Ω and the shunt field resistance is 80 Ω. Find the total armature current. 4

UNIT-V

9. (a) What is meant by service line? 3

(b) Describe the various types of cables or wires. 6

(c) What is a fuse? Discuss its advantages and disadvantages. 2+3

10. (a) What is earthing? Why is it essential for electrical installations. 2+4

(b) Define secondary accumulators. Write down the chemical reactions during the charging and discharging process of lead-acid cells. 2+6

*****

B.Tech Even Semester Examination, May, 2025

Agricultural Engineering / Computer Science & Engineering Electronics & Communication Engineering

(2nd Semester)

Course No: ASH-204

(Basic Electrical Engineering)

Full Marks: 70
Pass Marks: 28
Time: 3 hours

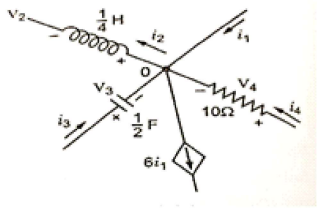
Note:

1. Attempt any five questions taking one from each unit.
2. Begin each answer in a new page
3. Answer parts of a question at a place
4. Assume reasonable data wherever required
5. The figure in the right margin indicates full marks for the question
6. All the mathematical symbols and abbreviations have their usual meanings.

UNIT-I

1. (a) State and prove Thevenin's theorem with the help of an appropriate electrical circuit. 5

(b) With reference to the figure, given $i_1 = -\frac{1}{2}e^{-2t}$, $V_3 = 2e^{-2t}$, $V_4 = 2e^{-2t}$. Find V_2. 5

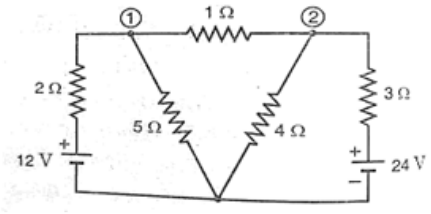


(c) State and explain the superposition theorem. 4

2. (a) State Kirchhoff's Voltage and Current law. 6

(b) State and explain Norton's theorem. 4

(c) Find the current through the 1 Ω resistor using the nodal analysis theorem for the circuit shown in the figure. 4



UNIT-II

3. (a) Define the following terms:

(i) Apparent Power (ii) True Power 2+2

(b) Describe Delta-Star transformation with the help of an appropriate electrical circuit. 6

(c) $V_{max} = \sqrt{2} \times 200\, cos500t, P_{avg} = 250\, W$ power factor=07 lagging, Calculate the reactive power of the system. 4

4. (a) Discuss the conditions for the resonance of the series R-L-C circuit. Draw the resonance curve. 6+2

(b) In a series R-L-C circuit, R= 2 Ω, L= 2 mH, C= 10 μF. Find the resonant frequency, Q-factor, bandwidth, and half-power frequencies. 6

UNIT-III

5. (a) Explain the assumptions taken for the ideal transformer. 4

(b) Describe various losses in a transformer. 6

(c) A transformer is rated at 100 kVA, at full load its copper loss is 1400 W and iron losses are 940 W. Calculate (i) the efficiency at full load, unity power factor (ii) the efficiency at half load, the same power factor. 2+2

6. (a) Describe the classification of magnetic materials. Give examples for each class.9

(b) What are ferrites? Give their properties and applications. 2+3

UNIT-IV

7. (a) Explain the working principle of the DC motor. 5

(b) Discuss the applications of different types of DC motors. 5

(c) A 20 kW, 200 V shunt generator has an armiger resistance of 0.05 Ω and a Shunt field resistance of 200 Ω. Calculate the power developed in the armature when it delivers rated output. 4

8. (a) What is a DC generator? Describe different types of DC generators with their appropriate circuit diagrams and equations. 2+8

(b) A 4-pole DC shunt generator with a lap-connected armature supplies a load of 100 A at 200 V. The armature resistance is 0.1