17323

11718

3 Hours / 100 Marks Seat No. | | | | | | | | |

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.

Marks

1. Attempt any TEN of the following: **20**

a) Define cycle and time period related to a.c. waveform.

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

c) Draw impedance triangle and voltage phasor diagram for R-L series circuit.

d) Define susceptance and admittances for a parallel circuit.

e) State superposition theorem applied to D.C. circuits.

f) State maximum power transfer theorem for D.C. circuits.

g) Write down the units of R, L, C and G.

h) Define quality factor of series A.C. circuit.

i) How current source can be converted into equivalent voltage source?

j) Draw the sinusoidal waveform of 3 phase emf and also indicate the phase sequence.

Marks

k) Find frequency and RMS value of the following voltage waveform Refer Figure No. 1

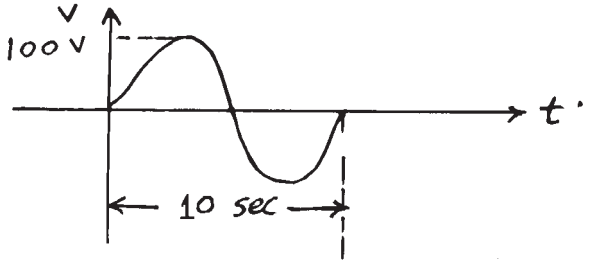

Fig. No. 1

l) State the behaviour of following elements at the time of switching i.e. transient period:

(i) Pure L

(ii) Pure C

2. Attempt any FOUR of the following: 16

a) Draw waveform and vector diagram to show following voltage and current. V = 100 sin wt. and i = 4 sin(wt – 30°)

b) Compare series and parallel circuits on any six points.

c) An alternating voltages of 250 V, 50 Hz is applied to a coil which takes 5A of current the power absorbed by the circuit is 1kW. Find the resistance and inductance of the coil.

d) Derive the expression for resonance frequency for a R-L-C series circuit.

e) Draw the phasor diagram and waveforms of voltage, current and power in a pure inductance circuit supplied by a 1-phase a.c. source.

f) Compare series and parallel circuit.

Marks

3. Attempt any FOUR of the following: 16

a) A choke coil has a resistance of 2Ω and an inductance of 0.035H is connected in parallel with a 350 μF capacitor which is in series with a resistance of 20Ω. When the combination is connected across a 200 V, 50Hz supply.
Calculate:

(i) The total current taken and

(ii) Power factor of whole circuit.

b) A coil having resistance of 5 Ω and inductance of 0.2H is arranged in parallel with another coil having resistance of 1Ω and inductance of 0.08 H. Calculate the current through the combination and power absorbed when a voltages of 100 V, 50 Hz is applied. Use impedance method.

c) Define the following terms:

(i) Leading quantity

(ii) Lagging quantity

d) A RC series circuit consisting of R = 10 Ω and C = 100 μF is connected across 200V, 50Hz AC supply. Find the value of current and power factor. What will be the value of current and power factor if the value of resistance is doubled?

e) A 200 W, 100 V l amp is connected in series with a capacitor to a 120 V, 50 Hz a.c. supply calculate:

(i) the capacitance required

(ii) the phase angle between voltage and current.

f) State the relation between line and phase values of current and voltage for star and delta connection.

Marks

4. Attempt any FOUR of the following: **16**

a) Three coils each with a resistance of 10 Ω and inductance of 0.35mH are connected in star to a 3-phase, 440 V, 50 Hz supply. Calculate the line current and total power taken per phase.

b) State any four advantages of polyphase circuit over single phase circuit.

c) Derive the formulae for star and delta transformation.

d) A delta connected induction motor is supplied by 3-phase, 400V, 50Hz supply the line current is 43.3A and the total power taken from the supply is 24 KW. Find the resistance and reactance per phase of motor winding.

e) Using mesh analysis find values of R1 and R2 shown in Figure No. 2

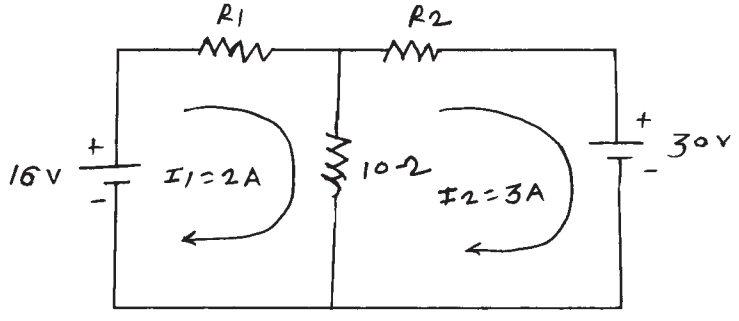

Fig. No. 2

f) Derive the condition for maximum power transfer theorem.

5. Attempt any TWO of the following: **16**

a) A coil of resistance 50 Ω and inductance of 0.1 H is connected in series with 100 μF capacitor. The combination is supplied with 230 V, 50 Hz A.C. supply. Calculate voltage across each, current through the circuit, power factor and draw complete vector diagram.

b) With the help of necessary phasor diagram, derive the relationship between line and phase current in balanced delta connected load connected to 3 phase A.C. supply.

