22324

21222

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

15 minutes extra for each hour

Instructions – (1) All Questions are *Compulsory.*

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

(3) Figures to the right indicate full marks.

(4) Assume suitable data, if necessary.

(5) Use of Non-programmable Electronic Pocket Calculator is permissible.

(6) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

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

a) Define active power and reactive power for R-L-C series circuit.

b) Define RMS value and average value related to sinusoidal AC waveform.

c) Define term conductance and susceptance, state its unit.

d) Define - Phase sequence and write equations for instantaneous values of 3ϕ voltages.

e) Give equations for delta to star transformation.

f) State Norton's theorem.

g) State Reciprocity theorem.

Marks

2. Attempt any THREE of the following: 12

a) Derive the expression for current in pure inductor circuit when connected to 1ϕ AC Supply with graphical representation.

b) Draw and explain RLC parallel Ckt. Find out the equation for resonant frequency.

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

d) Find the current in 6Ω resistor in the circuit shown in Fig. No. 1 using mesh analysis.

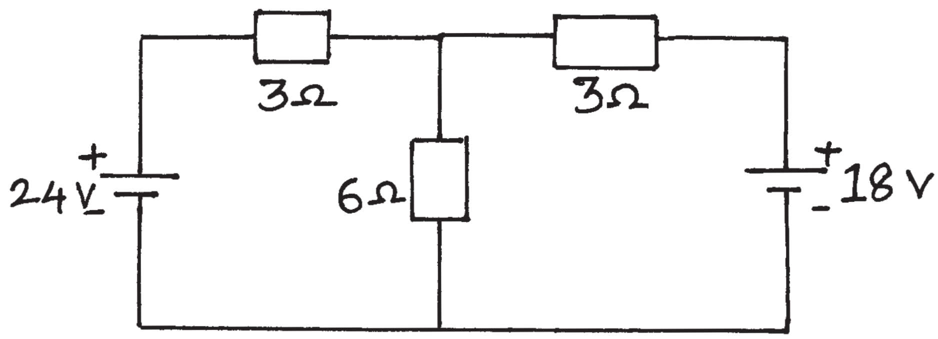

Fig. No. 1

3. Attempt any THREE of the following: 12

a) Derive the expression for resonance frequency for a RLC series circuit.

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

i) Resonant frequency

ii) Impedance

iii) Current

iv) Magnification

c) A star connected 3ϕ load is supplied from 3ϕ, 415V, 50 Hz supply. If the line current is 20 A and total power taken is 10KW, then determine

i) Load resistance and reactance per phase

ii) Load power factor

iii) Total 3ϕ reactive power

Marks

d) Find current in 40Ω and 10Ω in Fig. No. 2 using node voltage analysis method.

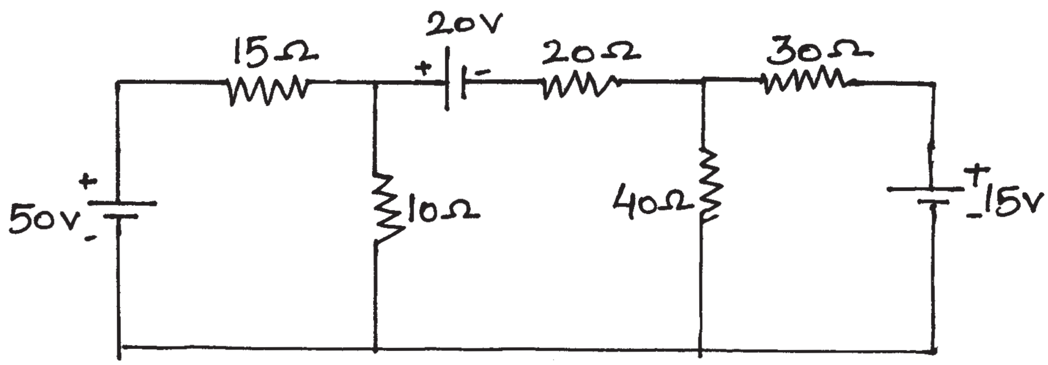

Fig. No. 2

e) State Norton's theorem. Also write stepwise procedure for applying Norton's theorem to simple Ckt.

4. Attempt any THREE of the following: 12

a) A R-L-C series circuit with a resistance of 20Ω, inductance of 0.25 H and capacitance of 100μF is supplied with 240 V variable a.c. supply, calculate.

i) Resonance frequency

ii) Current at this condition

iii) Power Factor

iv) Quality Factor

b) A choke coil has a resistance of 2Ω and an inductance of 0.0035H is connected in parallel with 350μF capacitor which is in series with a resistance of 20Ω. When the combination is connected across a 200 V, 50 Hz.

Calculate

i) Total current taken

ii) P.F. of whole circuit

c) Each phase of delta-connected load comprise a resistor of 50Ω and capacitor of 50μF in series. Calculate the line and phase currents when the load is connected to a 440V, 3 phase, 50 Hz supply.

Marks

d) Calculate the value of R which will absorb maximum power from the circuit of Fig. No. 3.

