17323

11920

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.

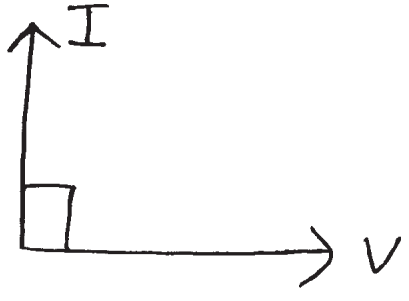
(5) Use on Non-programmable Electronic Pocket Calculator is permissible.

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

Marks

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

a) Identify/state nature of the circuit of Figure No: 1



Identify / State nature of circuit.

Fig. No. 1

b) Define : Frequency and Cycle for AC quantities.

c) Define : Apparent and Reactive power.

d) Define : Power factor and Quality factor in RC circuit.

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

f) Define Admitance and Conductance related to parallel circuit.

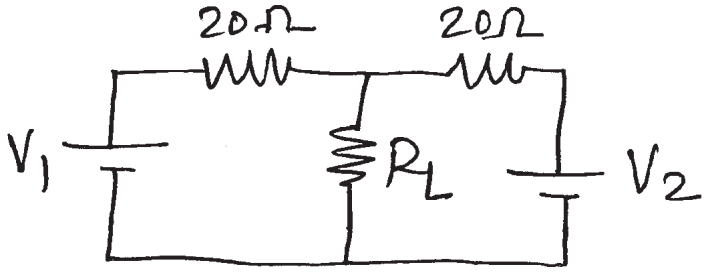
Marks

g) State any two advantages of polyphase circuit over single phase circuit.

h) Draw types of three phase connection.

i) State the formula for delta to star transformation.

j) Find the R_{TH} from Figure No:2



Calculate R_{TH}.

Fig. No. 2

k) State Norton's theorem for AC circuit.

l) State meaning of $t=0^-$ and $t=0^+$.

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

a) Instantaneous expression for voltage and current are given by:

$V = 141.4 \text{ Sin } 314t$

$i = 28.28 \text{ Sin } (314t + \pi/3)$

Determine :-

(i) RMS value of voltage and current

(ii) Average value of voltage

(iii) Frequency

(iv) Power consumed.

b) 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.

Marks

c) A series circuit has lagging power factor. Draw circuit,waveform and phasor diagrams.

d) State the values of power factor during resonance condition for RLC series ckt. Also state the importance of power factor.

e) A coil having a resistance of 20 Ω and inductive reactance of 47.1 Ω is connected in series with a capacitor of reactance 31.8 Ω across an AC supply of 230 v.

Determine :

(i) Current drawn from the supply

(ii) Power factor

(iii) Active and reactive components of current

(iv) Voltage across the coil.

f) An inductive coil $(10+j40)\Omega$ impedance is connected in series with a capacitor of 100 μF across 230 v, 50 Hz, 1 ph supply, Find : (i) Current through ckt

(ii) Power factor

(iii) Power dissipated in ckt

(iv) Draw phasor diagram.

3. Attempt any <u>FOUR</u> of the following: **16**

a) Compare series and parallel AC circuit.

b) Derive the expression for resonant frequency for the series combination of RL in parallel C

c) An inductor of 0.5 H inductance and 90 Ω resistance is connected in parallel with a 20 μF capacitor. This circuit supplied by 1 ph, 230 v, 50 Hz AC supply. Find:

(i) The total current

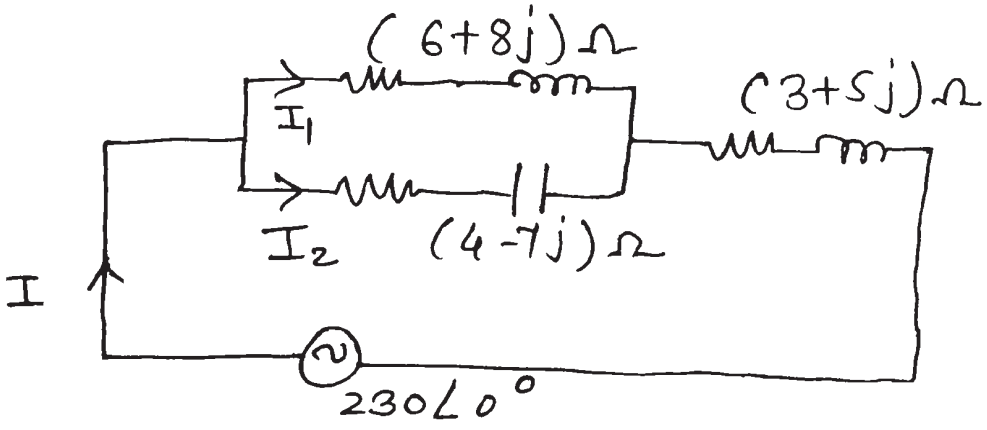
(ii) P.F of parallel circuit

(iii) Power taken from source

(iv) Draw the vector dia.

Marks

d) Find I, I_1, I_2 and power factor of ckt in Figure No:3



Calculate I, I_1, I_2.

