Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI (NEW) EXAMINATION – WINTER 2023

Subject Code:3160918 Date:11-12-2023

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)**	Write comparison between simplex lap and simplex wave winding applied to dc armature.	**03**
	(b)	Give classification of insulating material used in electrical machines	**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)	Discuss B-H curve in magnetic circuit	**04**
	(c)	Determine the air gap length of DC Machine from the following data: Gross core length=0.1 meter, Number of ducts=1, Width of duct=10 mm, Slot pitch= 24 mm, Slot Width= 12mm, Carter's coefficient for slots and ducts=0.3, Gap flux density at pole center=0.65 T, Field MMF per pole=3800 A, MMF required for iron parts of magnetic circuit= 600 A.	**07**
		OR	
	(c)	What is real and apparent flux density in the tooth of DC machine armature? Give difference between them & also derive relation between them.	**07**
Q.3	**(a)**	Discuss function & necessity of field regulator in case of DC shunt motor.	**03**
	(b)	Why starter is necessary for starting 3- phase induction motor?	**04**
	(c)	Design a suitable 8 section starter for a 14.92 KW, 250 V, 1000 rpm, DC shunt motor from following data. Maximum starting torque= Full load torque, Armature circuit resistance=0.4 Ω, Full load efficiency= 0.85	**07**
		OR	
Q.3	**(a)**	Differentiate single layer and double layer winding.	**03**
	(b)	Explain the significance of dummy coils and equalizer connections in DC armature windings.	**04**
	(c)	Write steps for designing small single phase Transformer.	**07**
Q.4	**(a)**	What are the factors that should be considered while selecting the type of wiring system?	**03**
	(b)	What is electric load? How will you classify loads?	**04**
	(c)	The domestic load in residential building is used in following manner: Fluorescent lamps, 55W each, 4 Nos. 6 Hrs/day Fans 70W each, 4 Nos. 8 Hrs/day Refrigerator of 3000W, 12 Hrs./day Heater of 1000W, 2 Hrs./day Television of 150W, 8 Hrs./day Calculate : (a) connected load (b) daily load factor (c) total cost of energy for 30 days, at the rate of Rs. 3/Unit	**07**
		OR	

Q.4	**(a)**	State the rules for electrical wiring as per IS.	**03**
	(b)	What is control panel? State and explain the various components/devices used in the control panel.	**04**
	(c)	Explain with neat sketches, the different systems of wiring used for domestic installations.	**07**
Q.5	**(a)**	What is soft starter? What are the benefits and advantages of soft starter?	**03**
	(b)	Discuss Leakage reactance calculation for various types of slots for DC machines.	**04**
	(c)	What is finite element method (FEM) and finite element analysis (FEA)? Give advantages of FEA.	**07**

OR

Q.5	**(a)**	Give the definition of the following terms with respect to load assessment: (1) maximum demand (2) load factor (3) diversity factor	**03**
	(b)	State various methods for calculating MMF required for teeth in DC machine & describe any one method for calculating MMF required for teeth in DC machine.	**04**
	(c)	Explain the installation plan, wiring diagram and single line diagram for electric wiring based on a given load. Also give the rules for deciding the number of sub circuits and power circuit.	**07**

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