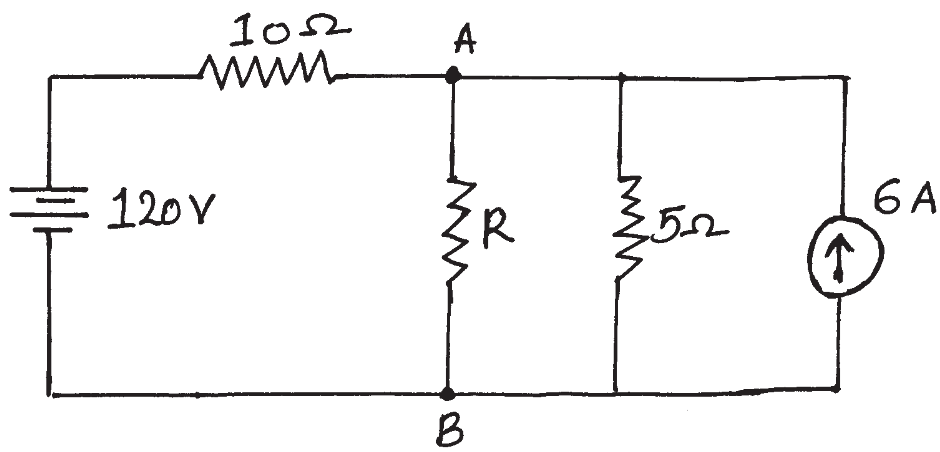

Fig. No. 3

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

a) A coil having resistance of 10Ω and inductance of 0.15H is connected in parallel with R-C series combination having R = 5Ω and C = 20μF . If supply voltage is 110 V, 50Hz then

i) Draw circuit diagram

ii) Calculate branch currents using impedance method

iii) Power absorbed by the each branch

b) Reduce the network shown in Fig No. 4 by applying Star/Delta or Delta/Star transformation and determine equivalent resistance 'R_{AB}'.

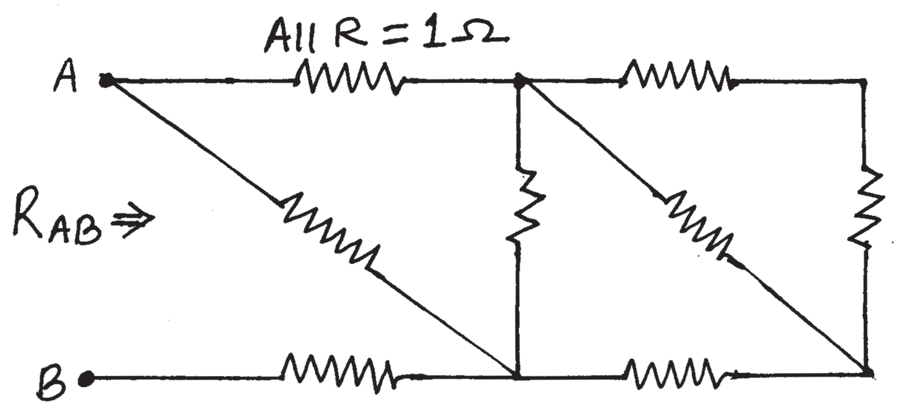

Fig. No. 4

Marks

c) Find I_L for the circuit shown in Fig. No. 5 using superposition theorem.

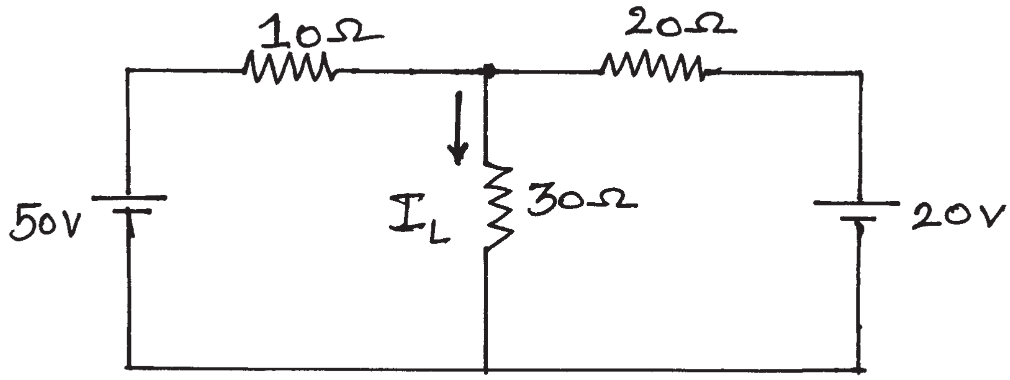

Fig. No. 5

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

a) An inductive coil (10+j40)Ω impedance is connected in series with a capacitor of 100μF across 230V, 50Hz, 1ϕ Mains.

Find :

i) Current through the circuit

ii) P.F of the circuit

iii) Power dissipated in the circuit.

iv) Draw the phasor diagram.

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

c) Apply superposition theorem to compute current I in the network shown in Fig. No. 6.

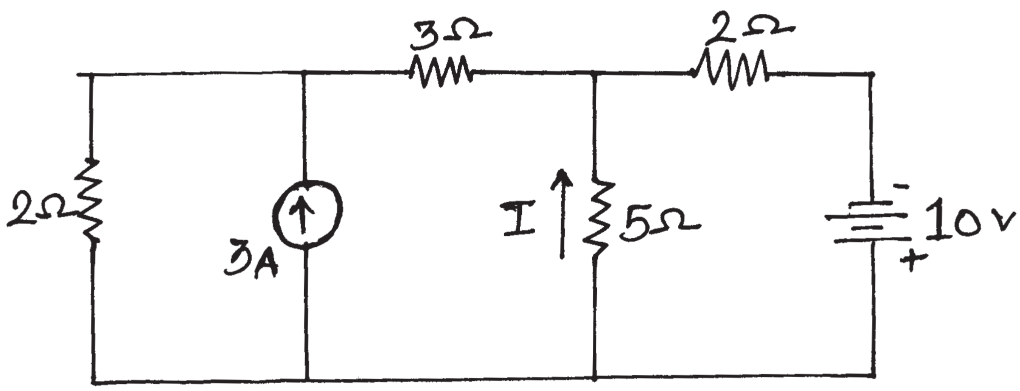

Fig. No. 6