Reg. No.									

INTERNATIONAL CENTRE FOR APPLIED SCIENCES

(Manipal University)

III SEMESTER B.S. DEGREE EXAMINATION – NOV. / DEC. 2017

SUBJECT: DC AND AC CIRCUIT ANALYSIS (EE 232)

(BRANCH: MECHANICAL, MECHATRONICS)

Wednesday, 8 November 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. **(10)**

1B. Find the current supplied by the battery in the network (Fig 1B). (Use star-delta transformation)

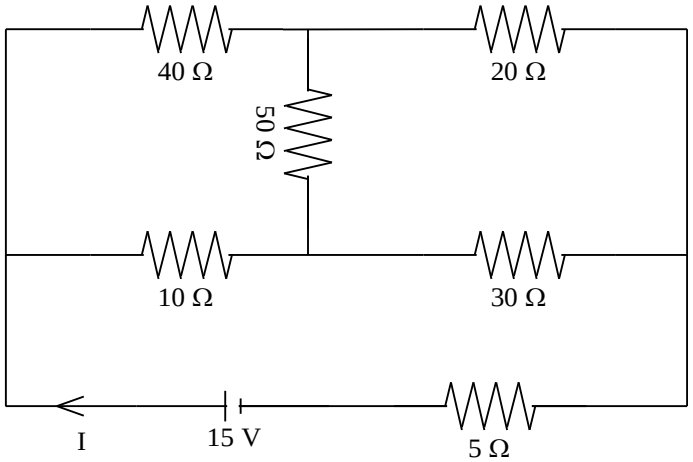

Fig 1B. **(10)**

2A. Find the power dissipated in the 6 Ω resistor (Fig 2A).

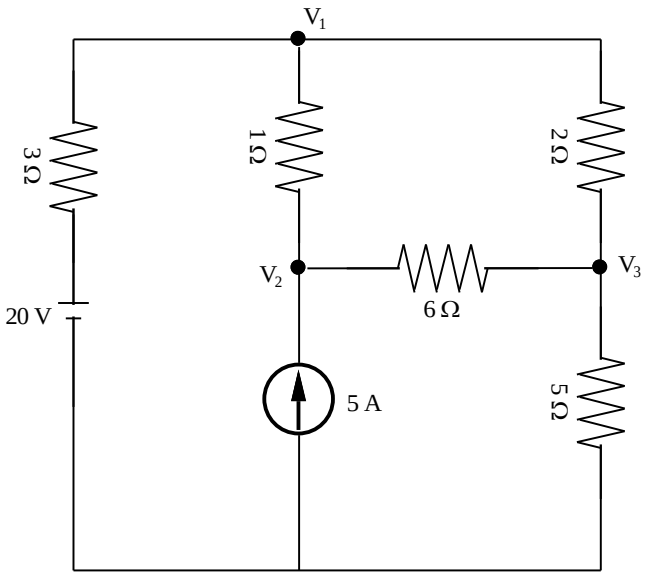

Fig 2A **(12)**

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

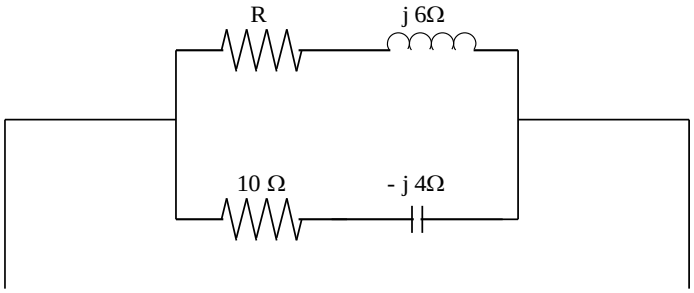

Fig 2B **(08)**

3A. Find the value of C in the circuit for resonance.

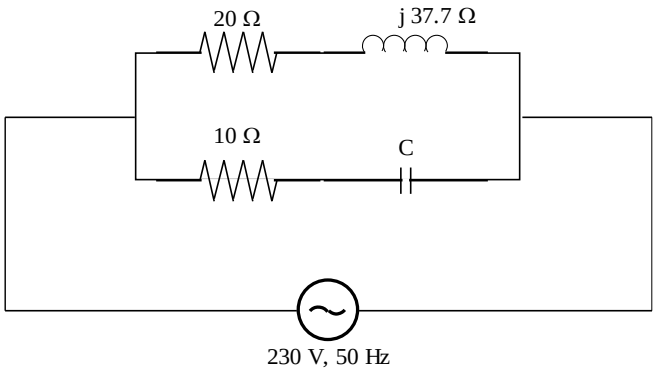

Fig 3A **(12)**

3B. A series RLC series circuit has a resistance of 10 **Ω**, inductance of 0.2 H and a capacitance of 40 μF. It is supplied with 100 V supply. Find