Marks

c) (i) State Thevenin's theorem and write its procedural steps to find current in a branch. (Assume simple circuit)

(ii) Develop Thevenin's equivalent across A and B in network shown below in Figure No. 3

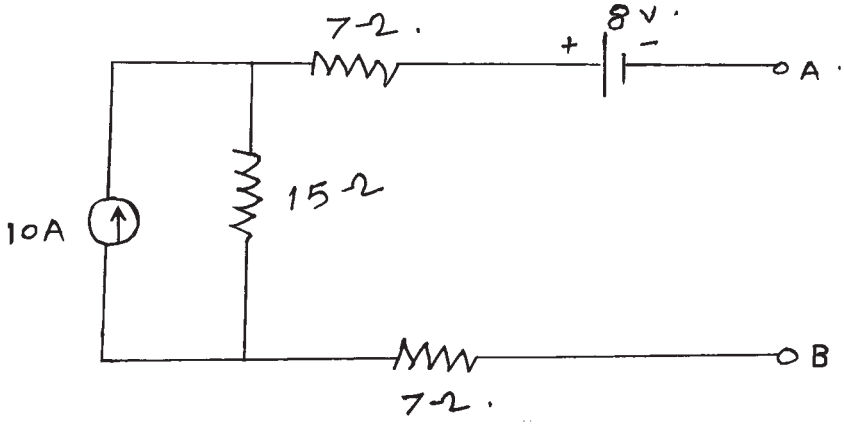

Fig. No. 3

6. Attempt any FOUR of the following: **16**

a) Calculate current through 10 Ω resistance in the network shown in Figure No. 4 using superposition theorem.

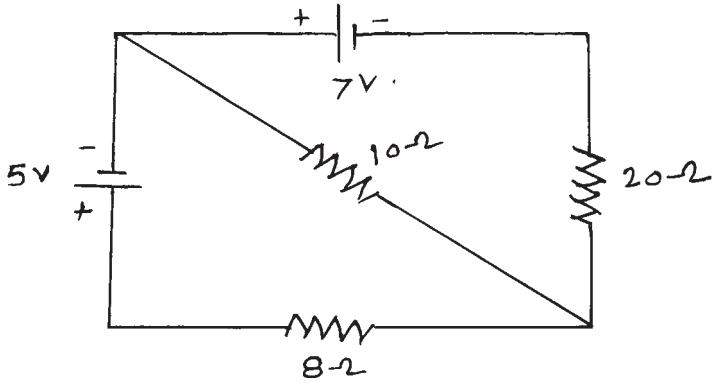

Fig. No. 4

Marks

b) Using Norton's theorem. Find current through 4 Ω resistance in Figure No. 5.

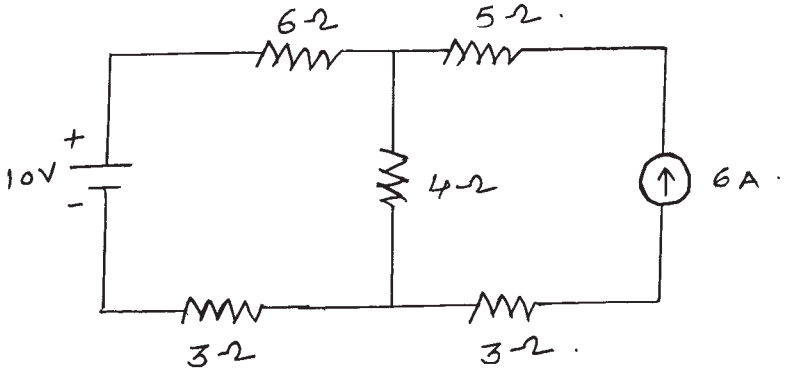

Fig. No. 5

c) Find current through 8 Ω resistance using nodal analysis in Figure No. 6

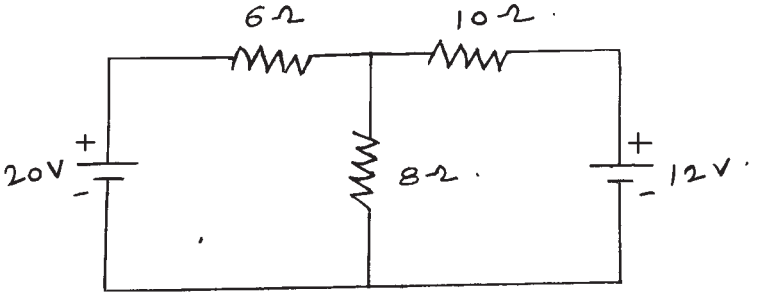

Fig. No. 6

d) Find the value of RL to transfer maximum power in the network shown in Figure No. 7

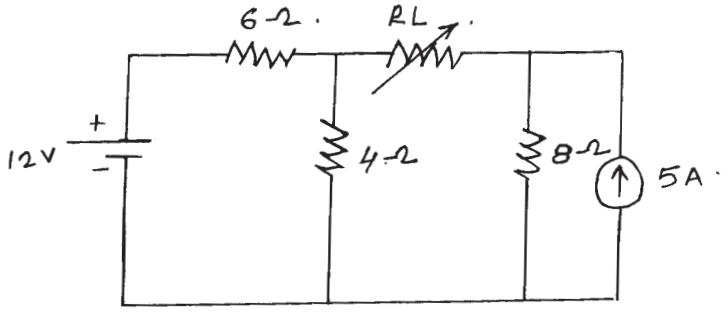

Fig. No. 7

e) Explain concept of initial and final conditions in switching circuits. For the elements R, L and C.

f) Give the expression for star to delta and delta to star transformation.