

# 22330

**21819**

**3 Hours / 70 Marks**

Seat No.

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

**Marks**

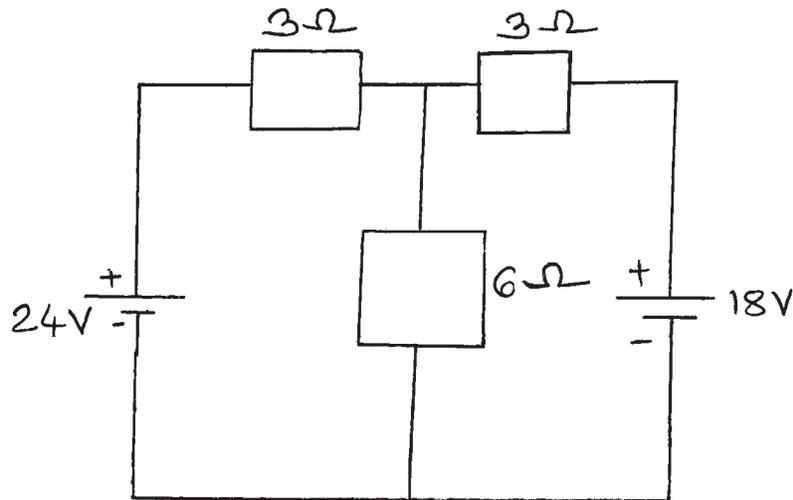
- 1. Attempt any FIVE of the following:** **10**
- a) Define impedance and reactance related to single phase AC series circuit. Give unit of both.
- b) Draw the impedance triangle for R-L series circuit.
- c) State Q factor for parallel R.L.C circuit.
- d) Give four steps to solve nodal analysis.
- e) Write the formula for star to delta.
- f) State Thevenin's theorem.
- g) State the significance of two port network.

P.T.O.

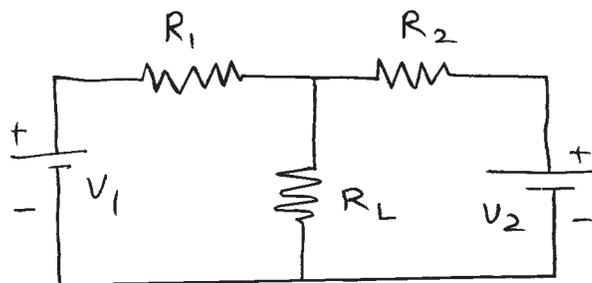
2. Attempt any THREE of the following:

12

- a) An RC series circuit consists of  $R = 10 \Omega$  and  $C = 200 \mu\text{f}$ . It is connected across 250 V, 50 Hz, 1  $\phi$  AC. Calculate the value of power consumed by the circuit.
- b) Describe the procedure to tune the given electrical circuit using the principles of resonance.
- c) Find the current in  $6 \Omega$  resistor in the circuit shown in Fig. No. 1 using mesh analysis.

Fig. No. 1

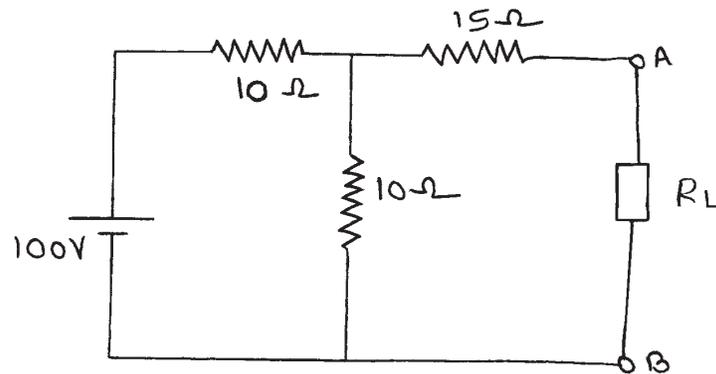
- d) Find value of  $R_L$  so that maximum power will transfer from source to it. Also write equation for  $P_{\text{max}}$  (Fig. No. 2)