a) Resonant frequency

b) Half-Power frequencies

c) Current at resonance

d) Quality factor **(08)**

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. **(10)**

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

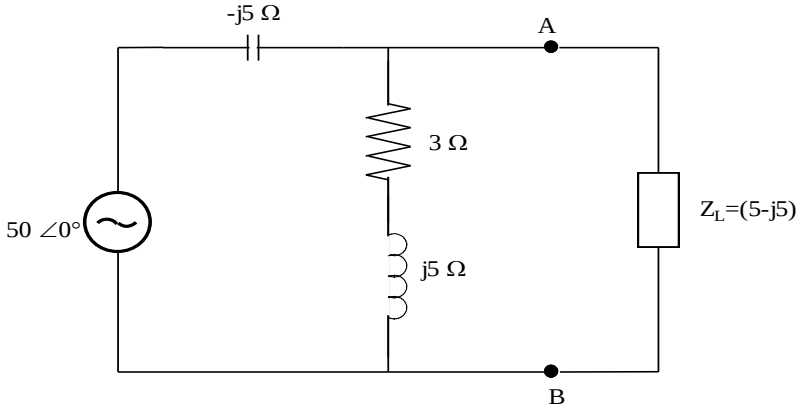

Fig 4B **(10)**

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 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 **(12)**

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. **(08)**

6A Find the Thevenin equivalent for the network shown in Fig 6A

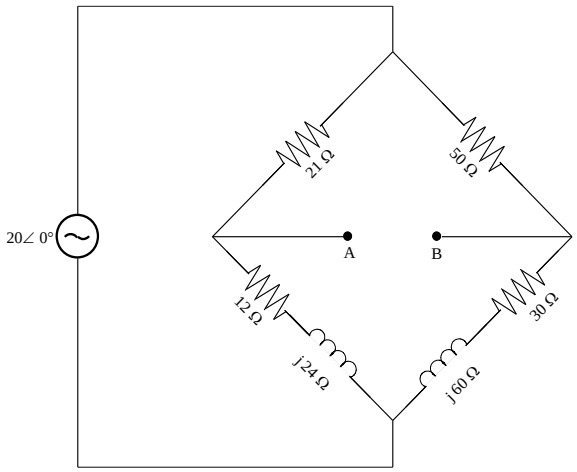

Fig 6A **(10)**

6B. Find the equivalent impedance and the power factor of the circuit given in Fig 6B

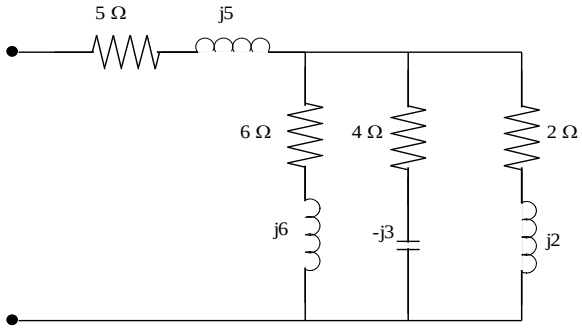

Fig 6B **(10)**

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. **(10)**

7B. Find the value of ZL so that maximum power can be transferred to it (Fig 7B). Find the maximum power.

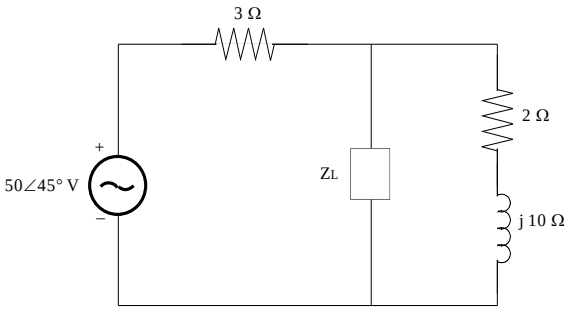

Fig 7B **(10)**

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

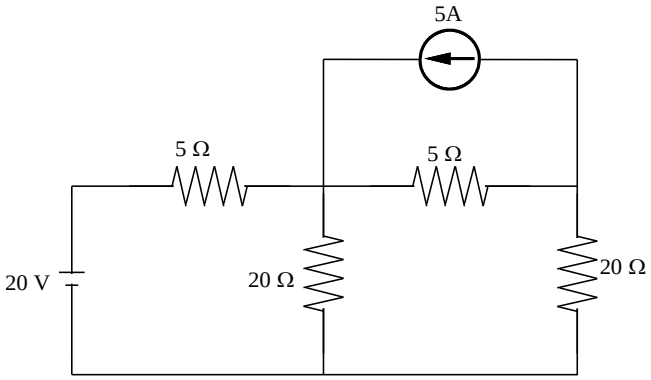

Fig 8A **(10)**

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

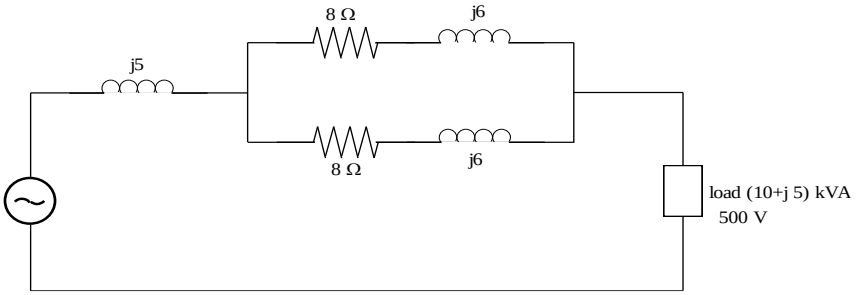

Fig 8B **(10)**