Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– VI• EXAMINATION–SUMMER 2015

Subject Code:160804 **Date:14/05/2015**

Subject Name: Electrical Machine Design

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.**

Q.1	**(a)**	Deduce the expression of m.m.f for the air gap of the armature for the slotting and ducting.	**07**
	(b)	Explain the factors affecting the choice of electrical loading.	**07**
Q.2	**(a)**	Explain the Real and Apparent flux densities.	**07**
	(b)	Derive the expression for the leakage permeance of parallel sided slot	**07**
		OR	
	(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.3	**(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)	Discuss the factors that determine the choice of air-gap in induction motor.	**07**
		OR	
Q.3	**(a)**	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**
	(b)	Define heating time constant and explain how it can be evaluated from heating curve.	**07**
Q.4	**(a)**	Derive the expression for the KVA rating of a three phase transformer and show that the e.m.f per turn $E_t = K\sqrt{KVA}$.	**07**
	(b)	Derive the condition for the optimum design of transformer for the minimum cost and minimum losses.	**07**
		OR	
Q.4	**(a)**	Explain the methods of estimation of motor rating for variable load drives.	**07**
	(b)	The temperature rise of a transformer is 25° after one hour and 37.5^{o} after two hours of starting from cold conditions. Calculate its final steady temperature rise and the heating time constant. If its temperature falls from the final steady value to 40° C in 1.5 hour when disconnected, calculate its cooling time constant. The ambient temperature is 30° C.	**07**
Q.5	**(a)**	What are the important considerations in choosing number of poles in d.c. machine?	**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)	Explain the methods for the estimation of Mmf for the tapered teeth.	**07**

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