Question Paper

Exam Date & Time: 25-Apr-2018 (09:30 AM - 12:30 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

INTERNATIONAL CENTRE FOR APPLIED SCIENCES
II SEMESTER B.S. (ENGG.)
END - SEMESTER THEORY EXAMINATIONS APRIL - 2018
DATE: 25 APRIL 2018
TIME: 9:30 AM TO 12:30 PM
Linear Networks in Steady State Analysis [EE 121]

Marks: 100 **Duration: 180 mins.**

Answer all the questions.

1) In the circuit of Fig. 1A, find the current through 8 ohms resistor using source transformation technique. (10)

A)

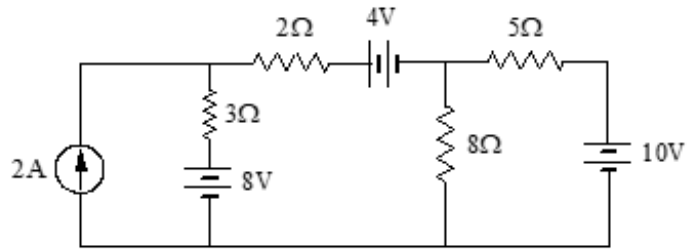

Fig. 1A

B) In the network of Fig. 1B, determine the battery voltage for supplying a current of 1.8A using network reduction technique. (10)

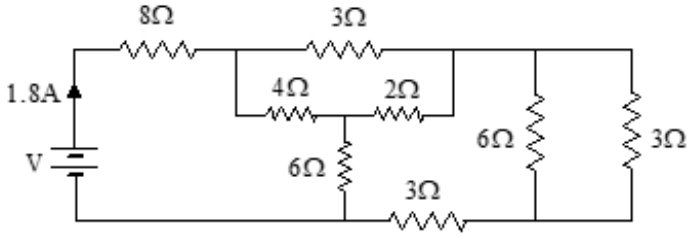

Fig. 1B

2) In the circuit of Fig. 2A, find the power consumed by 5 ohms resistor using mesh current analysis. (10)

A)

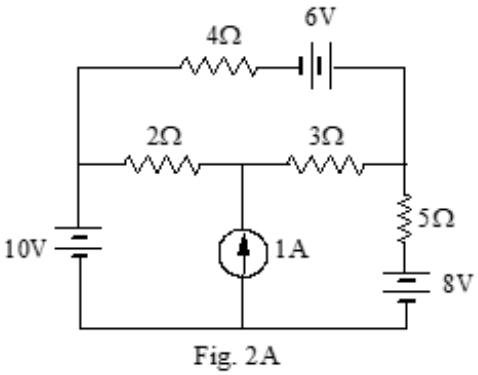

Fig. 2A

B) Find the current through 6 ohms resistor in the circuit of Fig. 2B (10)

using node voltage analysis.

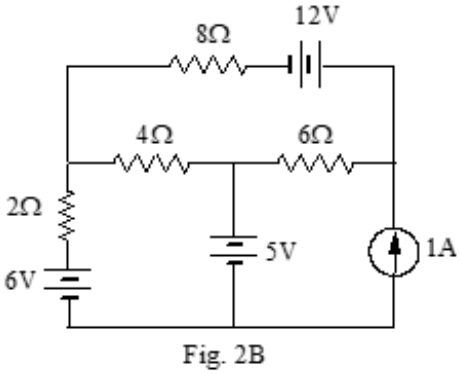

Fig. 2B

3) Show that current leads the voltage by 90^o in a pure capacitor. Draw the waveforms of voltage and current. (5)

A)

B) A coil is connected in series with a capacitor of 100 micro-Farads across a 220 V, 50 Hz, single phase AC supply. The voltage across the capacitor is 120 V and that across the coil is 180 V. Find the values of resistance and inductance of the coil. (10)

C) Two impedances of equal magnitude are connected in parallel. The power factor of one impedance is 0.6 lagging and that of the other is 0.8 leading. Find the power factor of the circuit. (5)

4) Two impedances, (4 + j3) ohms and (5 - j5) ohms are connected in parallel. This combination is connected in series with an impedance of (2 + j3) ohms. Find the (i) equivalent impedance of the circuit. (ii) current drawn from 100 V, single phase, AC supply (iii) current in each impedance. (10)

A)

B) In the network of Fig. 4B, determine the voltage across 5 ohms resistor using node voltage analysis. (10)

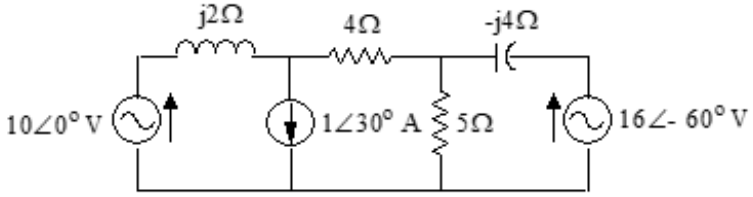

Fig. 4B

5) An impedance of (20 + j10) ohms is in parallel with another impedance consisting of a 30 ohms resistor in series with a variable capacitor. Draw the locus of total current if the supply voltage is 230 V. Hence, determine (i) minimum value of current (ii) maximum value of current (iii) current at unity power factor. (10)

