Reg. No.									

INTERNATIONAL CENTRE FOR APPLIED SCIENCES

(Manipal University)

III SEMESTER B.S. DEGREE EXAMINATION – APRIL / MAY 2017

SUBJECT: DC AC CIRCUIT ANALYSIS (EE 232)

(BRANCH: MECH, MET & IP)

Saturday, 13 May 2017

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

- ✓ **Answer ANY FIVE full Questions.**
- ✓ **Missing data, if any, may be suitably assumed**

1A. A 3 Phase, 220 V, 50 Hz, 11.2 kW induction motor has a full load efficiency of 88% and draws a line current of 38 A under full load. Find the power factor of the motor and the wattmeter readings to measure power input.

1B. Find the resistance between A & B (Fig 1B). **(10+10)**

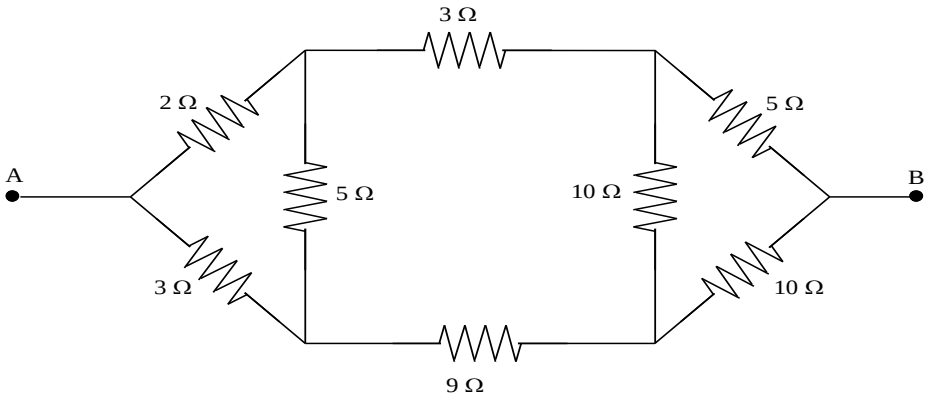

Fig 1B.

2A. Find the impedance Z_L so that maximum power can be transferred to it. Find the maximum power (Fig 2A).

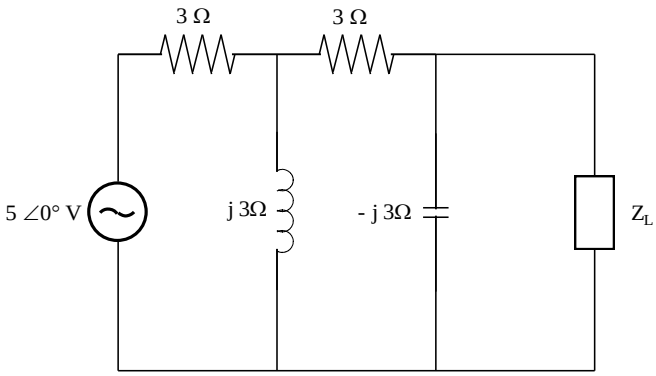

Fig 2A

2B. Find the value of R such that the circuit is in resonance (Fig 2B) **(12+8)**

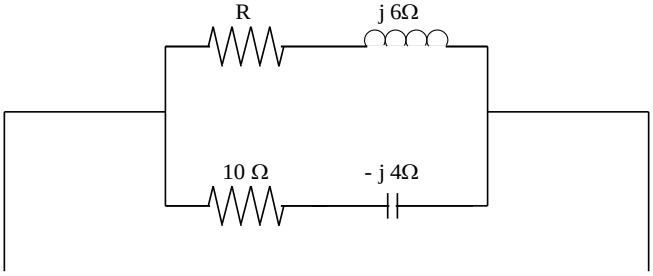

Fig 2B

3A. Using mesh analysis determine the current supplied by the source. Verify the answer by node analysis (Fig 3A)

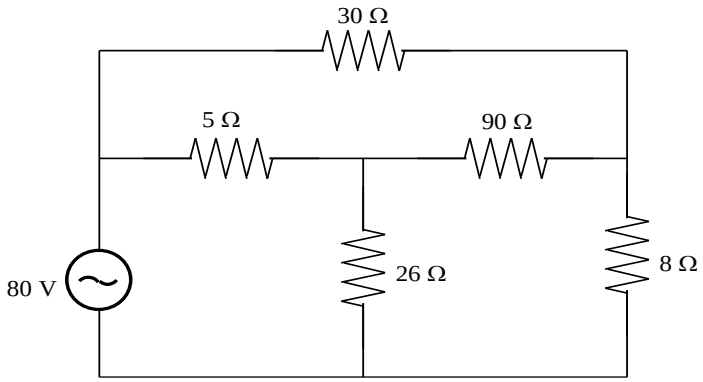

Fig 3A

3B. A voltage v(t) = 10 sinωt is applied to a series RLC circuit. At resonant frequency the voltage across capacitor is 500 V. The bandwidth of the circuit is 400 rads / sec. At resonance impedance of the circuit is 100 **Ω**. Determine inductance, capacitance, resonant frequency, upper and lower cutoff frequencies. **(12+8)**

4A. Inductor loads of 0.8 kW and 1.2 kW at lagging power factors of 0.8 and 0.6 respectively are connected across a 200 V, 50 Hz supply. Find the total current, power factor and the value of the capacitor to be put in parallel to make the overall power factor 0.94 lag.

