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24225

3 Hours / 70 Marks

Seat No.

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- 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) Draw vector diagram for R–L series circuit and write the equations of instantaneous voltage and current for same circuit.
- b) Define Active power and Reactive power for RLC series circuit.
- c) Define conductance and susceptance. State its unit.
- d) State relationship between line and phase values of voltage and current in balanced star connected system.
- e) Define –
 - i) Mesh
 - ii) Loop
- f) State Maximum Power Transfer theorem.
- g) State the value of internal resistance of –
 - i) Ideal Voltage Source and
 - ii) Ideal current source.

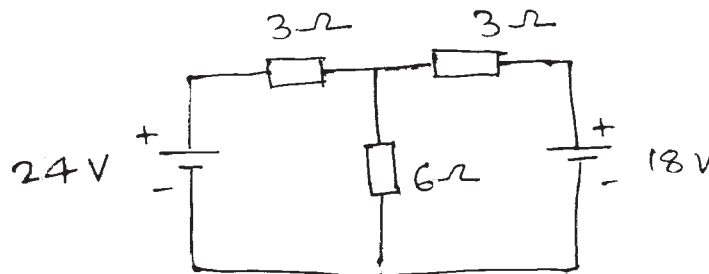
P.T.O.

2. Attempt any THREE of the following :**12**

- a) With neat diagram explain phasor representation of sinusoidal quantities.
- b) Two circuits, the impedances of which are given by $Z_1 = 10 + j15$ and $Z_2 = 6 - j8$ ohm are connected in parallel. If the total current supplied is 15A, What is the power taken by each branch ? Find also the P.f. of individual circuits and of combination. Draw vector diagram.
- c) With the help of neat phasor diagram, derive the relationship between line and phase values of current in balanced delta connected system.
- d) Explain how voltage source can be converted into equivalent current source. Write the important points to be considered for transformation of source.

3. Attempt any THREE of the following :**12**

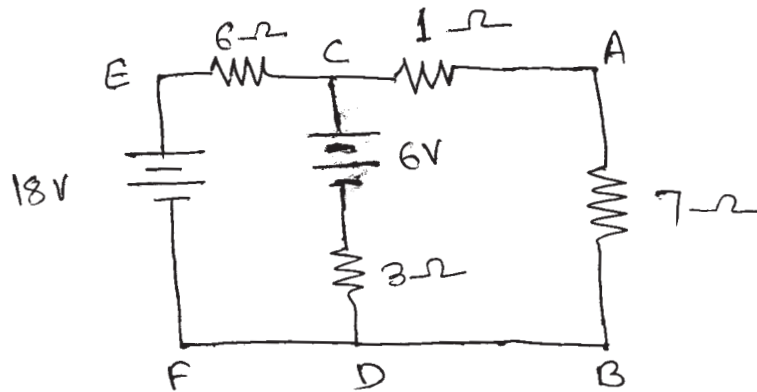
- a) Explain with neat circuit diagram RC series circuit. Draw impedance triangle and power triangle for same circuit.
- b) Draw and explain RLC parallel circuit. Find out the equation for resonant frequency.
- c) Compare star connected network with Delta connected network.
- d) Find the current in 6Ω resistor in the circuit shown in Fig. No. 1 using mesh analysis.

**Fig. No. 1**

4. Attempt any THREE of the following :

12

- a) Compare parallel resonance with series resonance on the basis of,
 - i) Impedance
 - ii) Current
 - iii) Magnification
 - iv) Resonant frequency
- b) Impedance $Z_1 = (10 + j5)\Omega$ and $Z_2 = (8 + j6)\Omega$ are connected in parallel across $V = (200 + j0)$ using the admittance method, calculate the circuit current and branch currents.
- c) Draw waveform of three phase voltages. Draw phasor diagram for these voltages. Write equations for instantaneous values of these voltages. Express these voltages in polar form.
- d) Using Thevenin's theorem, calculate the potential difference across terminals A and B in Fig. No. 2.

**Fig. No. 2**

- e) State and explain Reciprocity Theorem.

5. Attempt any TWO of the following :

12

- a) In a series circuit containing pure resistance and pure inductance, the current and the voltage are expressed as :
 $i(t) = 5 \sin (314 t + 2\pi/3)$ and $v(t) = 15 \sin (314 t + \frac{5\pi}{6})$
 - i) What is the value of resistance ?
 - ii) What is the impedance of the circuit ?
 - iii) What is the inductance in henrys ?
 - iv) What is the power factor and power drawn by circuit.

- b) Find I_L for the circuit shown in Fig. No. 3 using superposition theorem.

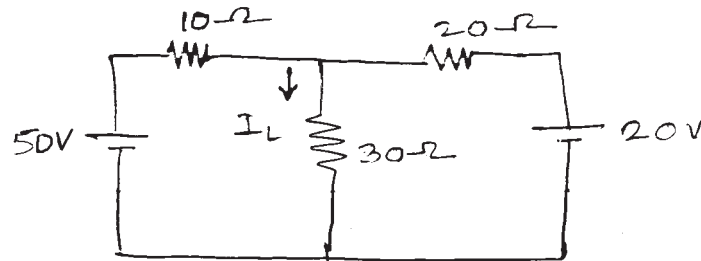


Fig. No. 3

- c) A star connected load is supplied from 3phase, 415V, 50 Hz, supply. If the line current is 15A and total 3phase power taken from supply is 30 KW, find –
- Power factor
 - Resistance in each phase
 - Capacitance in each phase.

6. Attempt any TWO of the following :

12

- Explain Graphical Representation of Resonance in R–L–C series circuit.
- A balanced star connected load of $(8 + j6)\Omega$ per phase is connected to a balanced 3phase 400V supply. Find the line current, power factor, power and total volt amperes.
- Use Nortons theorem to find the current through 3Ω resistance, for the circuit shown in Fig. No. 4

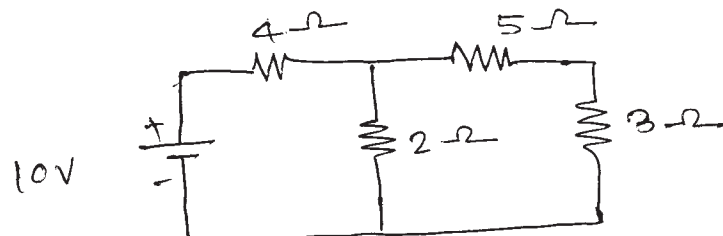


Fig. No. 4