Seat No.: _____   Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER–VI(NEW) EXAMINATION – WINTER 2022

Subject Code:3160918   **Date:16-12-2022**
Subject Name:Element of Electrical Design
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.**

			MARKS
Q.1	**(a)**	List the properties of good insulating materials?	**03**
	(b)	Write short note on field regulator.	**04**
	(c)	Explain steps for design of single phase variable chock coil.	**07**
Q.2	**(a)**	Define the following terms used in armature winding design: (1) back pitch (2) Commutator pitch (3) winding pitch	**03**
	(b)	Explain the importance of (a) current carrying capacity and (b) voltage drop while determining the size of conductor.	**04**
	(c)	Design and develop a mush winding for a 4-pole, 24 slots, 3-phase stator of ac machine.	**07**

OR

	(c)	Find the Front pitch, back pitch, winding pitch and commutator pitch for a simplex wave wound 13 slots, 4-pole d.c armature with 13 commutator segments. Draw the winding diagram in developed form. Also draw the sequence diagram to indicate the position of brushes. Assume number of coil sides per slot = 2	**07**
Q.3	**(a)**	Compare closed windings and open windings.	**03**
	(b)	Explain the use of dummy coils and equalizer connections in d.c. armature windings.	**04**
	(c)	Design a suitable 4 section rotor resistance starter for a 3-phase induction motor having full load slip 2.5%. Maximum starting current=full load current and rotor resistance/phase=0.025Ω	**07**

OR

Q.3	**(a)**	Differentiate single layer and double layer winding.	**03**
	(b)	What are the various types of starter used for stating squirrel cage Induction motor? Explain one of starter in brief.	**04**
	(c)	Design a suitable 8 section starter for a 14.92 KW, 250 V, 1000 rpm D.C. shunt motor from the following data: Maximum starting torque = Full load torque, Armature circuit resistance = 0.4 ohm, Full load efficiency = 0.85	**07**
Q.4	**(a)**	Define and clearly explain the terms: (1) Stacking Factor (2) Gap contraction factor for slots and ducts	**03**
	(b)	Discuss the necessity of starter in DC motors and Induction motors.	**04**
	(c)	Define real and apparent flux densities in the tooth of DC machine armature and give the difference between them. Also derive the relation between them.	**07**

OR

Q.4	**(a)**	What is Carter's fringing curve? Why it is used.	**03**

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(b)	State and explain methods for calculating MMF required for tooth in DC machine.	**04**
(c)	Explain design procedure of a small single phase transformer.	**07**

Q.5 **(a)** Draw different types of stampings used for making core of small transformer. **03**

(b) Generating station has connected load of 50 MW and maximum demand of 35 MW. The units generated 75×10^6 per annum. Calculate (1) Demand factor (2) Load factor. **04**

(c) Discuss the different types of loads with examples. **07**

OR

Q.5 **(a)** State the rules for electrical wiring as per IS. **03**

(b) Discuss the significance of (i) Space to height ratio (ii) Utilization factor and (iii) Depreciation factor in the design of lighting system. **04**

(c) A residential building has following load connected in it : Incandescent **07**
lamps 100W each, 02 Nos. 5hrs/day
Fluorescent lamps 40W each, 04 Nos. 6hrs/day
Fans 60W each, 06 Nos. 5hrs/day
Electric cooker 1.5 KW each, 01 Nos. 4hrs/day
Electric geyser 1 KW each, 01 Nos. 3hrs/day
Calculate the total cost of electrical energy for 30 days,

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