17323

11819

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

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

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

(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 Communication devices are not permissible in Examination Hall.

Marks

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

a) Identify the circuit of Figure No. 1

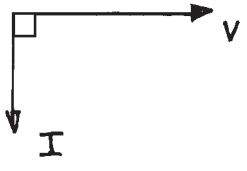


Fig. No. 1

b) Define - frequency. State its relation with time period.

c) If maximum value of a sine wave is 25A. Calculate its average value.

d) Draw a power triangle and state the relation between its sides.

e) State the range of phase angle and hence pf for a series RC circuit.

f) In a series RL circuit V_R = 100V and V_L = 150V. Find equivalent voltage across the circuit.

Marks

g) Write equation of resonant frequency and quality factor in terms of circuit components for a parallel circuit.

h) Draw phasor diagram for 3ϕ generated voltages.

i) List any two advantages of 3ϕ circuits over single phase circuits.

j) State only the formula for star to delta transformation.

k) State 'Norton's' theorem.

l) Find R_{TH} from Figure No. 2

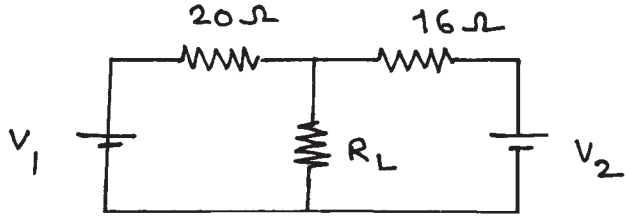


Fig. No. 2

m) State maximum power transfer theorem for AC circuits.

n) State meaning of t = 0 – and t = 0 +

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

a) For a single loop AC generator –

(i) Draw a neat sketch.

(ii) Identify components used.

(iii) Write equation of generated emf.

(iv) Draw waveform of the output voltage.

b) An alternating current is given by i = 20 sin (314t).
Find –

(i) Current at t = 0.0025 sec at first instant.

(ii) Time required to reach at 12A for first time.

c) In RLC series circuit R = 8Ω, L = 0.42 H with an unknown capacitor. If the circuit is connected across 230V, 50 Hz, 1ϕ AC. Calculate value of capacitor so that circuit resonates at supply frequency. Also calculate current and pf at this instant.

d) A series circuit has a leading pf. Express it with circuit, waveform and phasor diagram.

Marks

e) Find current I in the circuit shown in Figure No. 3 using admittance method.

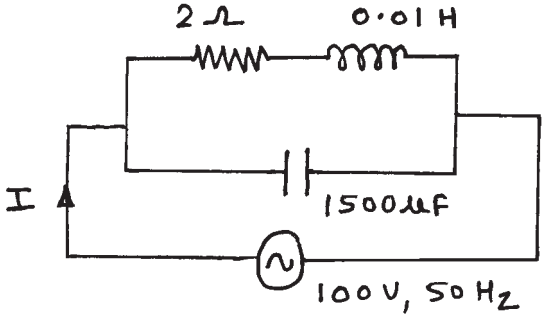


Fig. No. 3

f) List any four observations from the phasor diagram of a 3ϕ delta connection.

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

a) Define peak factor and form factor. State value of each for a pure sine wave.

b) State nature of pf for any two conditions in RLC series circuit. Draw phasor diagram for each.

c) A series RLC circuit consists of R = 20Ω, L = 1H and C = 2500 μf. If it is connected across 230V, 1ϕ AC. Calculate Q factor and resonant frequency.

d) Two admittances $Y_1 = 0.012\angle 60°$ ℧ and $Y_2 = 0.015\angle 45°$ ℧ are connected in parallel across 250V, 50Hz AC. Calculate power consumed by the circuit.

e) Draw an experimental set up to find current and power for parallel circuit of R = 50Ω and L = 0.2H, V = 230V, 50Hz, 1ϕ AC.

f) Three resistor each of 23Ω are connected in delta across a 230V, 3ϕ, 50Hz AC. Calculate the power consumed by the load.

