17323

16172

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 frequency and amplitude.

b) Define crest factor and form factor for sinusoidal A.C. waveform.

c) Draw impedance triangle for R-C series circuit. Write nature of power factor of this circuit.

d) Convert $Z = 6 + j8\,\Omega$ in polar form.

e) Define Q factor and write its expression.

f) Define admittance and state its unit.

g) Define balanced 3 phase load.

h) State the relation between line and phase values of voltage and current in 3 phase star connected system.

i) State Superposition Theorem.

j) State Thevenin's Theorem.

k) How to convert voltage source into equivalent current source?

l) State the behaviour of pure L at the time of switching.

Marks

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

a) Derive the expression for current in pure capacitive circuit when connected to AC supply. Draw phasor diagram.

b) Define :-

(i) Active Power

(ii) Reactive Power

(iii) Apparent Power

(iv) Power factor.

c) Three identical impedances are connected in delta to a 3 phase, 400v. The line current is 35 Amp. and total power taken from supply is 15 KW. Calculate resistance and reactance of each phase.

d) Compare the series and parallel resonant circuit.

e) Define r.m.s. value and average value. An alternating voltage is $e = 200 \sin 314t$ Calculate its r.m.s. and average value.

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

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

a) A resistance of 20 Ω, an inductance of 0.2 H and a capacitance of 100 μf are connected in series across 220 V, 50 Hz supply. Determine

(i) impedance

(ii) current

(iii) active power

(iv) apperant power

b) Two impedances (12 + j16) and (10-j20) Ω are connected in parallel across a supply of $200\angle 60^{\circ}$ using admittance method calculate branch currents, total current and power factor of whole circuit.

Marks

c) Using Nodal Analysis, find current in the 3 Ω resistor for circuit A. Refer Fig. No. 1.

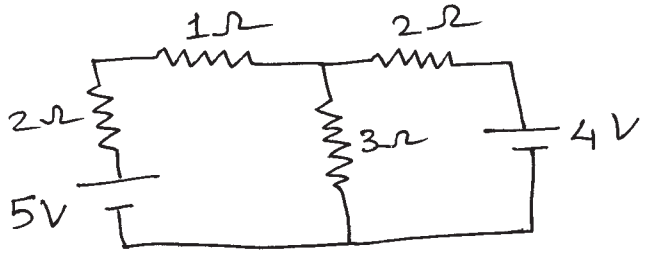

Fig. No. 1

4. Attempt any FOUR of the following: 16

a) What is phase sequence? Draw waveforms of 3 phase emf.

b) Derive the formulae for Delta to star transformation.

c) A voltage v = 100 sin 314t is applied across a circuit containing 25Ω resistor and 80 μF capacitor in series. Determine

(i) The expression for instantaneous current

(ii) Power consumed

d) Three coils each with a resistance of 10 Ω and inductance of 0.35 mH are connected in star to a 3 phase, 400V, 50 Hz supply. Calculate line current and total power consumed.

e) Explain lagging quantity and leading quantity explain this concept with voltage and current waveforms.

f) Find current through 6 Ω resistor using Mesh Analysis, for Circuit B. Refer Fig. No. 2.

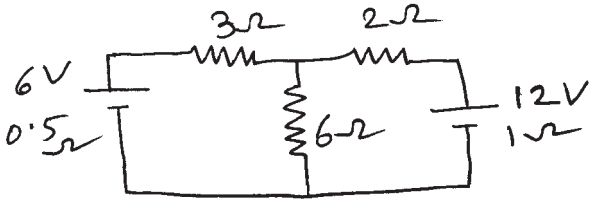

Fig. No. 2

Marks

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

a) Derive the expression for resonant frequency in RLC series circuit.

b) Draw the phasor diagram and waveforms of voltage and current in pure inductive circuit with single phase A-C supply.

c) Using Norton's Theorem, find current throught R_L in Fig. No. 3.