Fig. No. 2

3. Attempt any THREE of the following:

12

- a) List the power factor improves technique and explain any one with advantage and disadvantage.
- b) Compare series resonance to parallel resonance on the basis of:
  - (i) Resonant frequency
  - (ii) Impedance
  - (iii) Current and
  - (iv) Magnification.
- c) Write the procedure to convert voltage source into equivalent current source. Give its application. Draw neat diagrams of both the sources.
- d) Find Norton's equivalent circuit of the Fig. shown (Fig. No. 3)

Fig. No. 34. Attempt any THREE of the following:

12

- a) In a series circuit containing pure resistance pure inductance, the current and voltage are expressed as:  
 $i(t) = 5 \sin(314t + 2\pi/3)$  and  $v(t) = 20 \sin(314t + 5\pi/6)$   
 Find:
  - (i) Impedance of circuit
  - (ii) Resistance of circuit
  - (iii) Inductance in circuit
  - (iv) Average power drawn by circuit.

- b) Find  $I$ ,  $I_1$ ,  $I_2$  power factor of the circuit in Fig. No. 4

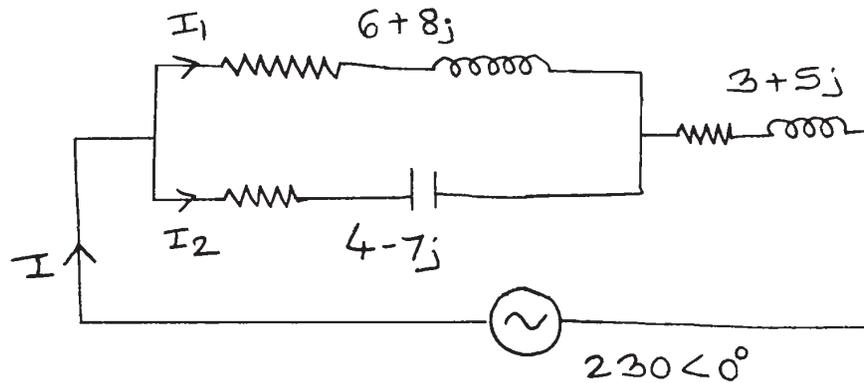


Fig. No. 4

- c) Explain the term bandwidth of a series resonant circuit. Derive its equation.
- d) A bridge network ABCD has arms AB, BC, CD and DA of resistances 1, 1, 2 and 1 ohm respectively. If the detector AC has a resistance of 1 ohm, determine by star/delta transformation, the network resistance as viewed from the battery terminals.

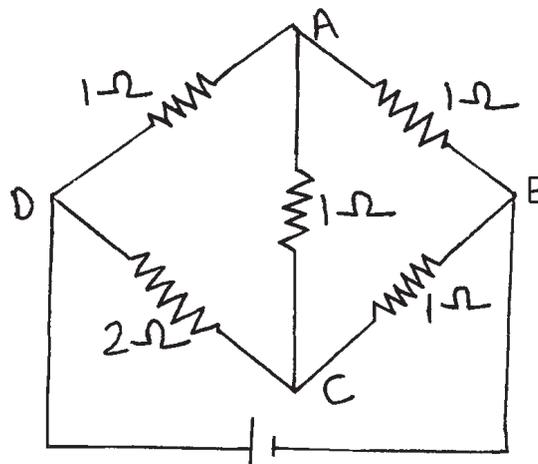


Fig. No. 5

- e) Find current through  $6\ \Omega$  resistor using superposition theorem.  
Fig. No. 6

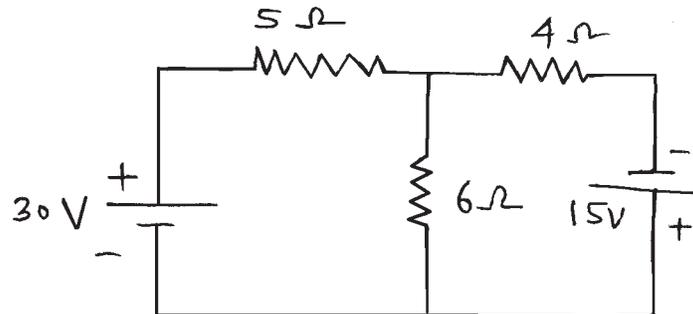


Fig. No. 6

5. Attempt any TWO of the following: 12

- a) A coil of resistance  $20\ \Omega$  and inductance  $200\ \mu\text{H}$  is in parallel with a variable capacitor. The voltage of the supply is  $20\ \text{V}$  at a frequency of  $10^6\ \text{Hz}$ . Calculate:
- The value of  $C$  to give resonance.
  - The  $Q$  of the coil
  - The current in each branch of the circuit at resonance.
- b) Find current through impedance  $3 + j5$  using superposition theorem in the circuit as shown in Fig. No. 7.