Fig. No. 3

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

f) A resistance of 100 Ω and 50 μF capacitor are connected in series across 230 v, 50 Hz supply.
Find :

(i) Impedance

(ii) Current flowing

(iii) Voltage across R and C

(iv) PF and power

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

a) Compare balanced and unbalanced three phase load.

b) A balanced γ connected load with phase impedance of $14 \angle 45° \Omega$ is connected to a 3 ph, 4 wire supply. Having phase vtg of 231 V at 50 Hz. Determine:

(i) Line current

(ii) Current in neutral wire

(iii) Power drawn

Marks

(iv) Power factor.

c) A 3ph Y connected load having R = 15Ω, L = 0.04H and C = 50μF in each phase. It is supplied by 440v, 3ph, 50Hz AC. Find :

(i) 2pH

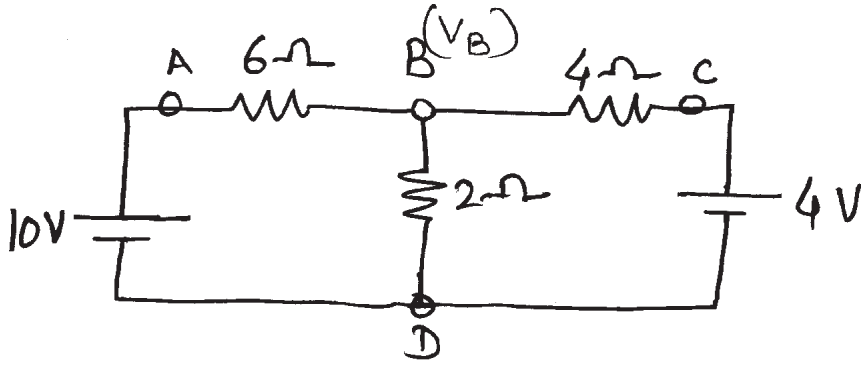
(ii) Line current

(iii) Power factor

(iv) Power consumed.

d) Derive the relation for star to delta transformation.

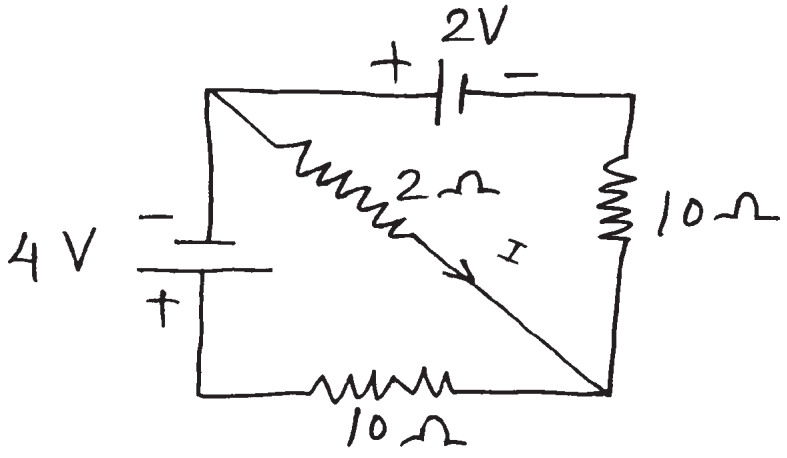
e) Calculate the node voltage V_B using the nodal analysis. Refer Figure No : 4.



Find V_B By using (Nodal analysis).

Fig. No. 4

f) Find current I through 2Ω using mesh analysis. Refer figure No : 5.



Find current I (By using Mesh analysis).

P.T.O.

Fig. No. 5

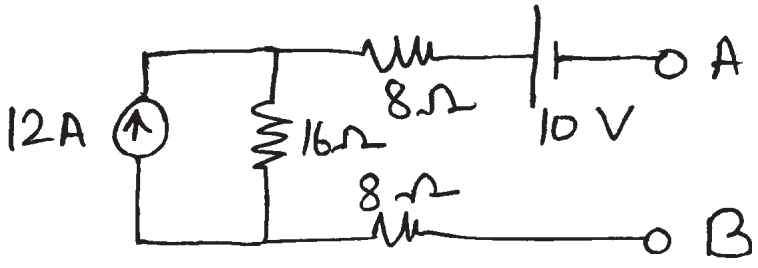
Marks

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

a) With the help of necessary phasor diagram derive the relationship between line and phase current in balanced Y connected load, Connected to 3 ph AC supply.

b) (i) State Thevenins theorem and write its procedural steps to find current in a branch (Assume any simple ckt).

