Reg. No.										

INTERNATIONAL CENTRE FOR APPLIED SCIENCES

(Manipal University)

III SEMESTER B.S. DEGREE EXAMINATION – MAY 2016

SUBJECT: D.C & A.C CIRCUIT ANALYSIS (EE 232)

(BRANCH: IP/ MECH)

24^{TH} MAY, 2014

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

✓ **Answer ANY FIVE full Questions.**

1. (A) For the circuit shown in Fig. 1(A), find the equivalent resistance as seen from the terminals A and B using star-delta transformation (7 mark)
   (B) For the circuit shown in Fig. 1(B), find the current through 6 Ω resistor using mesh current analysis. (7 mark)
   (C) For the circuit shown in Fig. 1(C), determine the voltage across the terminals A and B using source transformation (6 mark)

2. (A) An alternating current varying sinusoidally with a frequency of 50Hz has an rms value of 20A. Write down the equation for the instantaneous value and find the corresponding value:
      i. 0.0025 sec
      ii. 0.0125 sec after passing through a positive maximum value
      iii. At what time, measured from positive maximum value, will the instantaneous current be 14.14A? (10 mark)

   (B) Prove that the power absorbed by a pure capacitor and an inductor connected an AC source is zero. (10 mark)

3. (A) Find the value of RL which receives maximum power of the circuit shown in Fig. 3(A) and hence find the power. (10 mark)
   (B) State Norton's theorem. For the circuit shown in Fig. 3(B), find the value of I_b using Norton's equivalent circuit. Take R = 667 Ω. (10 mark)

4. (A) A 200V, 50Hz sinusoidal supply is connected to a parallel network comprising three branches A, B and C as follows:

   Branch A – A coil of resistance 3 Ω and inductive reactance 4 Ω

   Branch B – A series circuit of resistance 4 Ω and capacitive reactance 3 Ω

   Branch C – A capacitor

   Given that the power factor of the combined circuit is unity; find:

i. The capacitance of capacitor
ii. The current taken from the supply (10 mark)

(B) A coil of resistance 10 Ω and inductance 0.1H is connected in series with a capacitor 150 uF across 200V, 50Hz supply. Calculate:

i. Inductive Reactance
ii. Capacitive Reactance
iii. Impedance
iv. Current
v. Power Factor
vi. Voltage across the coil and capacitor (10 mark)

5. (A) Explain current resonance. Obtain the expression for resonant frequency f_0 and current magnification for the circuit shown in Fig 5(A). (10 mark)

(B) A circuit having a resistance of 50 Ω and inductance 0.4 H and a variable capacitance in series is connected across 110V, 50 Hz supply. Calculate:

i. The value of capacitance to give resonance
ii. Current
iii. Voltage across the inductance
iv. Voltage across the capacitance
v. Q-factor of the circuit (10 mark)

6. (A) Find the current through the galvanometer G of resistance 50 Ω in the circuit shown in Fig. 6(A) using Thevenin's theorem. (10 mark)

(B) Obtain the conditions for maximum power transfer across load terminals when:

i. Load resistance is equal to source resistance
ii. Load resistance is equal to magnitude of source impedance
iii. Load impedance is equal to complex conjugate of source impedance.

(10 mark)

7. (A) Calculate the Zeq and Yeq of the circuit shown in Fig. 7(A) and the power consumed in the impedance 2+5j. (10 mark)

(B) A choke coil is connected to 240V ac supply. When the frequency of the supply is 50Hz, an ammeter connected in series with the choke coil reads 60A. On increasing the frequency to 100Hz, the same ammeter reads 40A. Calculate the resistance and Inductance of the choke coil. (10 mark)

8. (A) While measuring three phase power by two wattmeter method, the following observations were made. Indicate the load power factor in each case.

i. When both the meters show same reading
ii. One of the wattmeter shows zero reading
iii. One wattmeter shows double the reading than the other. (03 mark)

(B) A balanced load of 8 + 6j ohms per phase is connected to a 3 phase 400V supply. Find the line current, power factor, real power, reactive power and total apparent power when the system is connected in:

i. Star
ii. Delta (10 mark)

(C) Show that in a three phase system with balanced load, two wattmeters are sufficient to measure the power. (7 mark)

