FACULTY OF ENGINEERING

B.E. (Civil) III - Semester (AICTE) (Main & Backlog) (New) Examination, February/March 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) Answer 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 be suitably assumed.

1. a) Write the expressions for energy stored in an inductor and capacitor.
   b) Calculate equivalent resistance R_{CB} for the circuit shown below
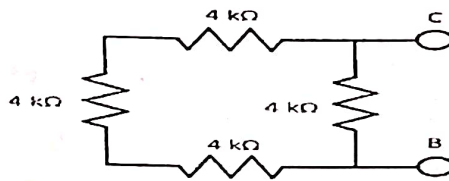
   c) An alternating current is given by $i=77\sin 314t$ A. Find the maximum value of current and frequency in Hz.
   d) What are the losses in single phase transformer?
   e) A 6 pole 3 phase Induction motor is connected to 50Hz supply. The speed of the shaft is 960rpm. Find % slip and slip speed.
   f) Define Faradays first and second law.
   g) What are the disadvantages of low power factor ?

2. a) State and explain Superposition Theorem.
   b) Determine current in 4Ω by Thevenin's Theorem.
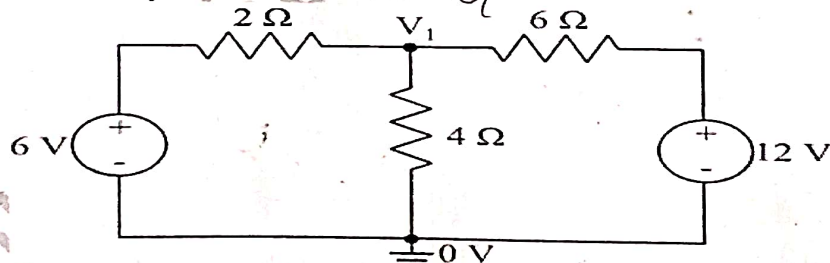
3. a) Analyze the single phase RL series AC circuit with a phasor diagram.
   b) A series circuit having R = 150Ω and L = 200mH connected to voltage source of V = 200 V. Determine (i) impedance (ii) current (iii) power factor (iv) voltage across each element. (v) Active power and reactive power

4. a) Derive EMF equation of transformer.
   b) A 5 kVA, 1-ϕ, 50 Hz, 230/115 V transformer gave the following test results:
   OC test: 115V, 0.6A, 100W; SC test: 60V, 13A, 300W;
   Calculate the efficiency at full load and half load at p.f 0.8 lagging.

5. a) Explain in detail constructional details and principle of operation D.C Generator.
   b) A shunt generator delivers 450A at 230V and the resistance of the shunt field and armature are 50Ω and $0.03\ \Omega$ respectively. Calculate the generated E.M.F.

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6. a) Explain the different methods to improve the power factor of the system.
   b) A household uses the following electric appliances: Refrigerator of rating 400 W for ten hours each day, Two electric fans of rating 80 W each for twelve hours each day, Six electric tubes of rating 18 W each for 6 hours each day. Calculate the electricity bill of the household for the month of June if the cost per unit of electric energy is Rs. 3.

7. a) Explain the significance of back emf in DC motor.
   b) Derive Average and RMS values of alternating quantity.

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