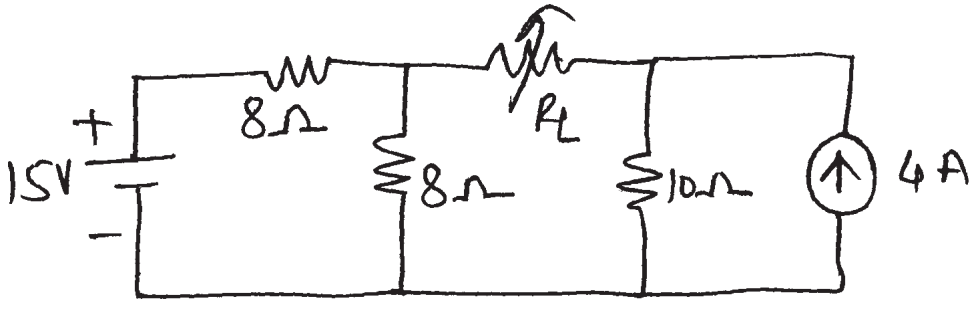
(ii) Develop Thevenins equivalent across A and B in the network shown in Figure No : 6.



Find Thevenin's equivalent circuit.

Fig. No. 6

c) State the maximum power transfer theorem. In following network shown in Figure No : 7, Find the value of R_L so that maximum power will transfer through it and also calculate this power.



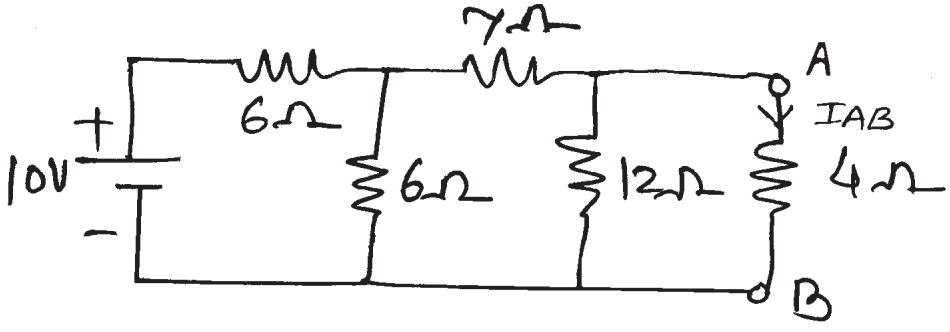
Calculate R_L (By using Max power transfer theorem).

Fig. No. 7

Marks

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

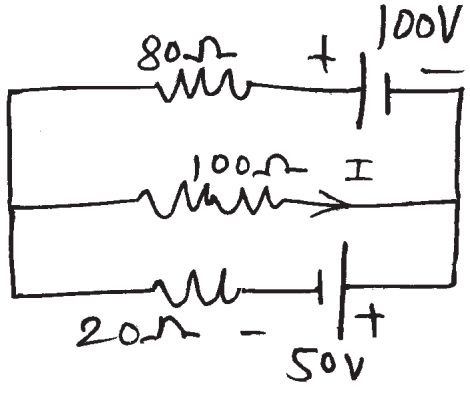
a) Find current I_{AB} flowing through 4Ω resistance using Norton's theorem as shown in Figure No. 8.



Calculate I_{AB} (By using Norton's theorem).

Fig. No. 8

b) Apply superposition theorem shown in Figure No. 9 for determining the current I in 100Ω resistance.

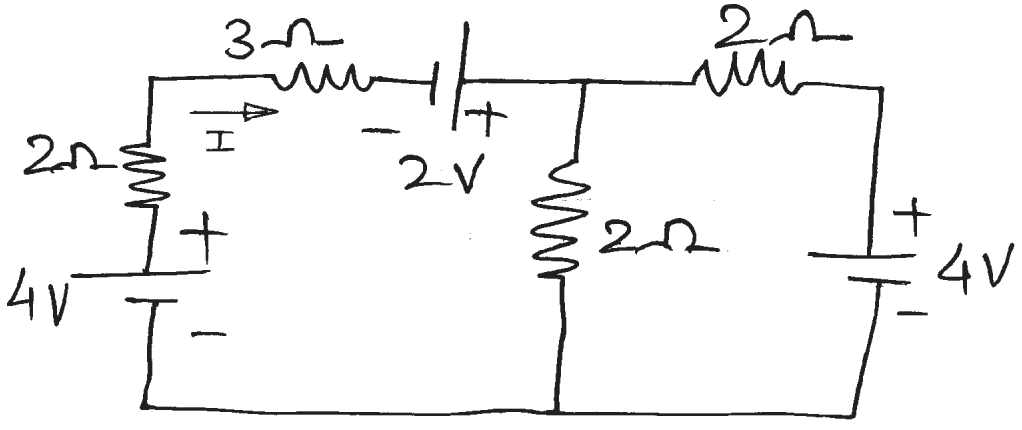


Calculate I (By using Superposition theorem).

Fig. No. 9

Marks

c) Using Node voltage method, find the current I in the 3Ω resistance in Figure No : 10.



Calculate I (By using Node voltage method).

Fig. No. 10

d) Current drawn by a 3 ph Y connected load of 10 A, 0.87 PF lagging when connected across 3 ph, 440 v AC supply. Find active, reactive and apparent power.

e) Explain the concept of intial condition switching circuit for the R, L and C.

f) Define RMS value and average value of AC quantities. State the RMV value and average value in terms of maximum value of sinusoidal waveform.