22324

12223

3 Hours / 70 Marks Seat No. | | | | | | | | |

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

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

(3) Illustrate your answers with neat sketches wherever necessary.

(4) Figures to the right indicate full marks.

(5) Assume suitable data, if necessary.

(6) Use of Non-programmable Electronic Pocket Calculator is permissible.

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

Marks

1. Attempt any FIVE of the following: 10

a) Find rms and average value of the waveform shown in Fig. No. 1.

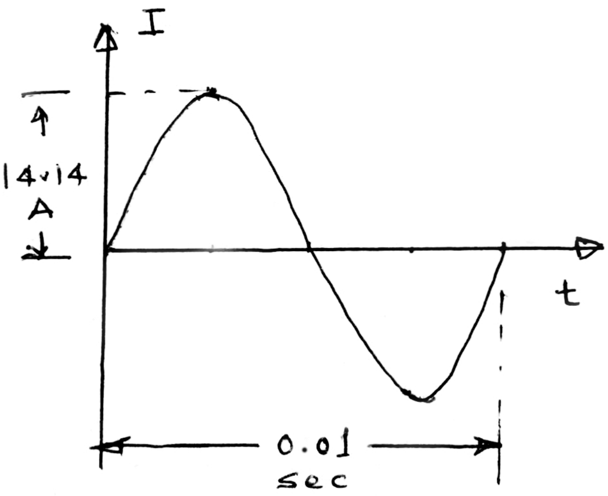

Fig. No. 1.

P.T.O.

Marks

b) Define impedance and state its unit.

c) Draw power triangle for RL series circuit and label it.

d) Define admittance. Give its relation with conductance.

e) State the type of magnification in parallel resonant circuit. Also give value of pf at this condition.

f) Specify the value of neutral current in case of balanced load and unbalanced load.

g) Draw an ideal and a practical current source. Write difference between them.

h) Define the terms - Mesh, Node.

2. Attempt any THREE of the following: 12

a) Identify the circuit from Fig. No. 2. Calculate power factor and circuit components.

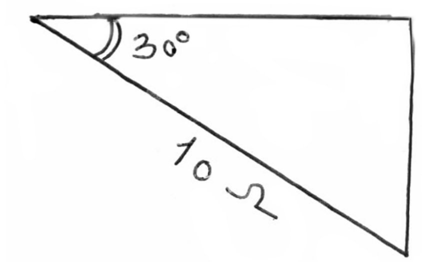

Fig. No. 2.

b) Derive relation of resonant frequency for the circuit shown in Fig. No. 3.

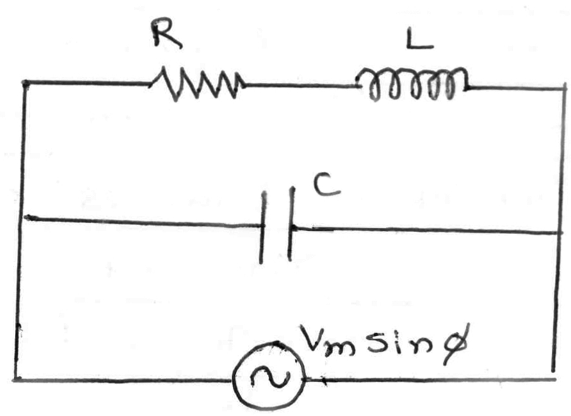

Fig. No. 3.

Marks

c) Three impedances each of $(12 - j15)\Omega$ are connected in star across 400V, 3ϕ AC. Calculate -

i) Z_ph

ii) I_ph and I_L

iii) Pf

iv) Q

d) Write a step by step procedure to find load current using Norton's theorem.

3. Attempt any THREE of the following: 12

a) A series circuit consists of $R = 20\Omega$, $L = 0.3H$ and $C = 400\ \mu F$. Calculate -

i) Resonant frequency

ii) Quality factor

b) Find admittance of each branch, total admittance and total current of the circuit shown in Fig. No. 4.

