17323

21718

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

Marks

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

a) Define:

(i) Amplitude

(ii) Frequency of a.c. quantity

b) State the average power taken by a pure inductor and a pure capacitor when connected to a.c. supply.

c) Draw impedance triangle for R-C series circuit.

d) Define power factor and state its value for pure resistive circuit.

e) Define terms conductance and susceptance and state their unit.

f) Define Balanced 3ϕ load.

g) State the numerical relationship for star connected load between:

(i) Line current and phase current

(ii) Line voltage and phase voltage

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

Marks

i) Write the procedure of converting a given current source into voltage source.

j) Give equations of delta to star transformation.

k) Write the nodal equation for Node A (Figure No. 1)

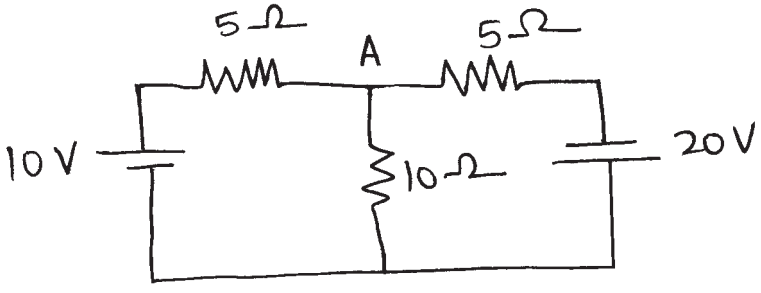

Fig. No. 1

l) State the behaviour of following elements at the final condition $t = \infty$

(i) pure L

(ii) pure C

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

a) Define:

(i) RMS value

(ii) Average value of an alternating quantity.

b) The voltage and current in a circuit with 50 Hz supply given as $V = 200 \sin wt$, $i = 14.14 \sin (wt - \pi/6)$
Draw phasor and waveform diagram of current and voltage.
Find:

(i) R.M.S. value of current

(ii) Average value of voltage

c) Draw vector diagram, impedance triangle and power triangle for series R-L-C circuit when connected to single phase a.c. supply for the condition XL > XC.

d) Two impedances $(5 + j6)\ \Omega$ and $(7 - j8)\ \Omega$ are connected in parallel across 230 V, 1ϕ, 50 Hz a.c. supply. Determine current drawn by each path and total current in the circuit.

Marks

e) Derive the expression for resonant frequency for the circuit shown in Figure No. 2.

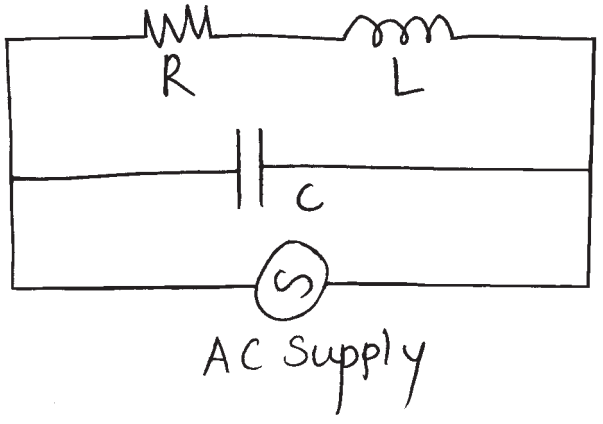

Fig. No. 2

f) Three impedance each of 5 + j6 are connected in star across 400 V, 50 Hz, 3 phase AC supply. Calculate:

(i) Phase current

(ii) Line current

(iii) Phase voltage

(iv) Power drawn

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

a) A 50 H inductor is connected across a 230 V, 50 Hz supply determine:

(i) Inductive reactance

(ii) R.M.S. value of current

(iii) Equation for voltage

(iv) Equation for current.

b) Draw graphical representation of resistance inductive reactance, capacitive reactance and impedance related to frequency for series resonance circuit.

Marks

c) Calculate current I shown in Figure No. 3.

