Question Paper

Exam Date & Time: 01-Dec-2018 (02:00 PM - 05:00 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

INTERNATIONAL CENTRE FOR APPLIED SCIENCES
II SEMESTER B.S. ENGG. END SEMESTER EXAMINATION - NOV./ DEC. 2018

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

Answer 5 out of 8 questions.
Missing data, if any, may be suitably assumed

1) A) For the circuit shown in Fig 1A, determine the equivalent resistance between the terminals A and B. (10)

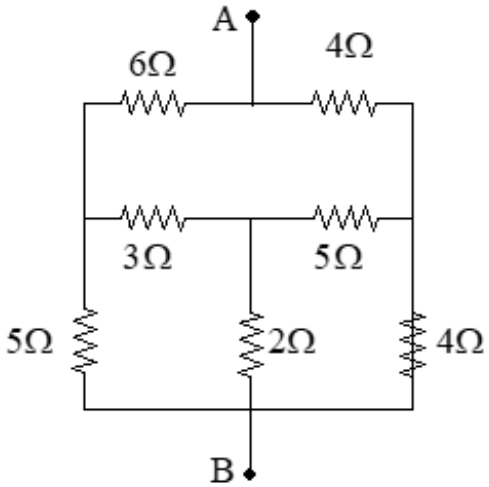

Fig. 1A

B) In the circuit shown in Fig. 1B, find the current through 8? resistor by source transformation method. (10)

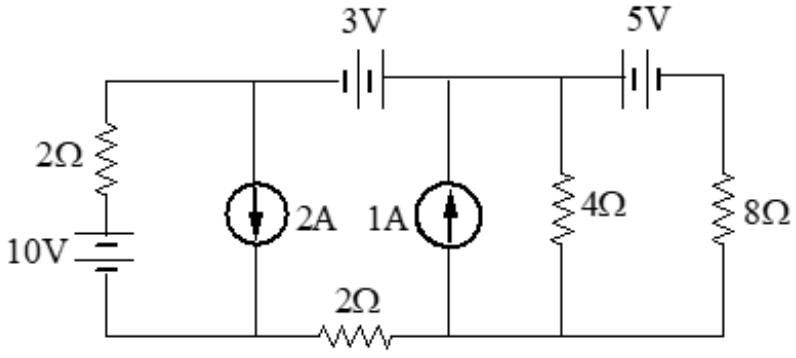

Fig. 1B

2) Determine the voltage across 10 Ω resistor in the circuit of (10)

A) Fig 2A using mesh current analysis.

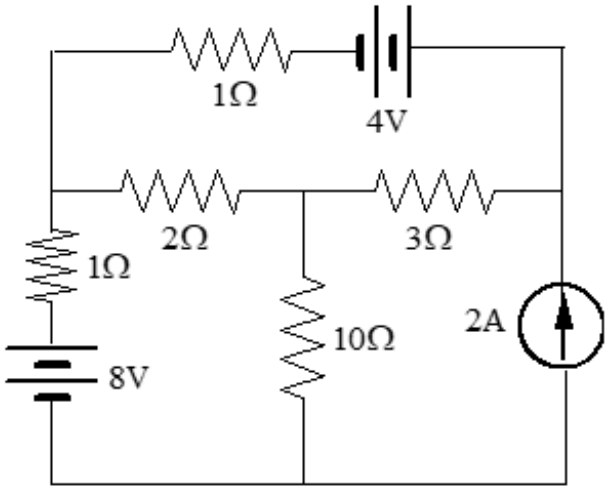

Fig 2A

B) In the network of Fig 2B, determine the current in 5 Ω resistor using node voltage analysis. (10)