4B. Use Norton's theorem to find current through Z_L (Fig 4B) **(10+10)**

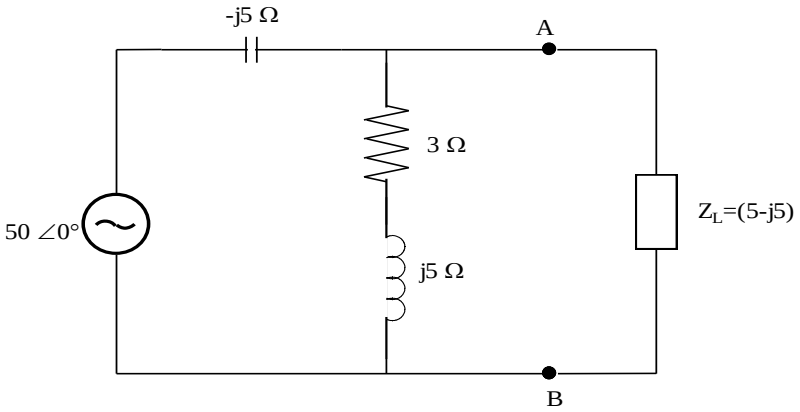

Fig 4B

5A A Generator of voltage 400 V ∠0° is connected to a motor of voltage E_b ∠Φ V, through a line impedance (1 + j4) **Ω**.

Find the supply current, power factor, power input & power output of motor for the following cases.

a) E_b=400 ∠-20° V
b) E_b=350 ∠-20° V
c) E_b=450 ∠-20° V

5B With a neat connection diagram & phasor diagram prove that two wattmeters are sufficient to measure three phase power. Explain how the wattmeter readings are affected by the load power factor. **(12+8)**

6A A generator of 400 ∠ 0° Vis connected to a constant magnitude load but variable phase angle, the load draws a current of 10 A at unity, 0,8 pf lag & 0.8 pf lead. Find the load voltage for the above cases, given line impedance of (0.5 + j3)**Ω**.

6B. Find the equivalent impedance and the power factor of the circuit given in Fig 6B **(10+10)**

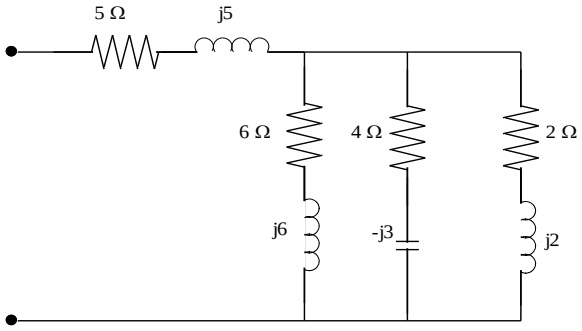

Fig 6B

7A. An industry has the following loads

i) A 3 phase circuit Y connected operating at 400 V drawing a line current of 20 A at 0.8 pf lag
ii) A 3 phase circuit Δ connected with a phase current of 15 A at 400 V and power factor 0.707 lag.
iii) A 10 kW motor with efficiency 0.8 and pf 0.8 operating at 400 V

Find the total load kVA and resultant power factor.

7B. Obtain the thevenin equivalent circuit for the network shown in Fig 7B. **(10+10)**

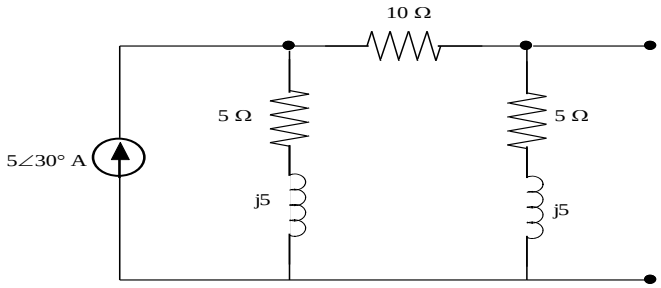

Fig 7B

8A. Find the power output of the current source shown in Fig 8A

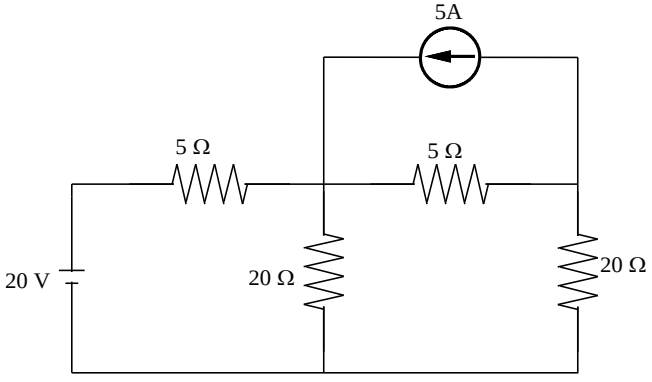

Fig 8A

8B. Find the source voltage, source current and power input (Fig 8B). **(10+10)**

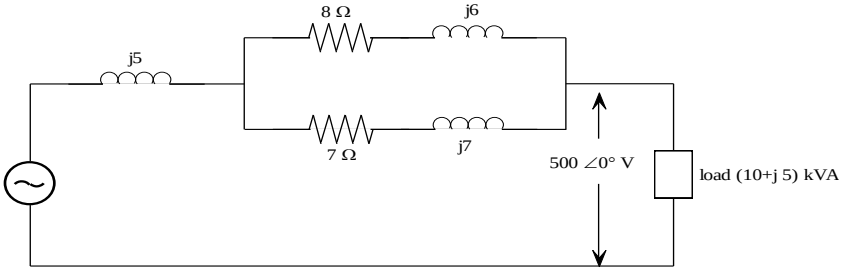

Fig 8B