INTERNATIONAL CENTRE FOR APPLIED SCIENCES
MAHE, MANIPAL
B.S. (ENGG.)
End – Semester Theory Examinations – Nov./ Dec. 2020
III SEMESTER - D.C. & A.C. CIRCUIT ANALYSIS (EE 232)
(Branch: Mechanical)

Time: 3 Hours **Date: 23 November 2020** **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 resistance between A & B (Fig 1B).

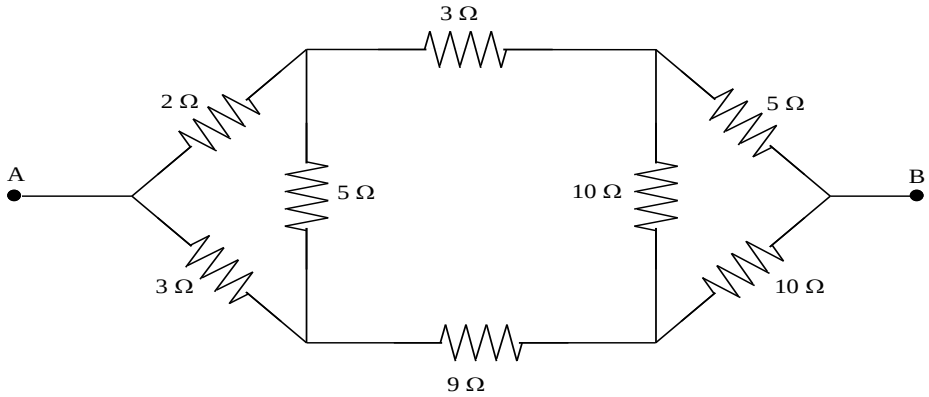

Fig 1B. **(10)**

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

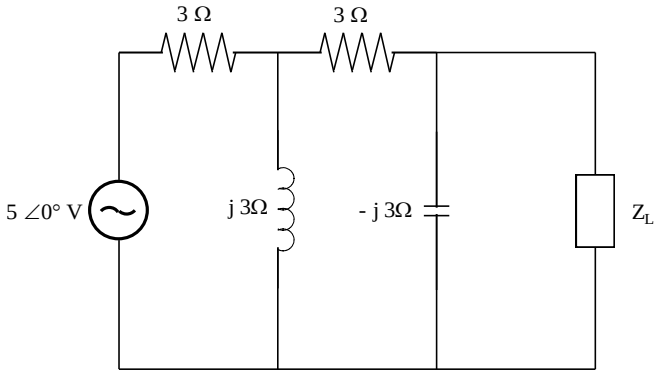

Fig 2A **(12)**

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

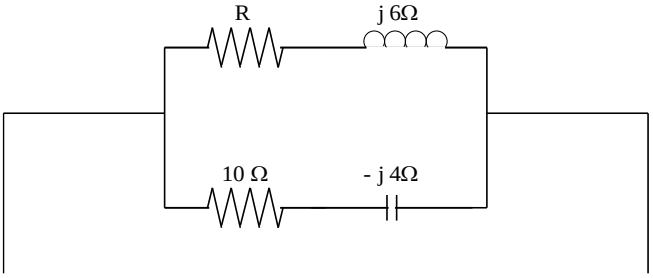

Fig 2B **(08)**

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

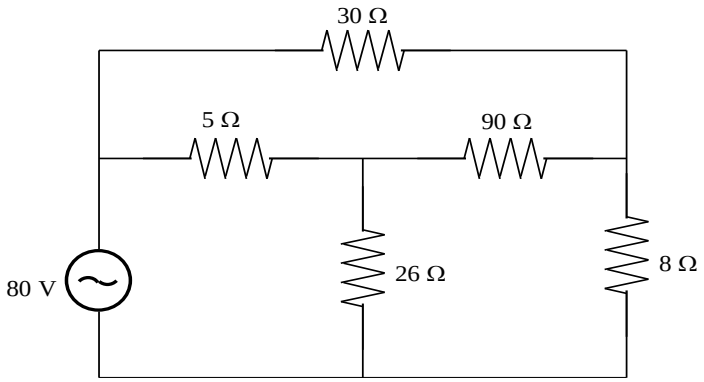

Fig 3A **(12)**

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. **(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)

