B.Tech. (Model Curriculum) Semester-I & II

ESC101 - Basic Electrical Engineering

P. Pages : 2 **GUG/S/25/13167**

Time : Three Hours * 1 4 7 9 * Max. Marks : 80

Notes :
1. All questions carry equal marks.
2. Due credit will be given to neatness and adequate dimensions.
3. Assume suitable data wherever necessary.
4. Illustrate your answers wherever necessary with the help of neat sketches.
5. Use of slide rule, Logarithmic tables, Steam tables, Mollier's chart, Drawing instruments, Thermodynamic tables for moist air, Psychrometric charts and Refrigeration charts is permitted.

1. a) State and Explain Thevenin Theorem? With one example. **8**

b) Find the network shown fig. 1 (a) find current in 5 ohm resistance by KCL. **8**

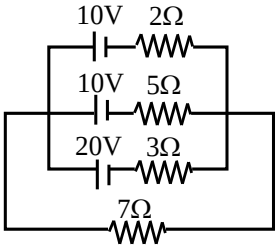
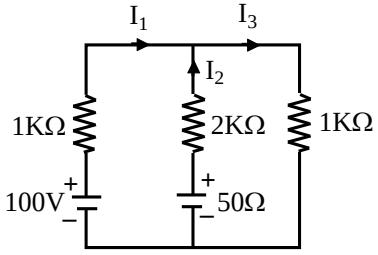


Fig. 1 (a)

OR

2. a) Illustrate the types of sources used in electrical network. Write down the difference between ideal and practical sources used in the electrical network? Explain with a suitable diagram how we can convert current source into voltage source. **8**

b) Calculate the branch current using superposition theorem? **8**



3. a) Why do we choose sinusoidal wave rather than a simple curve such as a square or triangle wave? Write down the difference between AC and DC quantities? **8**

b) An alternating voltage is represented by v=141.4sin377t , find **8**
i) Maximum value
ii) Frequency
iii) Time period
iv) Instantaneous value of voltage when t is 5ms
v) Angular velocity
vi) Find the speed of the rotating coil if it moving at 600 rpm

OR

4. a) A three-phase power system with a line voltage of 400V is supplying a delta connected load of 1500W at 0.8 pf lagging. Determine the phase and line current and also the phase impedance **8**

b) Draw a neat sketched diagram for a balanced 3 phase system showing the voltage waveform of three phase source. Also prove that sum of all thee emf at every instant is zero. **8**

5. a) A 500kVA transformer has 95% efficiency at full load and also at 60% of full load both at unity power factor, find **8**
i) separate out the transformer losses
ii) determine the transformer efficiency at 75% full load, unity power factor

b) Draw and explain briefly with the help of neat sketch the circuit model of the transformer referred to primary side, explain every parameter involved in it. **8**

OR

6. a) Illustrate various similarity and dissimilarity between ideal and practical transformer. Also explain why transformer is rated in KVA not in KW? **6**

b) The emf per turn of a single phase 2200/220 V, 50 Hz transformer is 12V. **6**
Calculate
i) The number of primary and secondary winding turns,
ii) The net cross-sectional area of core for a maximum flux density of 1.5T.

c) Why transformer cannot be operated using DC supply, explain briefly. **4**

7. a) Write a short note on DC motor, draw and explain the working of a DC motor. **5**

b) Write a short note on comparison between 3 different types of DC motor also write about applications of all three DC motors in various fields? **5**

c) Explain briefly how reversal of DC motor can be achieved? **6**

OR

8. a) Explain with the help of neat sketch torque-speed curve of 3 phase induction motor. **8**

b) A 3-phase induction motor is wound for 4 pole and is supplied from 50 Hz system. Calculate (i) the synchronous speed (ii) speed of the motor when slip is 4% (iii) the rotor current frequency when the motor runs at 600 rpm. **8**

9. a) Explain briefly working of PN junction diode as a half wave rectifier circuit. **8**

b) Write a short note on the importance of why earthing is required in any electrical network. **8**

OR

10. a) Short notes on **8**
i) SFU ii) MCB iii) MCCB

b) If an electric water heater of 3kW runs for 5 hours per day. Find the total daily, monthly and annual power consumption in kWh. (Take 30 days = 1 month, and 365 days=1 year). **8**

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