Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–I & II EXAMINATION – WINTER 2024

Subject Code:3110005 Date:13-01-2025

Subject Name:Basic Electrical Engineering

Time:10:30 AM TO 01:00 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.**

			MARKS
Q.1	**(a)**	State and explain Kirchhoff's current Law.	**03**
	(b)	Prepare a list of parts of a Single-phase AC Motor.	**04**
	(c)	State & Explain the Thevenin's theorem with suitable example.	**07**
Q.2	**(a)**	Write short note on autotransformer.	**03**
	(b)	Derive the EMF equation of single-phase transformer.	**04**
	(c)	When three resistances of 10Ω, 20Ω, and 30Ω are connected in series across 230 V supply. Find (1) equivalent resistance (2) current flowing through each resistance, (3) voltage drop across each and (4) power loss in each resistor	**07**
		OR	
	(c)	Derive the relationship between line and phase values of current in a three phase, balanced, delta connected system.	**07**
Q.3	**(a)**	Define following terms in connection with A.C wave forms: (i) Frequency (ii) Time period (iii) Amplitude.	**03**
	(b)	If the waveform of a voltage has a form factor of 1.11 and peak factor of 1.51 and if the maximum value of a voltage is 4500 volts. Calculate the average and r.m.s. values of the voltage.	**04**
	(c)	Describe the open circuit & short circuit test on single-phase transformer.	**07**
		OR	
Q.3	**(a)**	List out the merits of two-watt meter method.	**03**
	(b)	Compare series and parallel RLC circuit resonance.	**04**
	(c)	Derive an expression for the voltage across the capacitor during charging through the resistor at any instant $V_c = V (1-e^{-t/RC})$. Assume that RC series circuit is connected across a DC supply of voltage V.	**07**
Q.4	**(a)**	Mention Merits and Demerits of Single-Phase Induction Motor.	**03**
	(b)	Compare Squirrel cage induction motor and Slip ring Induction Motor.	**04**
	(c)	Describe construction of a DC machine.	**07**
		OR	
Q.4	**(a)**	Write applications of Auto Transformer.	**03**
	(b)	Explain Working of capacitor start Single phase induction motor	**04**
	(c)	Explain construction of synchronous generator with diagram.	**07**
Q.5	**(a)**	Write advantages and disadvantages of ELCB.	**03**
	(b)	Draw the structure of underground cable with name of all sections.	**04**
	(c)	Explain different methods of Power factor Improvement	**07**

OR

Q.5	**(a)**	Write safety precautions for electrical Applications	**03**
	(b)	Compute the monthly energy charges for an air conditioner having Power consumption of 3 kW and daily uses 10 hours. Energy charges Rs. 5 per unit	**04**
	(c)	Classify different types Earthing and explain any one in detail.	**07**

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