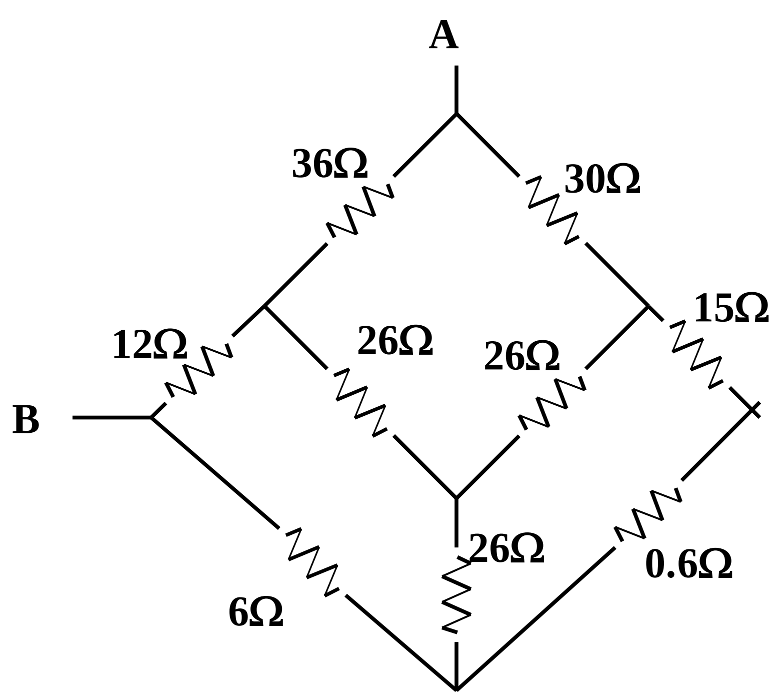

Fig. 1(A)

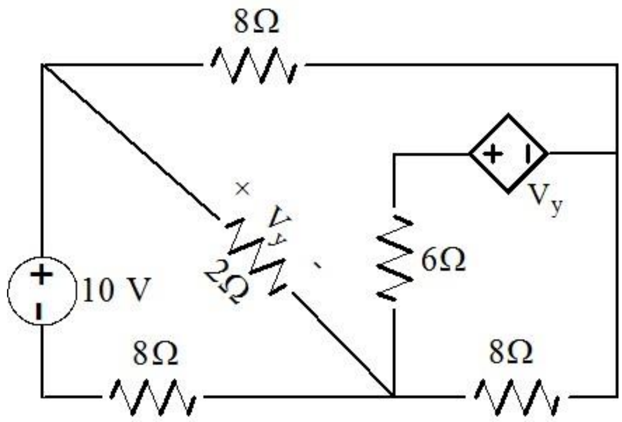

Fig. 1(B)

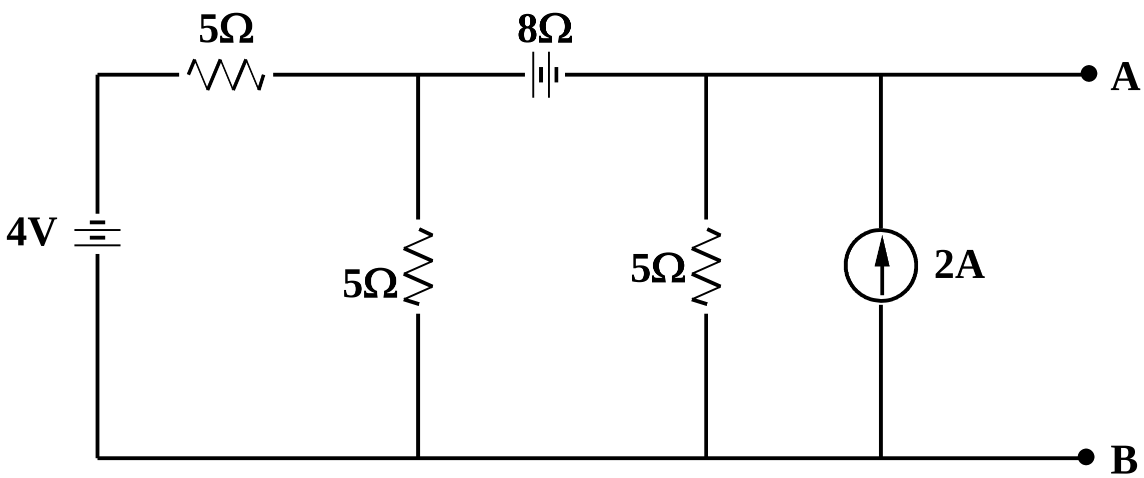

Fig. 1(C)

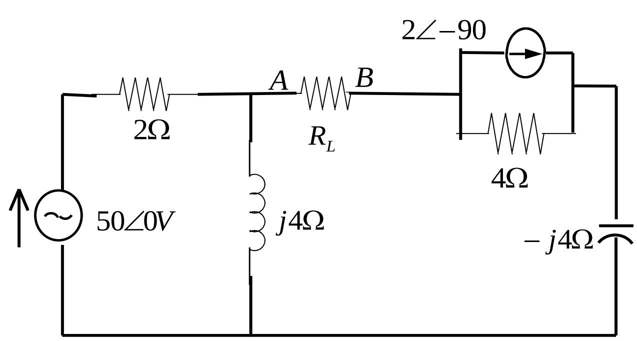

Fig. 3(A)

