Seat No.: _____ Enrolment No.

GUJARAT TECHNOLOGICAL UNIVERSITY

BE SEMESTER-VI OLD) EXAMINATION – WINTER 2017

Subject Code:160804 **Date:13-11-2017**

Subject Name: Electrical Machine Design

Time:02:30 pm to 5:00 pm **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	**(a)**	Deduce an expression for the M.M.F required for the air gap of an armature with slots and ducts.	**07**
	(b)	What are the factors that limit the design of an electrical machine?	**07**
Q.2	**(a)**	Show that for minimum total material cost of a 3-phase transformer the ratio (Weight of iron/Weight of copper) should be equal to the ratio (specific cost of Copper (Rs. /kg) / specific cost of iron ((Rs. /kg)).	**07**
	(b)	State the advantages of hydrogen cooling in alternators. Explain radial and axial ventilation with the help of sketches.	**07**
		OR	
	(b)	Deduce an expression for the design of core for Square and cruciform sections also state the reason why circular coils are always preferred in comparison to rectangular coils.	**07**
Q.3	**(a)**	What are the types of windings commonly used in transformer and on what basis are they selected?	**07**
	(b)	Explain : a. Significance of cruciform core in transformer. b. Design difference between power & distribution transformer.	**07**
		OR	
Q.3	**(a)**	Explain various factors affecting selection of Numbers of armature slots for D.C. machine.	**07**
	(b)	Explain how eddy current loss occurs and derive an expression for eddy current loss in a magnetic material.	**07**
Q.4	**(a)**	Define specific magnetic loading (Bav) and specific electric loading (ac) and obtain an expression for the "output co-efficient for a d.c. machine.	**07**
	(b)	Explain the design procedure in the design of field windings for a D.C. shunt machine.	**07**
		OR	
Q.4	**(a)**	Explain the Real and Apparent flux densities.	**07**
	(b)	Explain radial and axial ventilation with the help of sketches. Give the advantages of hydrogen cooling in alternators.	**07**
Q.5	**(a)**	Discuss the factors that determine the choice of air-gap in induction motor.	**07**
	(b)	List and explain briefly the limitations being imposed in the design of electrical machines also discuss the modern trends in the design.	**07**
		OR	
Q.5	**(a)**	What are the types of windings commonly used in transformer and on what basis are they selected?	**07**
	(b)	Derive the condition for the optimum design of transformer for the minimum cost and minimum losses.	**07**

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