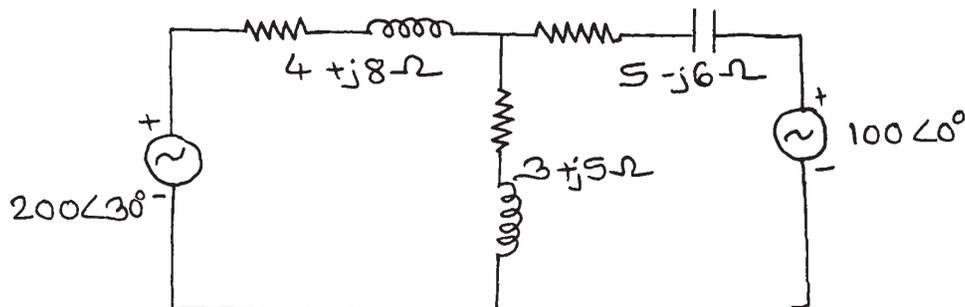


Fig. No. 7

- c) Sketch the phasor diagram for the nominal drawn circuit with justification of each phasor drawn.

6. Attempt any TWO of the following:

12

- a) Use nodal analysis to calculate the current flowing in each branch of the network shown in Fig. No. 8

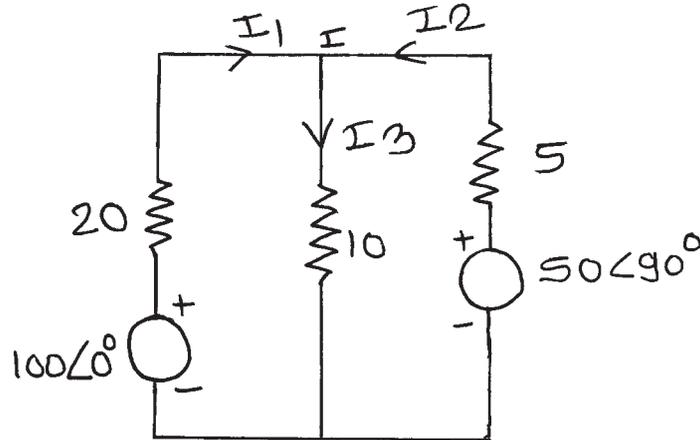


Fig. No. 8

- b) Verify the reciprocity theorem in the circuit given in Fig. No. 9.

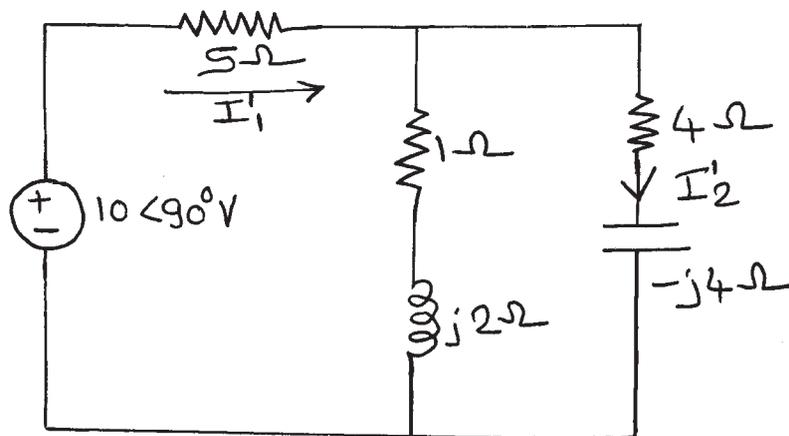


Fig. No. 9

- c) Draw the two port network and determine the indicated parameters for the following configurations:
- (i) Cascade configurations (ABCD parameter)
  - (ii) Series configurations
  - (iii) Parallel configurations