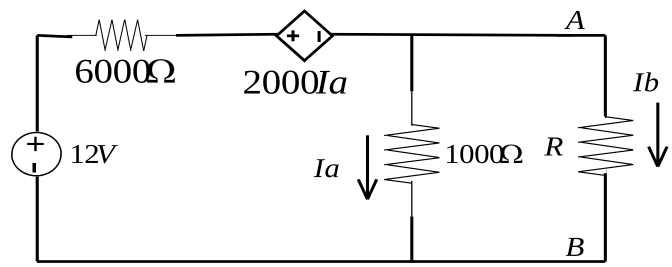

Fig. 3(B)

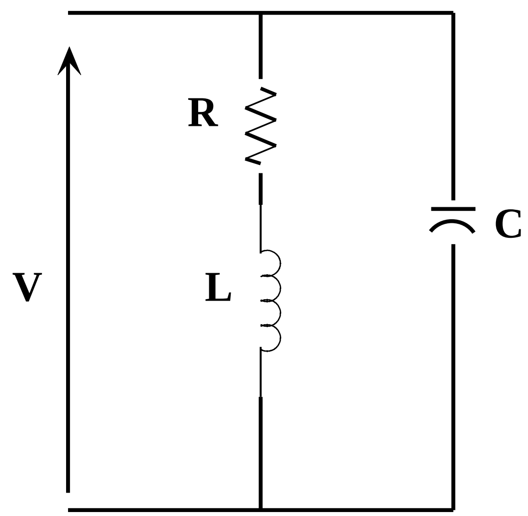

Fig. 5(A)

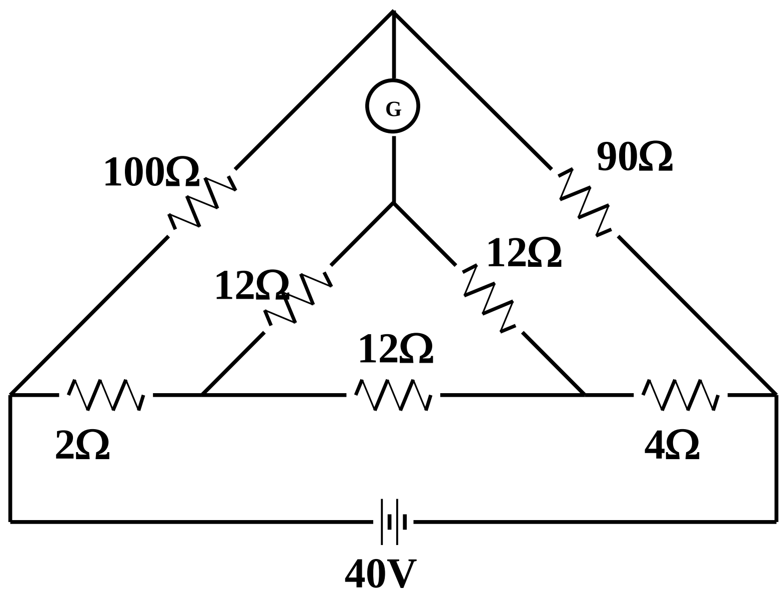

Fig. 6(A)

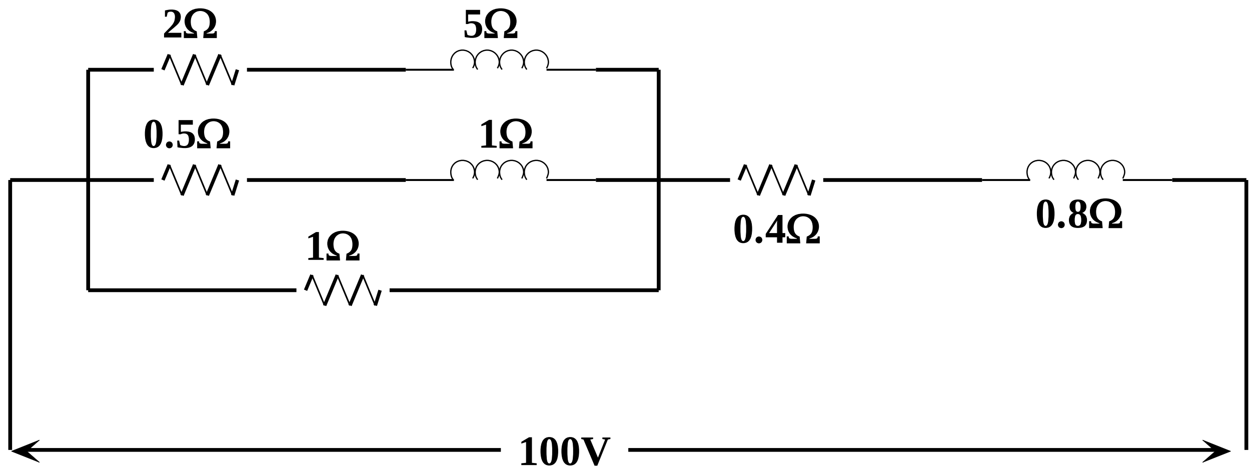

Fig. 7(A)