Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI • EXAMINATION – WINTER 2013

Subject Code: 160804 Date: 06-12-2013

Subject Name: Electrical Machine 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.**

Q.1	**(a)**	Derive 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)**	Explain radial and axial ventilation with the help of sketches. Give the advantages of hydrogen cooling in alternators.	**07**
	(b)	Define heating time constant and explain how it can be evaluated from heating curve.	**07**
		OR	
	(b)	Explain how eddy current loss occurs and derive an expression for eddy current loss in a magnetic material.	**07**
Q.3	**(a)**	Derive 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**
	(b)	Describe the various methods of cooling of transformers.	**07**
		OR	
Q.3	**(a)**	i)How are machines classified based on its ratings? Show the temperature variation for any one. (03) ii) What are the fundamental requirements of conducting materials? (04)	**07**
	(b)	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**
Q.4	**(a)**	What are the types of windings commonly used in transformer and on what basis are they selected?	**07**
	(b)	Derive the output equation of a single phase transformer.	**07**
		OR	
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 methods for the estimation of Mmf for the tapered teeth.	**07**
Q.5	**(a)**	Explain the design procedure in the design of field windings for a d.c. shunt machine	**07**
	(b)	i) What are the factors that affect the size of rotating machines? (04) ii) Mention various factors on which brush friction loss depends. (03)	**07**
Q.5	**(a)**	Discuss the factors that determine the choice of air-gap in induction motor.	**07**
	(b)	i) Mention the criteria for selecting rotor slots in an induction motor. (05) ii) Define stacking Factor.(02)	**07**

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