Reg. No.										

प्रज्ञानं ब्रह्म

Manipal

INSPIRED BY LIFE

INTERNATIONAL CENTRE FOR APPLIED SCIENCES

(Manipal University)

II SEMESTER B.S. DEGREE EXAMINATION – JUNE 2016

SUBJECT: LINEAR NETWORKS IN STEADY STATE ANALYSIS (EE 121)

(BRANCH: CE /E&C/ E&E / BIO-MED)

MONDAY, 13TH JUNE, 2016

Time: 3 Hours **Max. Marks: 100**

✓ **Answer ANY FIVE FULL Questions.**

1. A) In the circuit shown in Fig. Q1A, find the equivalent resistance between A and B.

   B) In the network of Fig. Q1B, find the current in 10 Ω resistor using source transformation technique.

   (10+10 Marks)

2. A) In the network shown in Fig. Q2A, find the current in 8V battery using mesh current analysis.

   B) In the circuit of Fig. Q2B, find the current in 5Ω resistor using node voltage method.

   (10+10 Marks)

3. A) A series circuit takes a current of 3.5A at a power factor of 0.8 leading when connected to a 100V, 50Hz, single phase AC supply. Determine the values of circuit elements.

   B) A coil of resistance r and inductance L is connected in series with a capacitor of 100μF. The voltage across the coil is half of the voltage across the capacitor. The power consumed in the coil is 200W when drawing a current of 5A. Find the values of r and L if the supply frequency is 50Hz.

   C) In the circuit of Fig. Q3C, determine the current through capacitor using mesh current analysis.

   (5+5+10 Marks)

4. A) In the network of Fig. Q4A, find (i) current supplied by the battery (ii) power consumed in the circuit (iii) Power factor. Also, draw the power triangle.

   B) A coil of resistance 15Ω and inductance 0.05H is connected in parallel with a non-inductive resistance of 15Ω. The combination is connected across a single phase, 250V, 50Hz, AC supply. Determine (i) the current drawn from the supply (ii) Power Consumed (iv) draw the phasor diagram.

   (10+10 Marks)

5. A) In the network of Fig. Q5A, find the current through 8Ω resistor using superposition theorem.

   B) In the circuit shown in Fig. Q5B, find the value of load impedance to be connected for maximum power transfer if the load consists of variable resistance in series with variable reactance. Also, find the value of maximum power.

   (10+10 Marks)

6. A) In the circuit shown in Fig. Q6A, find the current through 5Ω resistor using Norton's theorem.

   B) Three impedances $Z_1 = (4 + j3)\Omega$, $Z_2 = (8 – j2)\Omega$ and $Z_3 = (R – j5)\Omega$ are connected in parallel across a 100V, single phase AC supply. If R is variable from zero to infinity, draw the locus of total current. Hence, determine (i) minimum current (ii) maximum current in the circuit.

(10+10 Marks)

7. A) For the locus diagram shown in Fig. Q7A, draw the circuit configuration and insert the values of all the elements. Also, find the currents at unity power factor.

   B) Three similar impedances, each of $(12 – j8)\Omega$ are connected in star across a 200V, 50 Hz, 3 phase, RYB supply. Determine the line currents, total power consumed and the readings of the two wattmeters connected to measure the power.

(10+10 Marks)

8. A) Starting from the fundamentals, determine the readings of the two wattemters connected to measure the total power in a balanced star connected, lagging power factor load. Hence, show that two wattmeters are sufficient to measure the total power in the balanced 3 phase load.

   B) Three similar load impedances of lagging power factor are connected in delta across a 400V, 3 phase AC supply. The readings of the two wattmeters connected to measure the total power are 8KW and 1KW respectively. Find the values of the elements in the load impedance per phase.

(10+10 Marks)

