

B.Tech. (Model Curriculum) Sem-I
ESC101 / BSC104 - Basic Electrical Engineering

P. Pages : 2

Time : Three Hours

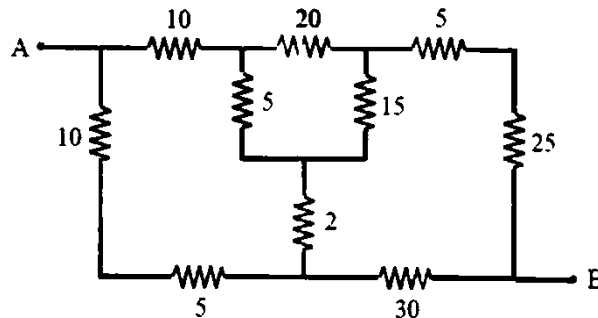


GUG/W/22/13167

Max. Marks : 80

- Notes :
1. All questions carry equal marks.
 2. Assume suitable data wherever necessary.
 3. Illustrate your answers wherever necessary with the help of neat sketches.
 4. Discuss the reaction, mechanism wherever necessary.

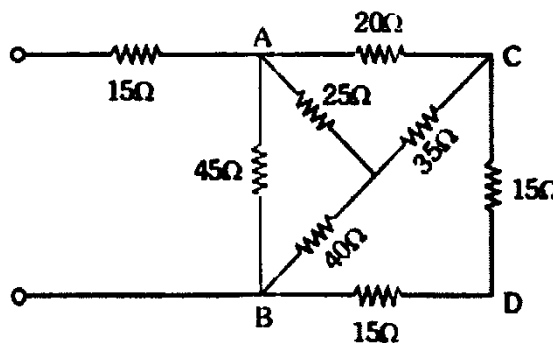
1. a) Determine the Equivalent resistance & voltage across the terminals. A and B in the network shown in figure. All resistances are in ohms. 8



- b) State and explain ideal and practical voltage and current source. Draw the V – I characteristics of ideal and practical voltage and current source. 8

OR

2. a) State and Explain Thevenin's Theorem with suitable example. 8
- b) Use star delta transformation to find the resistance between terminals A and B for figure shown below. 8



3. a) Draw & explain the impedance triangle for series 'R-L-C' circuit with $X_L < X_C$. 8
- b) A $50 \mu\text{f}$ capacitor is connected across a 230V, 50 Hz supply. Calculate:
- 1) The reactance offered by the capacitor.
 - 2) The maximum current
 - 3) The RMS value of current drawn by the capacitor.

OR

4. a) Define rms and average value as applied to ac voltage. Also obtain their expressions for sinusoidal voltage having the maximum value V_m . 8
- b) A circuit has a resistance of 110Ω and an inductance of 0.5 H . It is connected to a 230V , 50Hz supply. Calculate: 8
- i) The inductive reactance
 - ii) The impedance
 - iii) The current and
 - iv) Phase difference between voltage and current.

5. a) What is B – H Curve. Compare Magnetic and Electrical Circuit. 8
- b) Two bars of same material with relative permeability is 800 having equal mean lengths of 10 cm . but area of cross sections 2 cm^2 and 1 cm^2 are bent in the form of semicircle and joined to form a close ring. Calculate AT required to produce 1 wb/m^2 flux density in the smaller ring. Neglect air gap leakage and fringing effect. 8

OR

6. a) A maximum efficiency at full load and unity P.F. of a single phase 25 kVA , $500 / 1000\text{ V}$, 50 Hz transformer is 98% . Determine its efficiency at 8
- i) 75% of full load at 0.9 P.F.
 - ii) 50% of full load at 0.8 P.F.
- b) Explain Autotransformer & also state the types of auto transformer with neat sketch also give its application. 8
7. a) Derive the torque equation of DC motor. Also prove that the torque of series motor is proportional to square of the armature current. 8
- b) Explain speed control of separately excited of DC motor. 8

OR

8. a) Why starters are necessary for starting induction motors? Explain in short different starting methods for 3 phase induction motors. 8
- b) Explain the working principle of three phase induction motor. 8
9. a) Draw & explain full wave rectifier circuit with I/P & O/P waveforms with load resistance. 8
- b) Explain construction & working of diode. What are the application of diode as a rectifier. 8

OR

10. a) State & explain the necessity of series and parallel connection of batteries. 8
- b) Explain with neat sketch diagram of HRC Fuse. 8