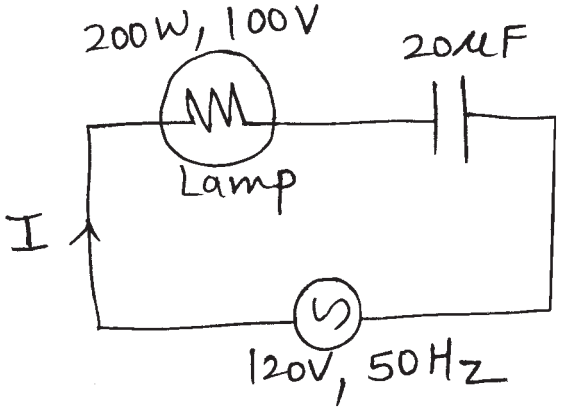

Fig. No. 3

d) Compare series resonance and parallel resonance circuit on any four parameters.

e) Explain in detail generation of three phase emf.

f) Using Thevenin's theorem find current through 5Ω resistance. Figure No. 4

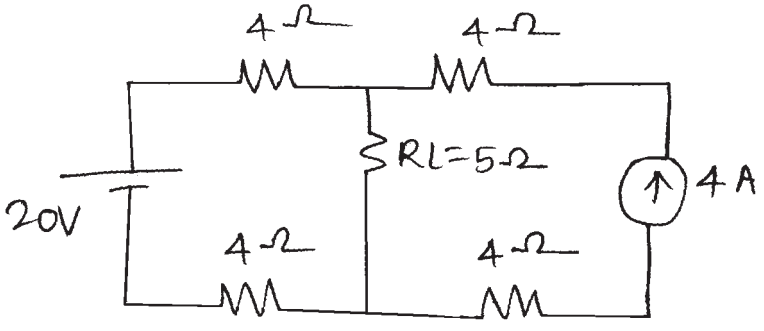

Fig. No. 4

Marks

4. Attempt any FOUR of the following: 16

a) Define terms:

(i) Leading quantity

(ii) Lagging quantity

b) A voltage of 200 $\angle 0°$ is applied across two impedances in parallel. The values of impedance are (12 + j16) and (10 – j20). Determine the kVA, kVAR and kW in each branch and power factor of the whole circuit.

c) Derive the formulae for star to delta transformation.

d) Using mesh analysis find value of R1 and R2 shown in Figure No. 5

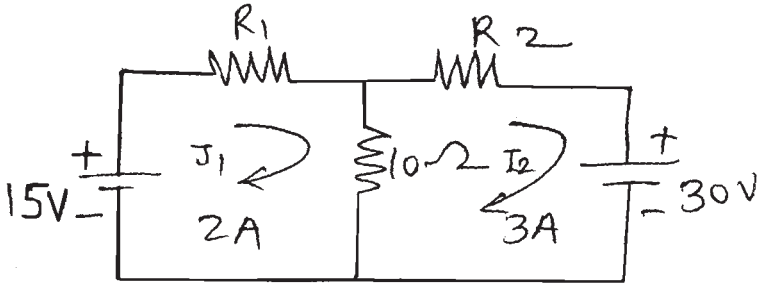

Fig. No. 5

e) Calculate current flowing through 5Ω, resister connected between A and B in Figure No. 6 by using superposition theorem.

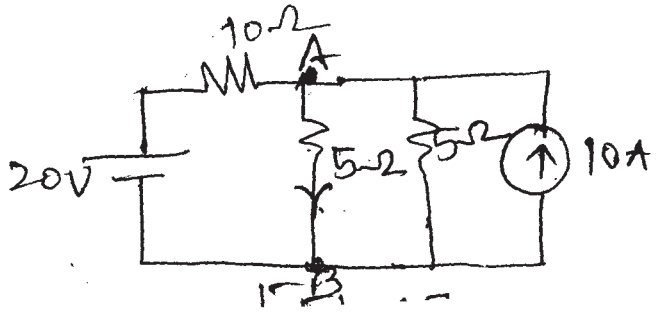

Fig. No. 6

f) Explain the concept of intial and final conditions in switching circuits for R, L and C.