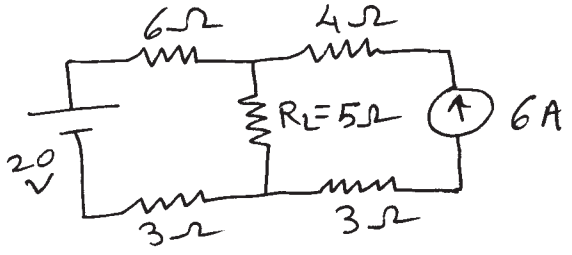

Fig. No. 3

d) A series RLC circuit consisting of R = 10Ω, L = 0.1H and C = 10 μF is connected to 230V variable frequency supply Calculate

(i) The frequency at which circuit behaves as purely resistive circuit.

(ii) Quality Factor.

e) Derive the relation between line and phase current in 3phase delta connected balanced load. Draw phasor diagram.

f) Express

(i) $Z = 10\angle 60^\circ$ in rectangular form

(ii) $Z = 16 + j8$ in polar form.

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

a) Calculate current through 5Ω resistor by using superposition theorem (Fig. No. 4)

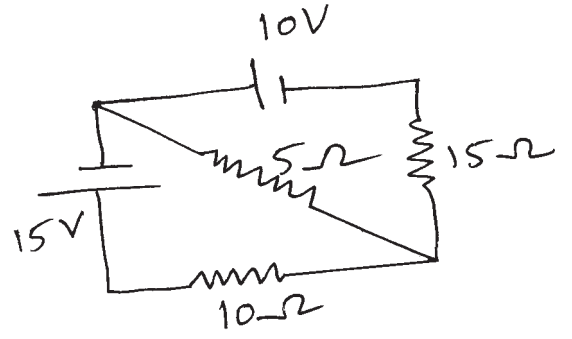

Fig. No. 4

Marks

b) Develop Thevenins equivalent circuit between points A and B in Fig No. 5 and find current in R_L = 10Ω.

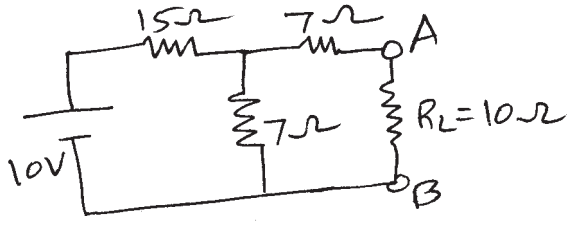

Fig. No. 5

c) Find valve of R_L in Fig. No. 6 for maximum power transfer.

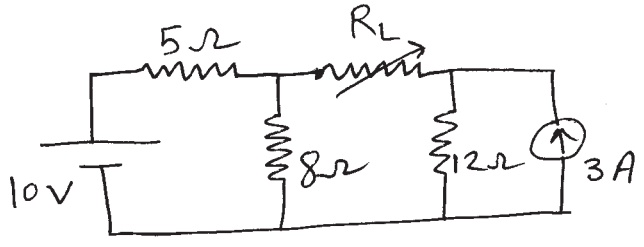

Fig. No. 6

d) Explain the concept of Initial and final condition in switching circuit for L and C.

e) Find voltages at nodes A and B in Figure No. 7.

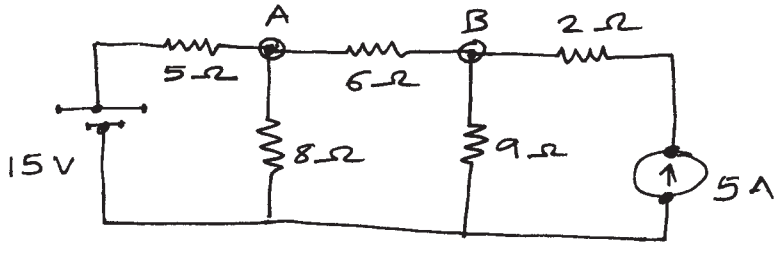

Fig. No. 7

f) Explain how sinusoidal AC voltage is generated by using simple one loop generator.