Marks

4. Attempt any FOUR of the following: 16

a) A choke coil when connected across a 200V, 50Hz, 1ϕ AC will take current at 0.8 pf lagging. The circuit consumes 2kW. Find circuit components.

b) Derive the condition for resonance in an RLC series circuit. Also derive the equation for Q factor.

c) Three impedances each of Z = 15 + j18Ω are connected in star across a 400V, 3ϕ, AC. Calculate –

(i) V_{ph}

(ii) I_{ph}

(iii) I_L

(iv) pf

d) Find the value of V of Figure No. 4 if the voltage at node A is 12V.

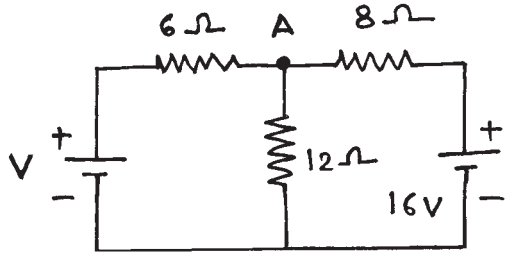


Fig. No. 4

e) Find the value of maximum power transferred to R_L = 6Ω from the source of Figure No. 5

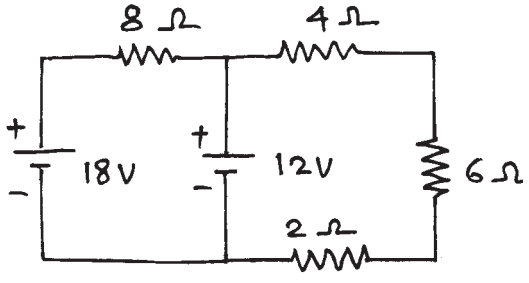


Fig. No. 5

f) Write a step by step procedure to find current through R_L of a circuit using Norton's theorem.

Marks

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

a) A balanced load connected in delta across a 415V, 3ϕ, 50Hz supply takes a phase current of 15A at 0.8 pf lag. Find components of the load.

b) Derive relation between I_L and I_{Ph} from the phasor diagram of a 3ϕ delta connected balanced load.

c) Find current through 8Ω resistor of Figure No. 6 using Nodal Analysis.

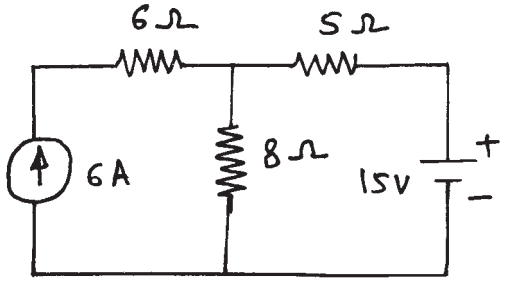


Fig. No. 6

d) Write a step by step procedure to find current through a load resistor using Mesh analysis.

e) Find current through 8Ω resistor of Figure No. 7 using super position theorem.

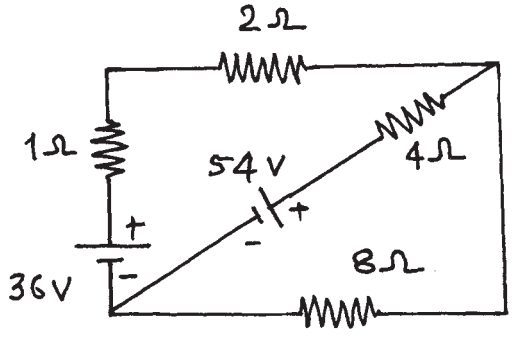


Fig. No. 7

Marks

f) Find current through 8Ω resistor of Fig. No. 7 using Thevenin's theorem.

