

BT-1/D-13

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ELECTRICAL TECHNOLOGY

EE-101-E

Time : Three Hours]

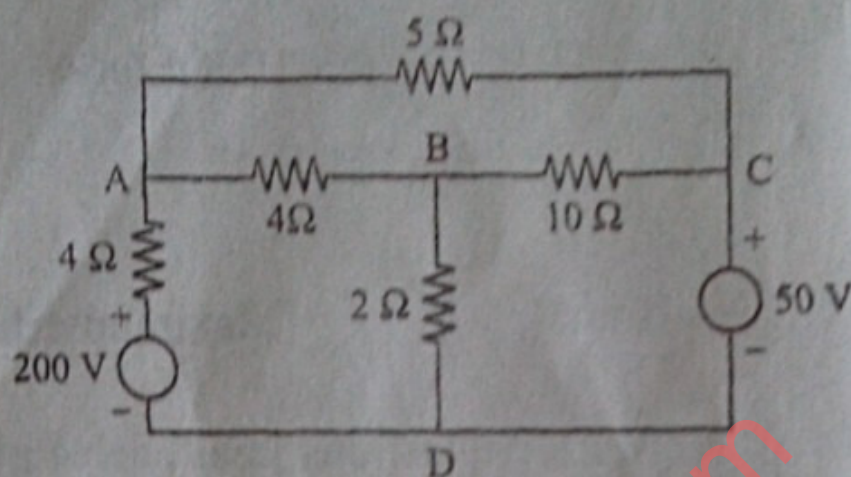
[Maximum Marks : 100

Note : Attempt *Five* questions in all, selecting at least *one* question from each Section. All questions carry equal marks.

Section A

1. (a) Given (all in volts) $V_1 = 50 \sin \omega t$, $V_2 = 40 \cos (\omega t + 225^\circ)$, $V_3 = 40 \cos (\omega t - 225^\circ)$. Find $V = V_1 + V_2 + V_3$. 10
- (b) Given a wave $v = V_m \sin \omega t$, if the wave is made full wave rectified, find the average and r.m.s. values for complete cycle. 10
2. (a) Use node voltage analysis to determine the voltage across 2Ω resistor shown in the Fig. 10

- (b) Use mesh analysis to determine the voltage across 2Ω resistor shown in the Fig. 10



Section B

3. (a) Explain and derive the expressions for frequency response of series RLC circuit and deduce the condition for resonance. 15
- (b) A practical coil of power factor 0.6 is in series with a $100\ \mu\text{F}$ capacitor when connected to 50 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
4. (a) State the maximum power transfer theorem and explain its importance. 10
- (b) Explain star to delta and delta to star transformation of set of pure resistors. 10

Section C

5. (a) For 3Φ balanced systems, prove that the total instantaneous power is constant when subjected to balanced 3Φ load. 5
- (b) Mathematically prove that the sum of all instantaneous phase voltages of balanced 3Φ supply is always zero. 5
- (c) Two watt meters are connected to measure the input to a balanced 3Φ circuit read 2000 W and 500 W respectively. Find the power factor of the circuit (i) when both the readings are positive, (ii) the later reading is obtained after reversing the connections of current coil of the watt meter 5
- (d) Given per phase balanced delta connected impedances $\therefore Z_p = 8 + 3j\Omega$, supply 230 V, 50 Hz and 3Φ . Find V_L , V_P and I_L , I_P Active Power. 5
6. Explain in detail the following with the help of neat phasor and circuit diagrams :
- (a) Transformer at no load without taking winding resistance and leakage reactance into consideration. 5

- (b) Concept of primary counterbalancing current and transformer at purely resistive load without taking winding resistance and leakage reactance into consideration. 5
- (c) Working and Phasor diagram of Transformer at inductive load (RL Series load) without taking winding resistance and leakage reactance into consideration. 10

Section D

7. (a) Explain the constructional features of D.C. Machine with the help of neat sketches. 10
- (b) Explain the working of Commutator in DC motor by explaining the working of split ring. How is bidirectional torque converted into unidirectional torque. 10
8. (a) Explain the constructional features of slip ring type 3Φ induction motor with the help of neat sketches. 10
- (b) Explain the torque slip variation curve in a 3Φ induction motor. 10