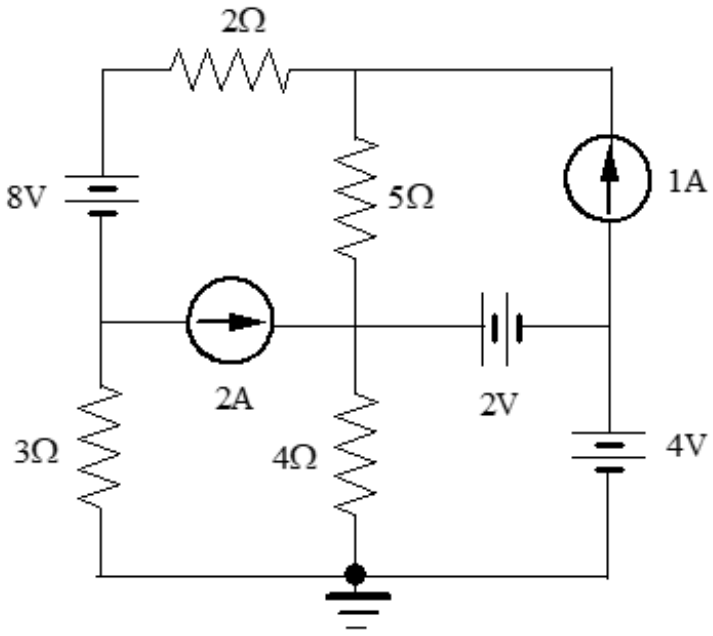

Fig 2B

3) A coil in series with a capacitor of 100 μF is connected (10)

A) across a 200 V, 50 Hz, single phase AC supply. The voltage across the capacitor is 120 V and the power consumed in the circuit is 80 W. Find the resistance and inductance of the coil.

B) The circuit shown in Fig 3B is connected to a 100 V, 50 Hz, (10)
single phase AC supply. Determine (i) Current drawn from

the supply (ii) Active, reactive and apparent powers.

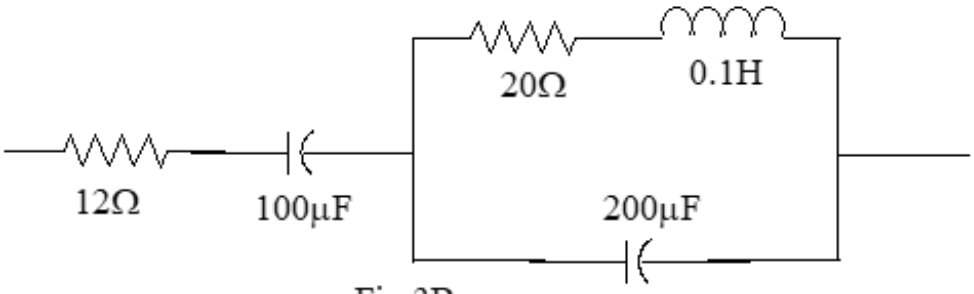

Fig 3B

4) A voltage of $v(t) = 200 \sin(314t+15^o)$ volts is applied to a two element series circuit. The resulting current is given by $i(t) = 15 \sin(314t-30^o)$ amps. Find the values of the elements in the circuit. (6)

A)

B) In the circuit of Fig. 4B, find the current in the capacitor using mesh current analysis. (10)

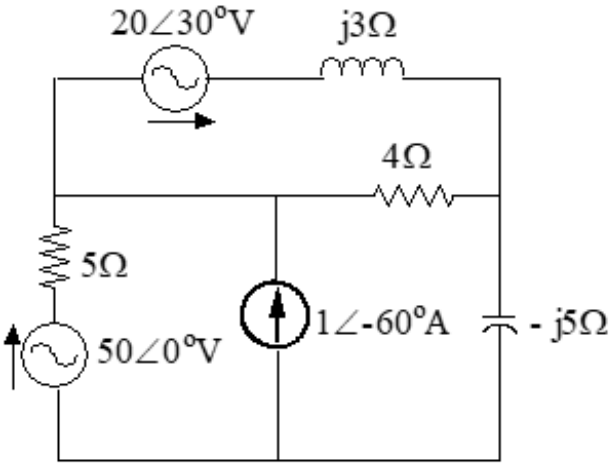

Fig. 4B

C) Show that current lags behind the voltage in a pure inductor. (4)

5) A two branch parallel circuit has $R_C = 6\ \Omega$ in series with $X_C = 8\ \Omega$ in one branch and $X_L = 6.2\ \Omega$ in series with a variable resistance in the other branch. The circuit is connected to a 100V a.c. voltage source. Draw the locus of total current and determine (10)

A)

i) U.P.F current and the corresponding value of R_L

ii) Minimum current and the corresponding power factor.

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

configuration. Also, find the value of maximum current in the circuit.

