2 CO6*