

Enrolment No./Seat No _____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER-I & II EXAMINATION – WINTER 2025

Subject Code:3110005

Date:12-01-2026

Subject Name:Basic Electrical Engineering

Time:02:30 PM TO 05:00 PM

Total Marks:70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

- Q.1** (a) Calculate current, resistance and energy consumed by an electric iron rated 230 V, 2 KW when used for 12 hours. What is the monthly energy bill at Rs. 5/- per unit? **03**
- (b) Draw various types of alternating waveforms. Label peak, peak-to-peak, RMS and average value on sinusoidal AC waveform. Why are sinusoidal voltages preferred over other alternating voltages? **04**
- (c) Write basic guidelines (Safety Rules) regarding the safe handling of electricity and electrical appliances. Mention various types of electrical safety devices. **07**

- Q.2** (a) A 100 V, 100 W lamp is connected in series with a 100 V, 60W lamp across 200 V supply. Determine current drawn and power consumed by each lamp. **03**
- (b) What are the limitations of the superposition theorem? **04**
- (c) Find current in $2\ \Omega$ resistance by Thevenin's theorem circuit shown in figure 1. Also draw Thevenin's equivalent circuit. **07**

OR

- (c) Derive the expression for the voltage across the capacitor at any instant after the application of DC voltage V to a circuit with a capacitance C in series with resistance R. Define the time constant (τ) of the series RC circuit. **07**

- Q.3** (a) A balanced star connected load of $4+j3\ \Omega$ per phase is connected to a balanced 3-phase 400 V supply. Find the active power and reactive power. **03**
- (b) Compare single phase alternating R-L circuit with R-C circuit. **04**
- (c) Write short technical note on series RLC resonance. Plot the variation of impedance, current and power factor with respect to the signal frequency. **07**

OR

- Q.3** (a) A single-phase series RLC circuit having $50\ \Omega$ resistance, 0.1 H inductance and $50\ \mu\text{F}$ capacitance and it is connected with single phase 230 V, 50 Hz supply. Calculate the active power consumed by the circuit. **03**
- (b) Draw Power triangle and impedance triangle for single phase R-L series circuit and write the formula of power factor from it. **04**
- (c) Define power factor. What are the drawbacks of low power factor? Explain any one method to improve the power factor. **07**

- Q.4** (a) Compare core type and shell type transformer. **03**
 (b) Write short note on B-H curve of magnetic materials. **04**
 (c) Explain the principle of operation of the transformer. Draw the construction of transformer and write function of each part. **07**

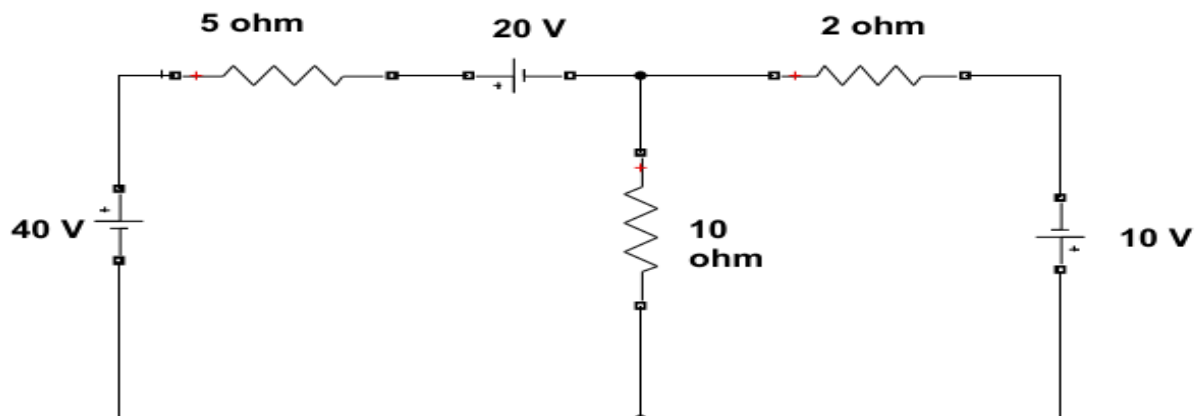
OR

- Q.4** (a) Explain the principle of operation of induction motor. **03**
 (b) Mention the advantages of induction motor over dc motor. **04**
 (c) Draw construction of DC machine, label each part and write the function of each. **07**

- Q.5** (a) Explain the construction of the cable. **03**
 (b) What is the necessity of earthing? **04**
 (c) Differentiate fuse, MCB and MCCB. **07**

OR

- Q.5** (a) Compare equipment earthing with neutral earthing. **03**
 (b) Write a short technical note on battery maintenance. **04**
 (c) Elaborate various methods of earthing. **07**



(Q. 2-C) Fig. 1