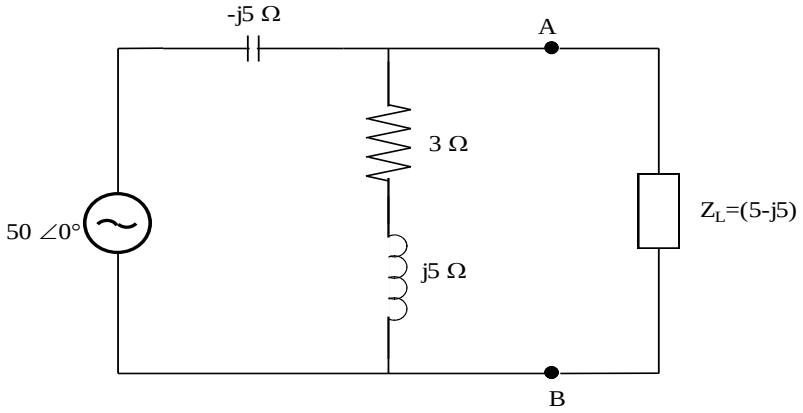

Fig 4B **(10)**

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 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 **(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 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**. **(10)**

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

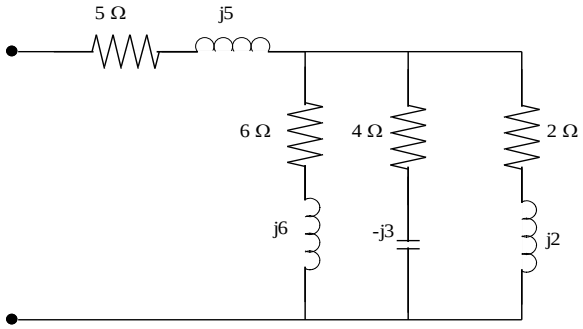

Fig 6B **(10)**

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. Obtain the Thevenin equivalent circuit for the network shown in Fig 7B.

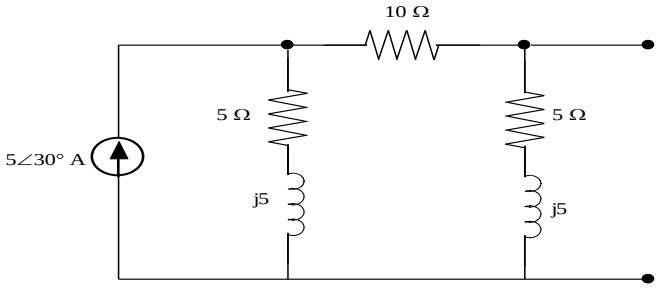

Fig 7B **(10)**

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

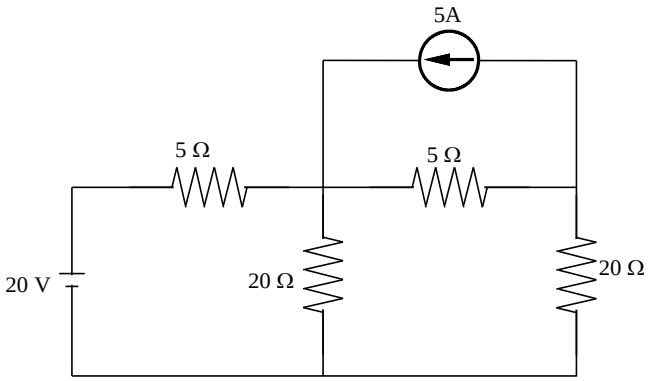

Fig 8A **(10)**

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

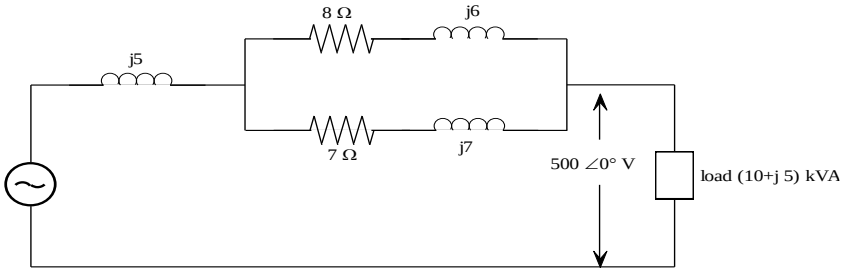

Fig 8B **(10)**

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