Code No: F-13604/N/AICTE

FACULTY OF ENGINEERING

B.E. (ECE/ETE/M/P/AE/CS/AI & DS/AI & ML/IoT/IT) I - Semester (AICTE) (Main & Backlog) (New) Examination, February/ March 2024

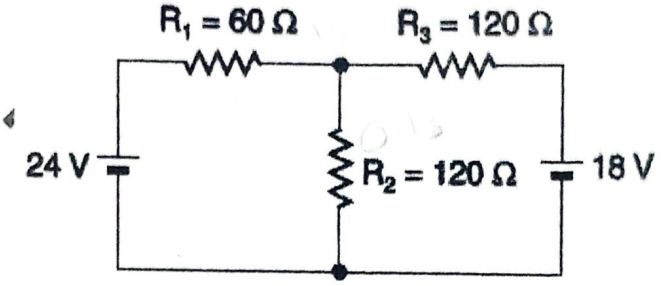
Subject: Basic Electrical Engineering

Time: 3 Hours **Max. Marks: 70**

Note: (i) First question is compulsory and answer any four questions from the remaining six questions. Each questions 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) Derive the equation for energy stored in a capacitor.
   b) Show how to combine a four 100 ohm resistors to obtain an equivalent resistance of (i) 100 Ohm and (ii) 60 Ohm
   c) A series circuit having R = 5 Ω & X_L = 10 Ω. Determine power factor of the circuit?
   d) Draw Impedance and Power Triangle for series RC Circuit?
   e) The half load core and copper losses in a transformer are 100 W & 200 W respectively, find the full load core and copper losses of a transformer?
   f) Mention the applications of a three phase induction motor.
   g) Why is it necessary to improve the power factor in an industry?

2. a) Find the current through R_2 resistor in the given circuit using Norton's theorems.



   b) State and explain Superposition Theorem with an example.

3. a) Derive the RMS and Average values of a sinusoidal wave form and find its crest factor.
   b) A 415V, 50Hz, delta connected system has a resistance of 50 Ohm and an inductance of 10mH. Calculate (i) line current, (ii) phase current, (iii) line voltage (iv) phase voltage, (v) power factor (vi) Real power, (vii) Reactive power and (viii) Apparent power?

4. a) A single phase transformer has 500 turns on primary and 1000 turns on secondary. The voltage per turn in the primary winding is 2 volts. Calculate
   (i) voltage induced in the primary winding, (ii) voltage induced in the secondary winding
   (iii) the maximum value of the flux density if the cross-section area of the core is 200 cm^2
   b) Write the differences between the squirrel cage induction motor and slip ring induction motor.

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5. a) A shunt generator delivers 200A at 220V and the resistance of the shunt field and armature are 220 Ω and 0.02 Ω respectively. Calculate the generated e.m.f of the shunt generator.
   b) Explain the operation of Capacitor start & Capacitor run 1-Φ Induction Motor.

6. a) What is earthing? Explain with a neat diagram how pipe earthing is done.
   b) With a neat circuit diagram, explain the operation of MCB and ELCB.

7. a) With a neat Phasor diagram state the relation of line voltage, phase voltage, line current and phase current of three phase star connected system.
   b) Draw the three phase transformer connections.

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