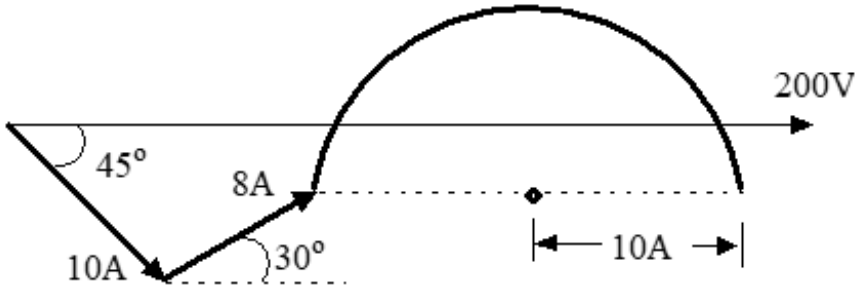

Fig. 5B

6) A) A 3 phase, 400V, 50Hz, AC supply is applied to a 3 phase, delta connected, balanced load. Each phase of the load consists of a 10Ω resistance in series with a 20mH inductance. Find (i) line currents (ii) total power consumed (iii) readings of the two wattmeters connected to measure the total power. (10)

B) A 3 phase, balanced, inductive load is connected to a balanced 3 phase AC supply. Determine the readings of the two wattmeters connected to measure the power. Also, show that the sum of the two wattmeters is the total power consumed in the load. (10)

7) A) The readings of the two wattmeters when a 3 phase, 400V, 50Hz, RYB supply is connected to a 3 phase, balanced, delta connected, lagging load are 8KW and 4.2KW. Find the (i) total power consumed (ii) power factor (iii) line current (iv) resistance and reactance per phase. (10)

B) Find the power dissipated in the (6+j3)Ω impedance in the circuit shown in Fig 7B, using Thevenin's theorem. (10)

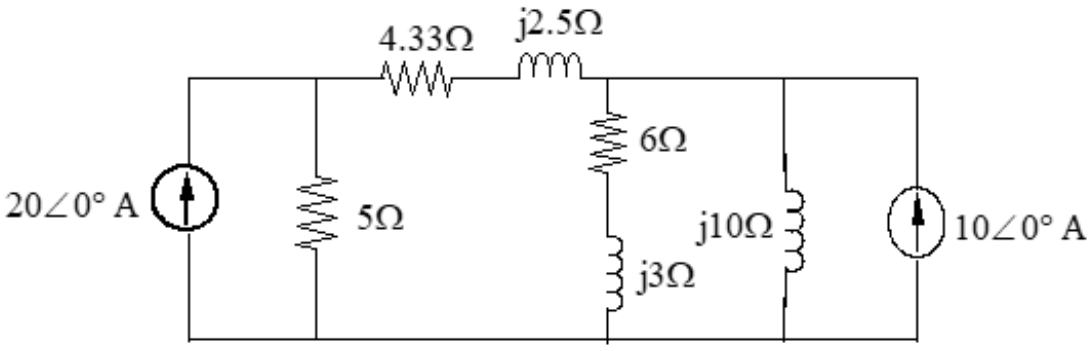

Fig 7B

8) A) Find the current through 3Ω resistance in the circuit shown in Fig 8A and hence prove reciprocity theorem. (10)

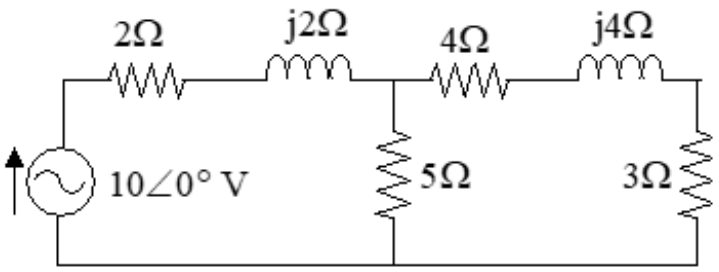

Fig 8A

B) In the circuit of Fig 8B, find the current I_O using superposition theorem. (10)

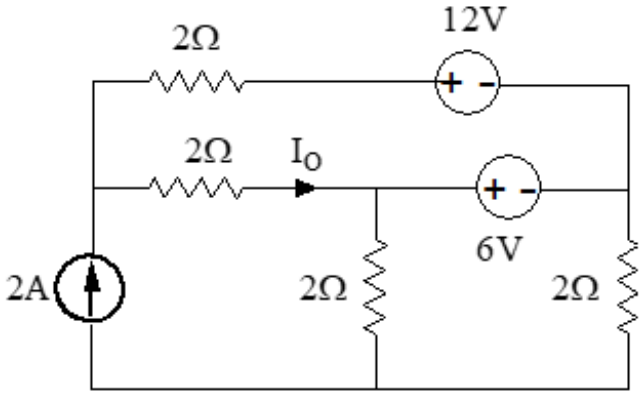

Fig 8B

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