



(Following Paper ID and Roll No. to be filled in your Answer Book)

**PAPER ID : 199213**

Roll No.

### B. Tech.

### (SEM. II) THEORY EXAMINATION, 2014-15 ELECTRICAL ENGINEERING

Time : 3 Hours]

[Total Marks : 100

**Note :** Attempt All Questions. All Questions carry **equal** marks.

- 1 Answer any four parts of the following : **5x4=20**
- a) Three resistances  $r$ ,  $2r$  and  $3r$  are connected in delta. Determine the resistances for anequivalent star connection. Prove formula used.
  - b) State and explain Super position theorem. Determine the current through  $6\ \Omega$  resistor.

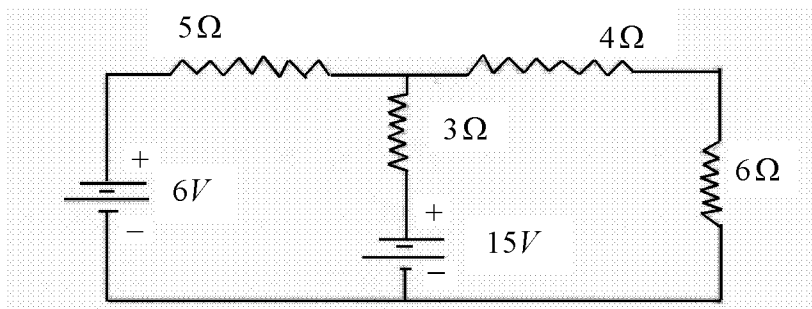
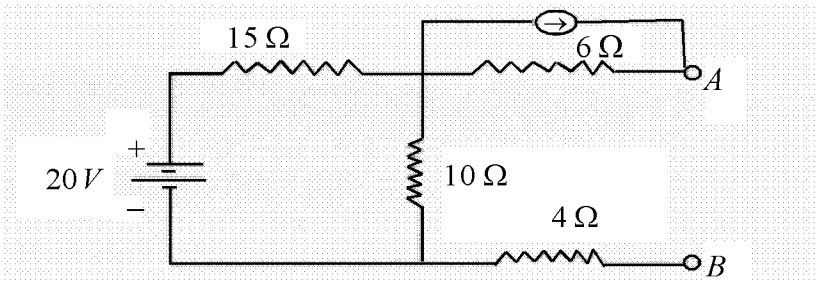


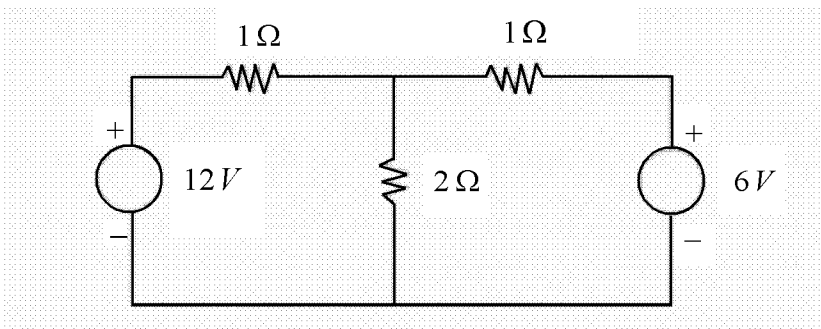
Fig.1

- c) Define the following terms:
- (i) Active and passive elements
  - (ii) Voltage and current source
  - (iii) Unilateral and bilateral elements
- d) State and prove the Maximum Power Transfer Theorem.
- e) Find the Norton equivalent for the network shown in the fig 2.



**Fig.2**

- f) Determine the current through  $2\Omega$  resistor in the network by Thevenin's Theorem.



**Fig.3**

**2** Answer any four parts of the following: **5x4=20**

- a) Deduce an expression for the resonant frequency of a series R-L-C ac circuit.
- b) Explain active, reactive and apparent power.
- c) A circuit takes a current  $i=20 \sin(314t-\pi/6)$  amperes when the supply voltage is  $v = 100 \sin 314 t$ . Calculate the impedance, phase angle, resistance and inductance of the circuit.
- d) A coil in parallel with a  $200\mu\text{F}$  capacitor is connected across a  $200\text{V}$ ,  $50\text{ Hz}$  supply. The coil takes a current of  $8\text{A}$  and loss in the coil is  $960\text{W}$ . Calculate the resistance, inductance of the coil and power factor of the entire circuit.
- e) Why series resonant circuit is called as an acceptor circuit? Explain bandwidth and quality factor of series resonant circuit.
- f) Three impedances  $(6+j5)\Omega$ ,  $(8-j6)\Omega$  and  $(8+j10)$  are connected in parallel. Calculate the current in each branch when the total current is  $20\text{ A}$ .

**3** Answer any two parts of the following: **10x2=20**

- a) Compare 3 phase star and delta connected systems. Show the total power in these connections remains same. A balanced 3 phase star connected load takes a power of  $5\text{ kW}$  at  $0.8\text{ pf}$  lagging when connected to a  $400\text{ V}$ , 3 phase supply. Calculate the line current and impedance per phase of the load.
- b) Explain moving iron instruments working principle as an ammeter.

- c) Explain the principle of operation of a single phase transformer.  
A 230/460 V transformer has a primary resistance of  $0.2\ \Omega$  and a resistance of  $0.5\ \Omega$  and the corresponding values for the secondary are  $0.75\ \Omega$  and  $1.8\ \Omega$  respectively. Find the secondary terminal voltage when supplying
- 10 A at 0.8 p.f. lagging
  - 10 A at 0.8 p.f. leading.

- 4 Answer any two parts of the following: **10x2=20**
- Explain two wattmeter method to measure three phase power with suitable diagram.
  - Power in a 3-phase circuit is measured by two wattmeters and the readings of the wattmeters are 5 kW and 0.5 kW, the latter reading being obtained after reversal of the current coil connection. Find the total power, and power factor of the circuit.
  - Explain different types of d.c. machines and derive emf equation.

- 5 Answer any two parts of the following: **10x2=20**
- Rotor of 3 phase induction motor cannot run at synchronous speed. Explain a three phase slip ring, 4 pole induction motor has rotor frequency 2.0 Hz while connected to 400 V, 3 phase, 50 Hz supply determine slip and rotor speed.
  - Draw torque-speed characteristics of 3 phase induction motor. Show the different operating regions. What will happen if rotor resistance of motor changes?
  - Why single phase induction motor is not self-starting? Explain method to start it.