Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

PDDC - SEMESTER–VIII • EXAMINATION – WINTER • 2014

Subject Code: X 80902 **Date: 01-12-2014**

Subject Name: Electrical Machine design I and II

Time: 02:30 pm - 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)**	For a transformer show that e.m.f. per turn Et = k√Q where Q = kVA rating. Explain how service condition of transformer affect the value of K.	**07**
	(b)	Explain various methods of Cooling of Transformer and rotating machines.	**07**
Q.2	**(a)**	State the factors to be considered while selecting the number of poles in the design of DC machine	**07**
	(b)	Explain the various factors that should be consider for designing power and distribution transformer.	**07**
		OR	
	(b)	Briefly discuss factors affecting determining air gap length in induction motor design.	**07**
Q.3	**(a)**	Explain detail design of the brushes and commutator for dc machine.	**07**
	(b)	Calculate the leakage reactance of a 50Hz, transformer with the following data: Mean length of primary turn = 1.2 m, No of primary turns= 500, Mean length of secondary turns= 1.0 m, No of secondary turns = 20, Thickness of the each winding=0.025m, width of the duct=0.014m, Height of each winding = 0.60m.	**07**
		OR	
Q.3	**(a)**	What do you mean by specific electric loading applied to electric machines? State the factors on which the choice of these loadings depends.	**07**
	(b)	Explain methods of Improving starting torque of Induction Motor.	**07**
Q.4	**(a)**	Explain the term SCR and its effects on synchronous machine performance	**07**
	(b)	Explain the terms “critical speed” and “run away speed” with reference to synchronous machine.	**07**
		OR	
Q.4	**(a)**	What is Dispersion coefficient? Explain the effect of Dispersion coefficient on maximum output power factor.	**07**
	(b)	Find the suitable no of poles and the diameter of the core of a 400 KW 550 volt , 180 RPM, d.c. generator having 92% efficiency. Assume an average flux density in the air gap of about 0.6 wb/m^2 and ampere conductor per meter to be 35000	**07**
Q.5	**(a)**	State important design difference between turbo alternators and hydro generators.	**07**
	(b)	Find the current in the bars and end rings of a cage rotor of a 6 pole 3 phase, induction motor having 72 stator slots with 15 conductors in each slot if the stator current per phase is 20 A and rotor slots are 55. Hence find the suitable size of the cage bars and end rings.	**07**
		OR	
Q.5	**(a)**	State the rules for the selection of rotor slots. Describe the methods for reducing the effect of harmonics torque.	**07**
	(b)	Discuss the role of damper winding in synchronous motor.	**07**

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