

FACULTY OF ENGINEERING

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

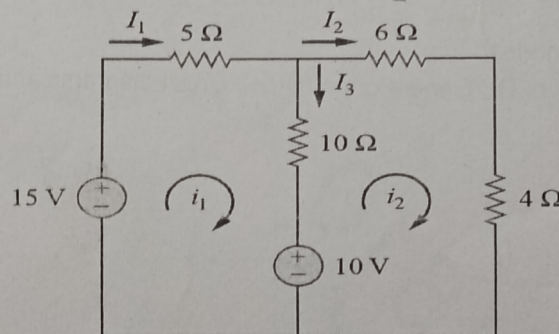
Subject: Basic Electrical Engineering

Time: 3 Hours

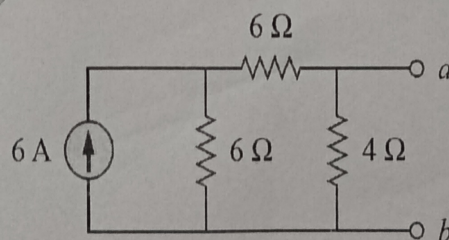
Max. Marks: 70

- Note: (i) First question is compulsory and answer any four questions from the remaining six questions. Each 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) Explain Active and Passive components in electrical circuits with an example.
b) State and explain Kirchhoff's laws with an example.
c) A series circuit having $R = 10 \Omega$ & $X_L = 15 \Omega$. Determine power factor of the circuit?
d) Mention the losses in a transformer.
e) Draw the star-star and delta-star three phase transformer connection diagrams?
f) A 4 pole, 3- Φ , 50 Hz Induction motor is running at 1450 rpm. Calculate slip and slip speed.
g) Distinguish between primary and secondary batteries.
2. a) Use nodal analysis to determine the branch currents I_1 , I_2 , and I_3 for the circuit shown below.



- b) Find the Norton equivalent of the circuit shown below.



3. a) A sinusoidal varying alternating current is given by $i(t) = I_m \sin(\omega t)$, obtain its RMS value of current in terms of its maximum value also find its crest factor.
b) Three impedances each having a resistance of 20 ohm and an inductive reactance of 15 ohm are connected in delta across a 415 V, 3-phase, 50 Hz supply. Calculate (i) Line current
(ii) Phase voltage and (iii) Total power absorbed.

4. a) Derive an expression for EMF induced in either primary or secondary side of a single phase transformer.
- b) A single-phase, 25 kVA, 11 kV/230 V, 50 Hz transformer is tested for open and short-circuit test with below shown inferences:
- Open circuit test : $V = 230 \text{ V}$, $I = 1.2 \text{ A}$, $W = 100 \text{ W}$
- Short circuit test : $V = 100 \text{ V}$, $I = \text{rated current}$, $W = 300 \text{ W}$
- Calculate efficiency at full load and half load at 0.8 pf lagging
5. a) Explain the principle of operation of capacitor start and capacitor run 1-phase induction motor.
- b) A 220 V, 4-pole, lap wound dc shunt motor has 800 conductors, on its armature. It draws a current of 21 A from the supply mains and out of which the field winding takes a current of 1 A. The resistance of the armature winding is 0.5Ω and flux per pole is 30 m Wb. Find the (i) Back e.m.f, and (ii) Speed.
6. a) Explain the working principle of fuse and MCCB.
- b) What is earthing? Why earthing is required? With the help of neat sketch explain pipe earthing.
7. Write short notes on:
- a) Ideal Transformer on no-load
- b) Explain different types of DC Generators with their circuit diagrams and generated EMF equations.