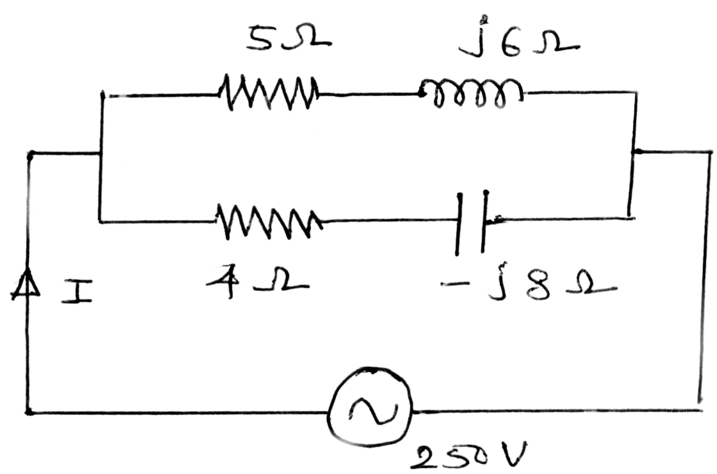

Fig. No. 4.

c) 1 3ϕ load when connected in delta across 250V, 3ϕ, 50Hz AC consumes 8kw at 0.8 pf. Calculate load parameters.

Marks

d) Find current through 20Ω resistor of Fig. No. 5 using mesh analysis.

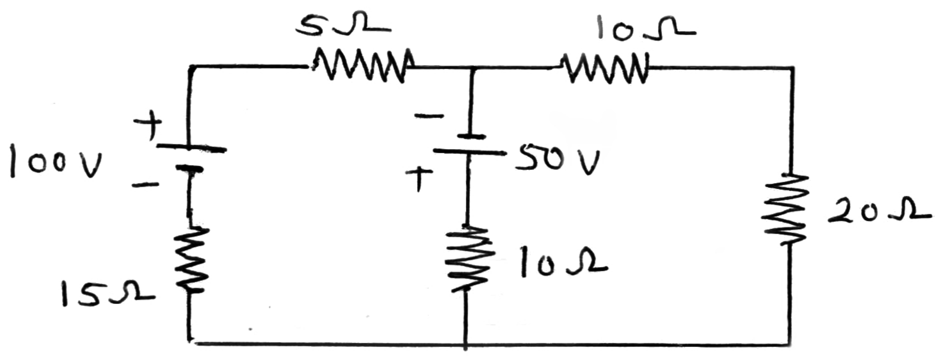

Fig. No. 5.

e) i) State reciprocity theorem.

ii) Write duality of any two electrical elements.

4. Attempt any THREE of the following: 12

a) For a pure inductor connected across AC supply -

i) Write current equation.

ii) Draw voltage and current waveform.

iii) Draw phasor diagram.

iv) State value of power consumed.

b) A coil with R = 10Ω and L = 0.25 H is connected in parallel with a capacitor of 100 μf. Find -

i) Quality factor

ii) Dynamic resistance.

c) Three impedances each of value (6 + j8)Ω are connected in delta across 250V, 3ϕ, 50Hz AC. Calculate -

i) Phase current

ii) Line current

iii) Power factor

iv) Power.

Marks

d) Find the value of current through 9Ω resistor of Fig. No. 6. using Thevenin's theorem.

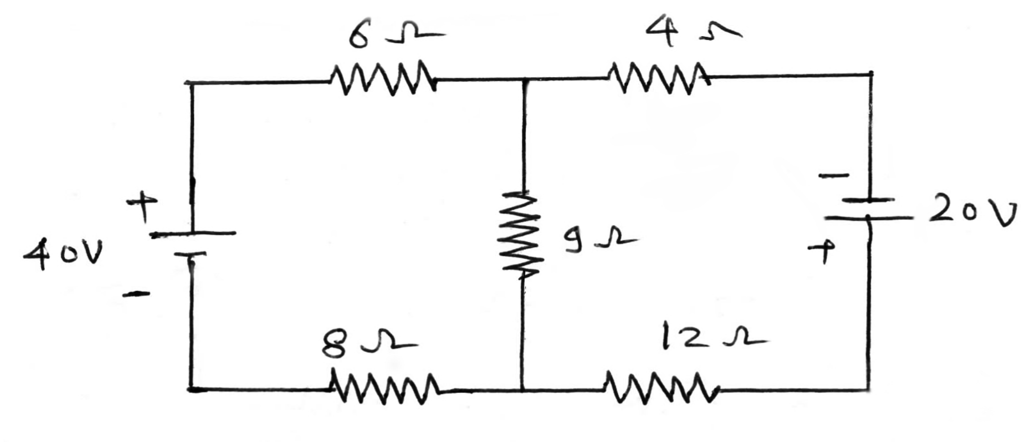

Fig. No. 6.

5. Attempt any TWO of the following: 12

a) A series RLC circuits consists of R = 33Ω, L = 0.44 H and C = 222 μf. It is connected across 200V, 50Hz, 1ϕ AC. Calculate -

i) X_L and X_C

ii) Z

iii) I

iv) ϕ and pf

v) P

vi) Q

b) Find voltage across 3Ω resistor of Fig. No. 7. using Nodal analysis.