Marks

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

a) (i) If A = 10 + j8, B = – 7 + j5, C = 8 + j6

Find:

1) AB/C

2) (A + B) / (B – C)

(ii) A RLC series circuit with a resistance of 10 Ω, Inductance of 0.2 H and capacitance of 50 μF is connected to supply of 200V, 50Hz. Find :

1) impedance

2) total current

3) power factor

4) power consumed by series circuit.

b) State relationship between line voltage and phase voltage, line current and phase current in a balanced delta connection. Draw complete phasor diagram of voltages and current.

c) (i) State maximum power transfer theorem and write its procedural step to find load resistance.

(ii) Find value of RL and maximum power in Figure No. 7

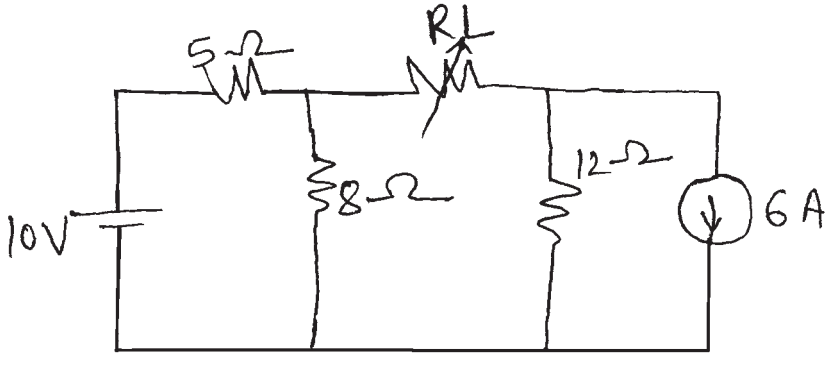

Fig. No. 7

Marks

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

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

b) Find the current in 10Ω resistor in Figure No. 8 by node voltage analysis method.

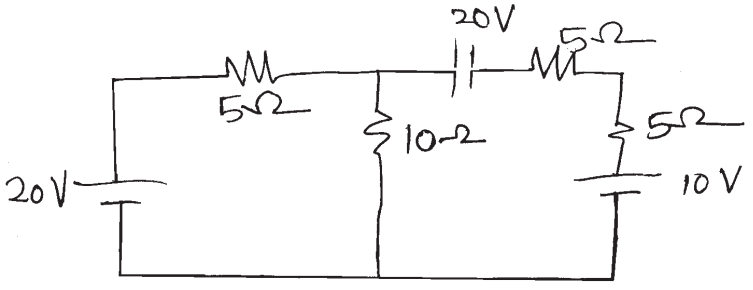

Fig. No. 8

c) Use Norton's theorem, find the current through 3Ω resistance. For the circuit shown in Figure No. 9.

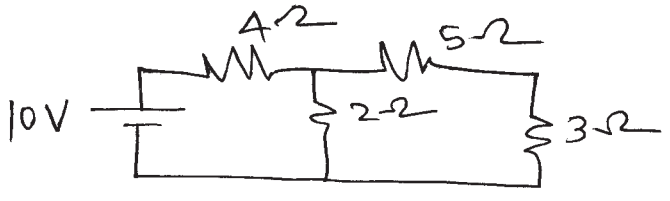

Fig. No. 9

d) State Thevenin's theorem and write its procedural steps to find current in a branch.

e) Find the current through 4 Ω impedance shown in Figure No. 10 using super position theorem.

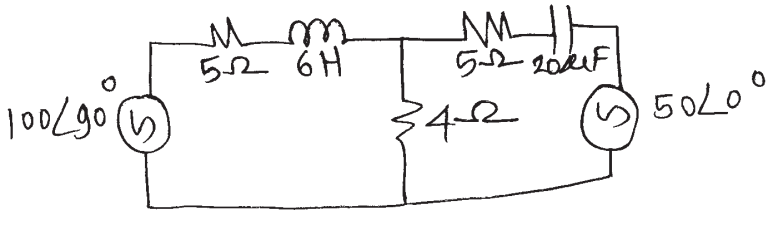

Fig. No. 10

f) State the behaviour of following elements at the time of switching i.e. trasient period:

(i) Pure R

(ii) Pure L

(iii) Pure C