11819

3 Hours / 70 Marks Seat No. | | | | | | | | |

Instructions : (1) All Questions are *compulsory.*

(2) Answer each next main Question on a new page.

(3) Illustrate your answers with neat sketches wherever necessary.

(4) Figures to the right indicate full marks.

(5) Assume suitable data, if necessary.

Marks

1. Attempt any FIVE of the following : **10**

(a) Define active power and reactive power for RLC series circuit.

(b) Draw impedance triangle and voltage triangle for RL series circuit.

(c) Define susceptance and admittance for parallel circuit.

(d) Define quality factor for parallel resonance and write its mathematical expression.

(e) Draw sinusoidal waveform of 3 phase emf and indicate the phase sequence.

(f) Write the procedure of converting a current source into voltage source.

(g) State superposition theorem applied to d.c. circuits.

2. Attempt any THREE of the following : **12**

(a) Draw a circuit diagram of R.C. series circuit. Draw impedance triangle and power triangle for same circuit.

(b) Two circuits the impedance of which are given by $Z_1 = 6 + j8$ ohm and $Z_2 = 8 - j6$ ohm are connected in parallel. If the applied voltage to the combination is 100 V. Find (i) Current and power factor at each branch (ii) Overall current and power factor of the combination. (iii) Power consumed by each impedance. Draw phasor diagram.

(c) State any four advantages of polyphase circuits over single phase circuit.

(d) Using mesh analysis, find loop currents I_1 and I_2 in the circuit, as shown in fig no. 1

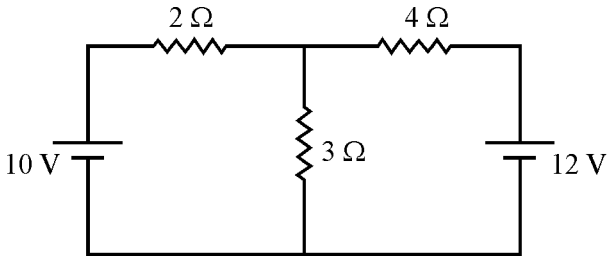

Fig. 1

3. Attempt any THREE of the following : **12**

(a) Derive the expression for resonance frequency for a RLC series circuits.

(b) Compare series resonance to parallel resonance on the basis of

(i) Resonant Frequency (ii) Impedance

(iii) Current (iv) Magnification

(c) Compare star & delta connection. (any four points)

(d) By using Nodal analysis calculate the current in 110 Ω resister and p.d. across 110 Ω resistor as shown in fig. no. 2.

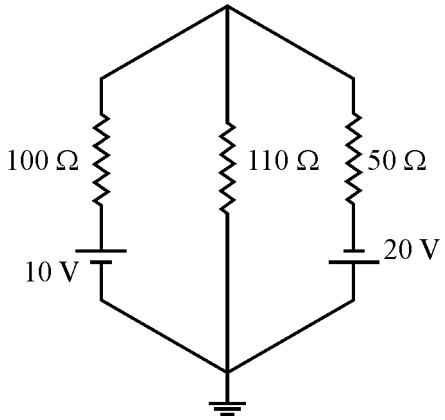

Fig. 2

(e) Convert following circuit as shown in fig. no. 3 into Thevenins circuit across A & B.

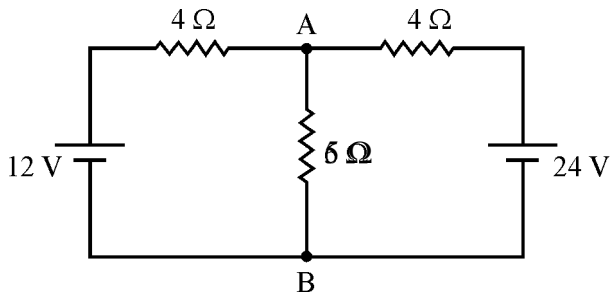

Fig. 3

4. Attempt any THREE of the following : **12**

(a) A resistance of 100 Ω, an inductance of 0.2H and capacitance of 150 μF are connected in series across 230 V, 50 Hz ac supply. Calculate the current drawn by the circuit, power factor of the circuit, its nature and power consumed by the circuit.

(b) Define :

(i) Admittance

(ii) Susceptance

(iii) Conductance

(iv) State the units for admittance & conductance

(c) Delta connected induction motor is supplied by 3 phase, 400 V, 50 Hz. Supply the line current is 43.03 amp and the total power from the supply is 24 kW. Find resistance and reactance per phase of motor.

(d) Derive the formulae for star to delta transformation.

5. Attempt any TWO of the following : **12**

(a) A choke coil has a resistance of 4 Ω and inductance of 0.07 H is connected in parallel with another coil of resistance 10 Ω and inductance of 0.12 H. The combination is connected to 230 V, 50 Hz supply. Determine total current and current through each branch.

(b) Determine the current in 40 Ω and 10 Ω as shown in fig. no. 4 by node voltage analysis method.

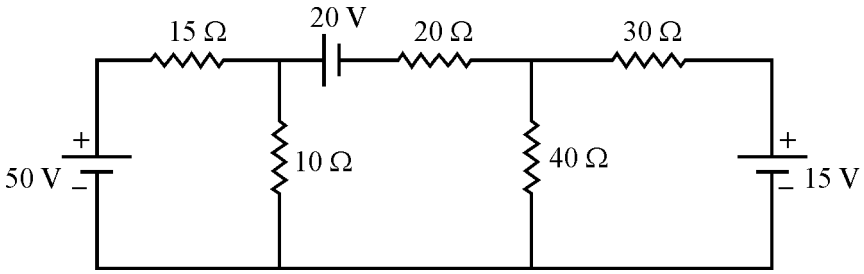

Fig. 4

(c) Use Norton's theorem to find the current through 3 Ω resistance, for the circuit shown in fig. no. 5

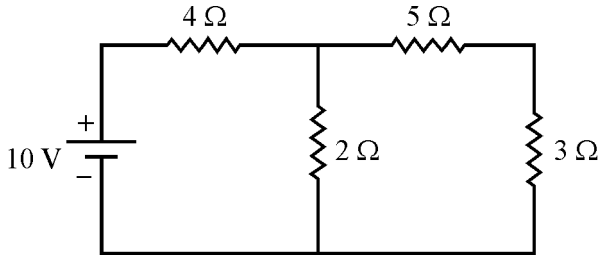

Fig. 5

6. Attempt any TWO of the following : **12**

(a) Voltage across a coil is 146.2 V and across a series resistance is 150 V, when they are connected across 220 V, 50 Hz supply. If supply current is 10 amp, find

(i) Resistance of coil

(ii) Inductance of coil

(iii) Power consumed by coil

(iv) Power factor of total circuit

(b) In a 3 phase star connected system, derive the relationship $V_L = \sqrt{3}\ V_{ph}$.

(c) State the Thevenin's theorem. Also write stepwise procedure for applying Thevenin's theorem to simple circuits.

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