

BT-2/M-13

8212

ELECTRICAL TECHNOLOGY

Paper-EE-101E

Option-I

Time Allowed : 3 Hours]

[Maximum Marks : 100

Note : Attempt five questions in all, selecting at least one question from each Unit. All questions carry equal marks.

UNIT-I

1. (a) Find the average and r.m.s. values of $v = V_m \sin \omega t$ for half cycle. 4
- (b) Define KCL & KVL with the help of examples. 4
- (c) Given (all in volts):
 $V_1 = 40 \cos \omega t$, $V_2 = 40 \sin(\omega t + 225^\circ)$,
 $V_3 = 40 \sin(\omega t - 225^\circ)$. Find $V = V_1 + V_2 + V_3$. 12
2. (a) Use nodal method to determine the current supplied by 50V source shown in the figure: 2.1. 10

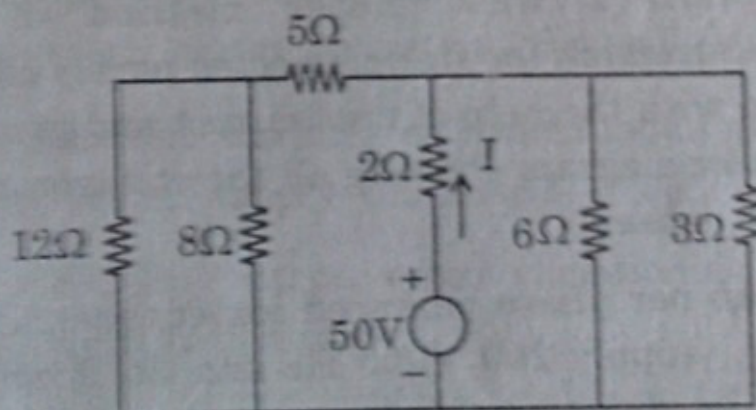


Fig. 2.1.

- (b) Explain behaviour of pure C when subjected to ac supply with finding reactance, equations of current, instantaneous power and average power with their neat waveforms. 10

UNIT-II

3. (a) A practical coil of power factor 0.8 is in series with a $200\ \mu\text{F}$ capacitor when connected to 100 Hz supply the potential difference across the coil is equal to the potential difference across the capacitor. Find the resistance and inductance of the coil. 5
- (b) Explain and derive the expressions for frequency response of series RLC circuit and deduce the condition for resonance. 15
4. (a) State the maximum power transfer theorem and explain its importance. 10
- (b) Explain delta to star and star to delta transformation of set of pure resistors. 10

UNIT-III

5. (a) Explain 2 watt meter method of power measurement for star connected purely capacitive load with the help of neat circuit and generalized phasor diagram showing all the voltages, currents and phases. 15
- (b) Given per phase balanced impedances: $Z_p = 4 + 3j\ \Omega$, supply 200 V, 50 Hz and 3ϕ . Find V_L , V_P and I_L , I_P , active power and p.f. of the system in both star and Δ delta cases. 5

6. Explain in detail the following with the help of neat phasor diagrams:
- (i) Transformer at no load without taking winding resistance and leakage reactance into consideration. 5
 - (ii) Transformer at load without taking winding resistance and leakage reactance into consideration (concept of primary counterbalancing current). 5
 - (iii) Working and Phasor diagram of actual transformer at inductive load (RL series load). 10

UNIT-IV

7. (a) Why do we need a starter to start a motor? 4
- (b) Why do we need a Commutator in DC generator? 4
- (c) Why do we need Carbon brushes in DC motor? 4
- (d) Why is the armature core of machines laminated and made up of silicon steel? 4
- (e) Why do we acknowledge phase sequence in 3ϕ induction motor industrial drives? 4
8. (a) Explain the working of Synchronous generator. How is 3ϕ supply produced? 10
- (b) Explain the torque speed variation curve in a 3ϕ induction motor. 10