A)

B) For the locus diagram shown in Fig. 5B, draw the circuit configuration. (10)

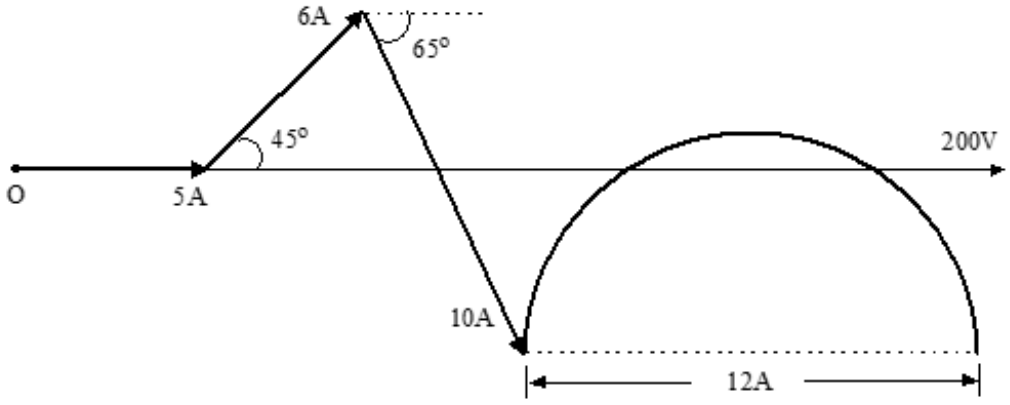

Fig. 5B

6) With neat connection diagram and phasor diagram, deduce the relations between the line and phase values of voltages and currents in a 3 phase, balanced, star connected lagging power factor load. (10)

A)

B) Three similar impedances, each of (5 + j8) ohms are connected in delta across a 3 phase, balanced, 300 V, AC supply. Determine (i) phase current (ii) line current (iii) power consumed (iv) readings of the two wattmeters connected to measure the total power. (10)

7) Two wattmeter method is used to measure the total power in a 3 phase, balanced, delta connected, 400 V, RYB load. The readings of the wattmeters are 8.2 KW and 3.6 KW. Find (i) total power consumed (ii) power factor (iii) impedance per phase if the load is lagging in nature. (10)

A)

B) In the circuit of Fig. 7B, find the current through 10 ohms resistor using Thevenin's theorem. (10)

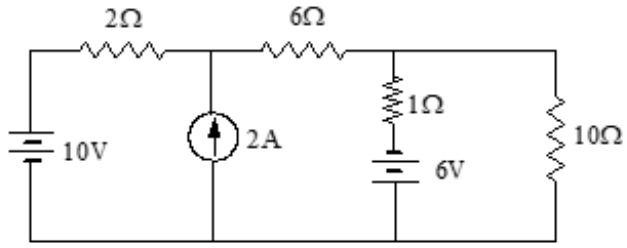

Fig. 7B

8) In the circuit of Fig. 8A, find the voltage across the capacitor. Hence, verify Reciprocity theorem. (8)

A)

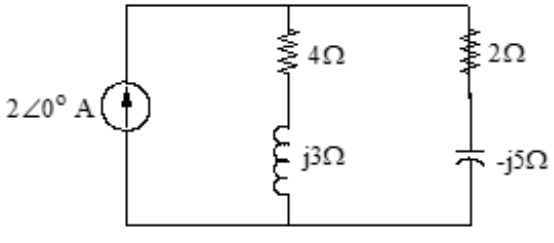

Fig. 8A

B) In the network of Fig. 8B, find the current through 8 ohms resistor using Superposition theorem. (12)

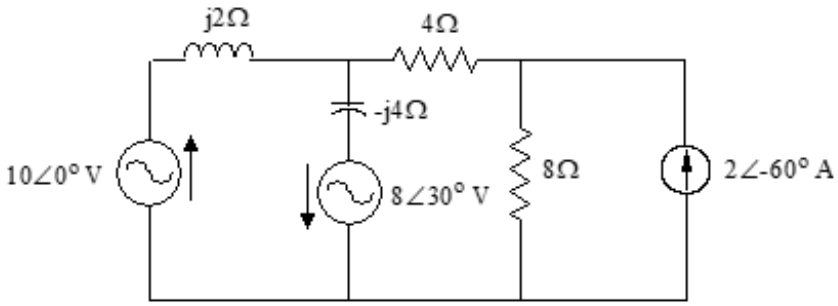

Fig. 8B

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