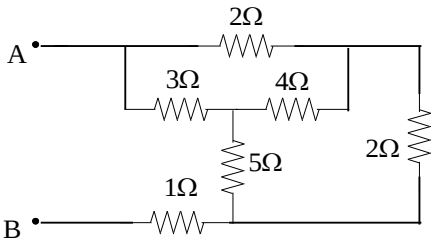

Fig. Q1A

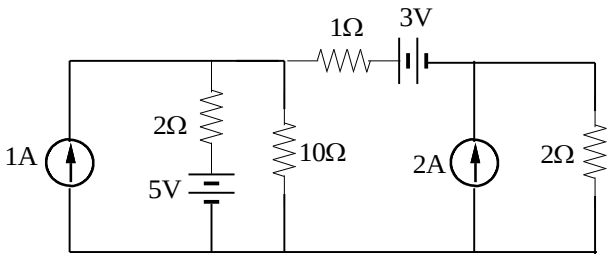

Fig. Q1B

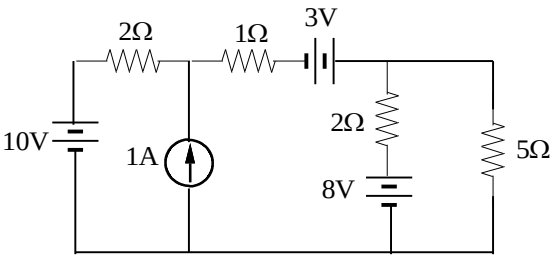

Fig. Q2A

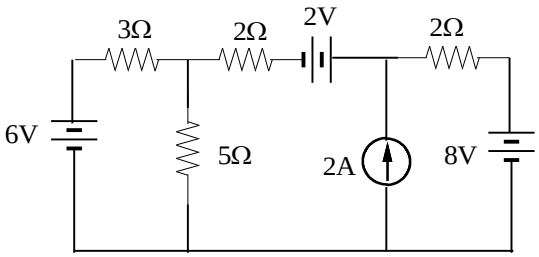

Fig. Q2B

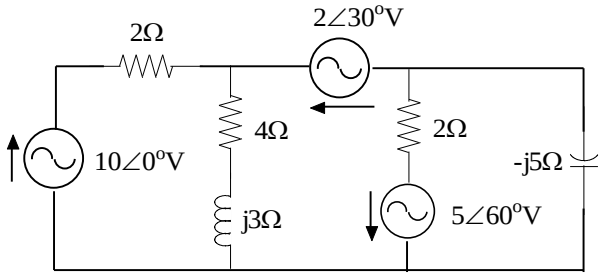

Fig. Q3C

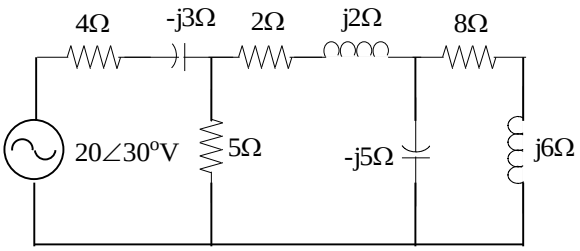

Fig. Q4A

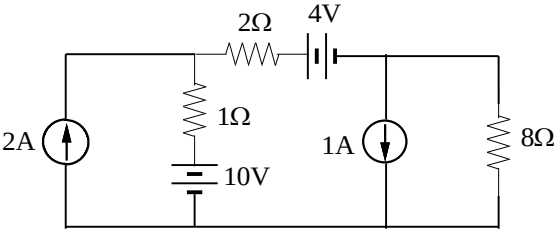

Fig. Q5A

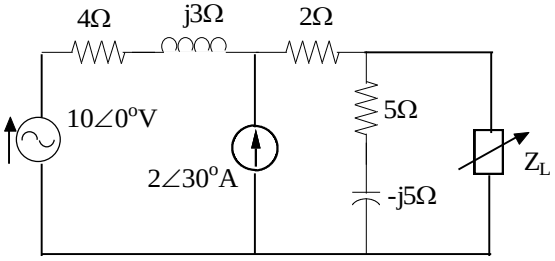

Fig. Q5B

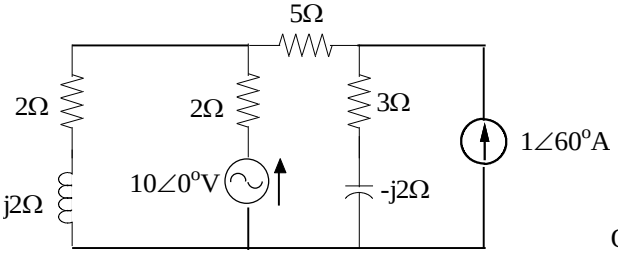

Fig. Q6A

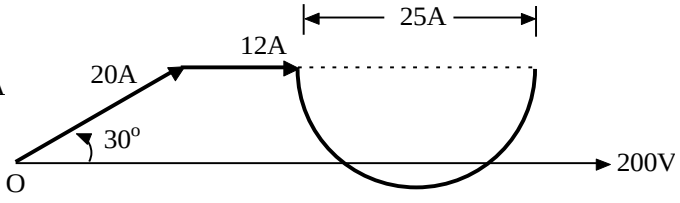

Fig. Q7A