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Code No.: G-5440/N/AICTE

FACULTY OF ENGINEERING

B.E. (CME/CSE/EEE)- II Semester (AICTE)(New)(Main) Examination, July/August 2025

Subject: Basic Electrical Engineering

Time: 3 hours

Max. Marks: 70

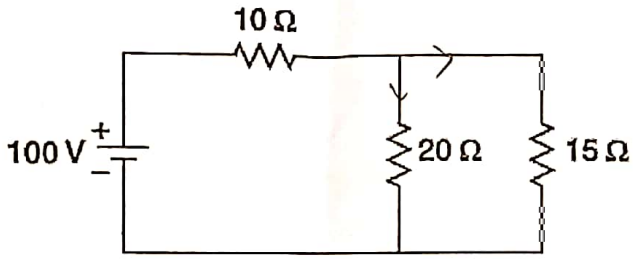
Note: i) **First Question is compulsory and answer any four questions from the remaining six questions. Each question carries 14 Marks.**

ii) **Answers to each question must be written at one place only and in the same order as they occur in the question paper.**

iii) **Missing data, if any, may suitably be assumed.**

1. a) A 12 V DC power supply is connected in series with three resistors having resistances of 4Ω, 3Ω, and 5Ω respectively, forming a closed-loop circuit. Using Kirchhoff's Voltage Law, determine the current flowing through each resistor.
   b) In an AC circuit, the current is 10 A, voltage is 230 V, and the power factor is 0.8 lagging. Calculate real power, reactive power, and apparent power.
   c) A three-phase induction motor runs at 1440 rpm when supplied with a 50 Hz source. The motor has 4 poles. Calculate the slip speed and slip.
   d) List the various types of losses that occur in a transformer.
   e) A 4-pole DC generator with a wave-wound armature has 400 conductors. The flux per pole is 0.02 Wb, and the speed is 1500 rpm. Calculate the generated EMF
   f) State Fleming's Right Hand Rule.
   g) What is the role of ELCB in a domestic wiring system?

2. a) State the Superposition Theorem and illustrate with a suitable example.
   b) Apply Thevenin's theorem to determine the current flowing through the 15 Ω resistor in the provided circuit.



3. a) Define the Root Mean Square (R.M.S) value of an alternating current. Derive an expression to show that the R.M.S value is directly proportional to the maximum (peak) value of the current.
   b) A circuit consists of a resistance of 20Ω, an inductance of 0.05H are connected in series. A supply of 230V at 50 Hz is applied across the circuit. Determine the voltage across R & L, impedance, current, power factor real power and reactive power consumed by the circuit.

4. a) Explain how a rotating magnetic field is produced in a three-phase induction motor. Support your explanation with neat diagrams and phasor representations.
   b) A 500 KVA, 11000/415 volts, 50 Hz single phase transformer has 100 turns on the secondary winding. Calculate i) Rated primary and secondary currents ii) Number of primary turns iii) Maximum value of flux in the core iv) Voltage induced/turn on both primary secondary winding.

5. a) Derive the EMF equation of a DC generator.
   b) Explain the operation of Capacitor start & Capacitor run 1-Φ Induction Motor.

6. a) What is earthing and why is it important in electrical installations? Describe the pipe earthing method in detail and illustrate the process with a neat diagram.
   b) Why is power factor improvement important in electrical systems? Discuss the significance of power factor improvement and explain any one practical method used to enhance the power factor in an induction motor.

7. a) Derive the mathematical relationship between line voltage and phase voltage in a three-phase star (Y) connected system. Illustrate the relationship with the help of a neat phasor diagram.
   b) Two resistors have a combined resistance of 25 Ω when connected in series and 6 Ω when connected in parallel. Calculate the individual resistances.

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4 x 14 = 56