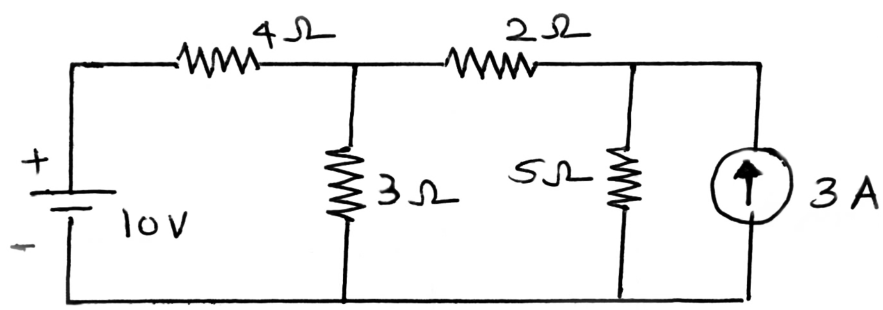

Fig. No. 7.

Marks

c) State maximum power transfer theorem. Find value of R_L for Fig. No. 8, so that maximum power will be transferred to it. Also find the maximum power.

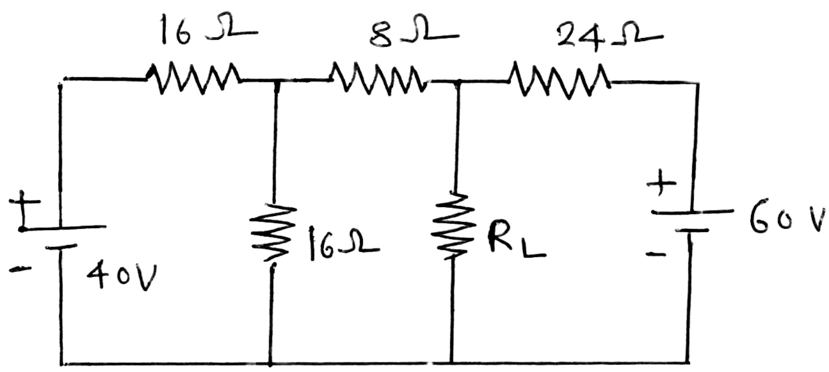

Fig. No. 8.

6. Attempt any TWO of the following: 12

a) For a three phase circuit, give -

i) Any two advantages over single phase.

ii) Any two types of connections.

iii) Any two possible phase sequences.

iv) Relation of reactive power.

v) Value of incoming voltage in your laboratory.

vi) Meaning of phase current, line current.

b) Derive the equation to convert the value of resistances connected in delta to those equivalent values in star. Hence convert the circuit of Fig. No. 9. into equivalent one.

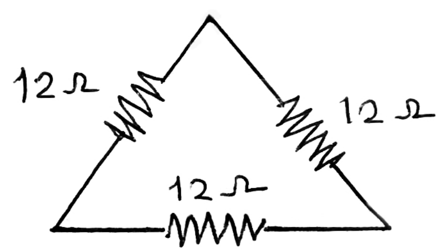

Fig. No. 9.

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c) Find the voltage across 8Ω resistor of Fig. No. 10. using Superposition theorem.

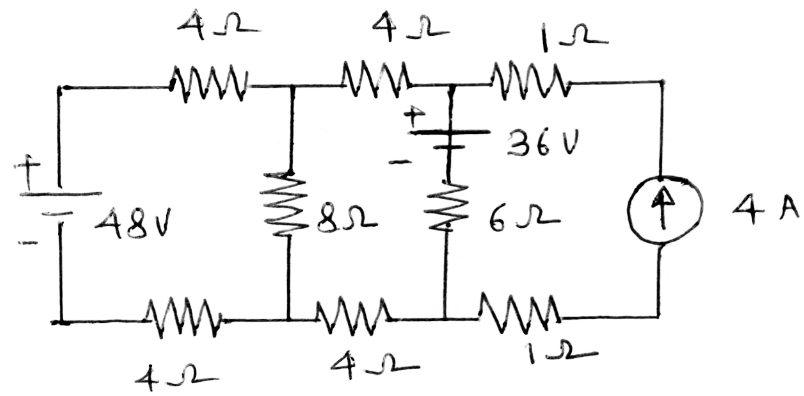

Fig. No. 10.

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