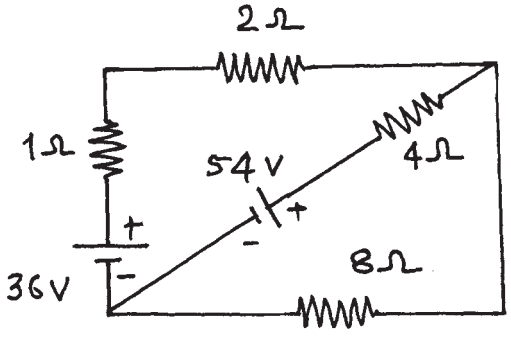
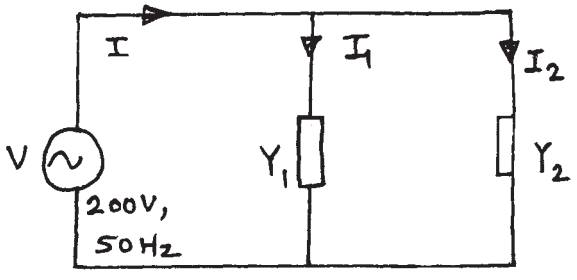


Fig. No. 7

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

a) Find I_1, I_2 and I of the Figure No. 8



$Y_1 = 0.033 \angle -30^\circ$ ℧

$Y_2 = 0.025 \angle 60^\circ$ ℧

Fig. No. 8

b) Current drawn by a 3ϕ star connected load of 12Amp. 0.8 p.f. lagging when connected across 3ϕ, 440V AC.
Find active, reactive and apparent power.

c) Find I_L of Figure No. 9 using Mesh analysis.

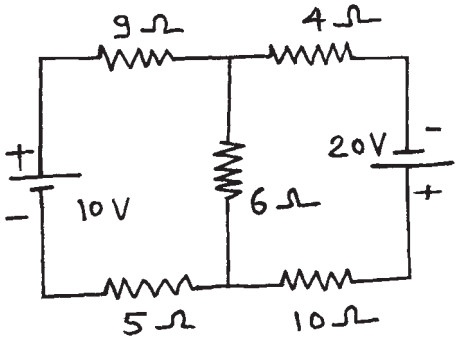


Fig. No. 9

Marks

d) Find current through 12Ω resistor using super position theorem, of Figure No. 10.

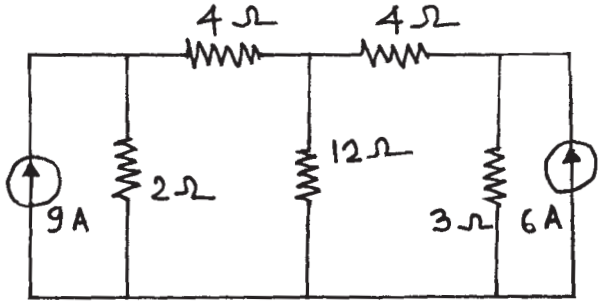


Fig. No. 10

e) Find R_{TH} for the circuit shown in Figure No. 11

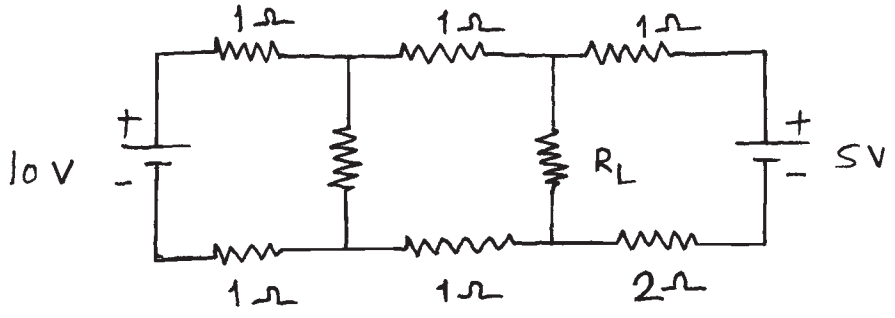


Fig. No. 11

f) Explain the concept of initial condition in switching circuits for the elements R, L and C.