Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

B. E. - SEMESTER – VI • EXAMINATION – WINTER 2012

Subject code: 160901 Date: 02/01/2013

Subject Name: Electrical Machine - III

Time: 02.30 pm - 05.00 pm Total Marks: 70

Instructions:

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

Q.1	**(a)**	What are the causes of harmonics in the voltage waveform of an alternator? How can these be minimized?	**07**
	(b)	Explain an experimental method of determining 'V' curves for a synchronous motor.	**07**
Q.2	**(a)**	Describe slip test for determining X_d and X_q of salient pole synchronous machine . Draw circuit diagram.	**07**
	(b)	Draw experimental setup diagram of Brake test for DC motor and write its efficiency equation.	**07**
		OR	
	(b)	In a Hopkinson's test on a pair of 500 V, 100 KW shunt generators, the following data was obtained : Auxiliary supply, 30 A at 500 V : Generator output current is 200 A Field currents, 3.5 A and 1.8 A. Armature circuit resistances 0.075 Ω each machine. Voltage drop at brushes 2 V (each machine) Calculate the efficiency of the machine acting as a generator.,	**07**
Q.3	**(a)**	Explain the effect of varying the excitation and torque of the prime-mover of synchronous machine connected to infinite bus-bar.	**07**
	(b)	State the condition and explain dark lamp method of synchronizing of an alternator with busbar.	**07**
		OR	
Q.3	**(a)**	Explain concept of pitch factor and distribution factor in case of an alternator. How these values change with harmonics. Also explain how e.m.f. in alternator can be evaluated when it contains non sinusoidal variation of fluxes.	**07**
	(b)	Explain the principles of operation of DC servo motor and PM synchronous motor.	**07**
Q.4	**(a)**	Explain concept of "Two reaction theory" used for the analysis of a salient pole synchronous machine.	**07**
	(b)	A 60- KVA, 220 V, 50 Hz, single phase alternator has effective armature resistance of 0.016 Ω and an armature leakage reactance of 0.07 Ω. Compute the voltage induced in the armature when the alternator is delivering rated current at a load p.f. of (a) unity (b) 0.7 lagging (c) 0.7 leading.	**07**
		OR	
Q.4	**(a)**	What do you mean by 'Synchronous reactance' in syn. Machine? Explain why the synchronous impedance method gives a regulation that is higher than the actual value in case of syn. Generator.	**07**
	(b)	List different methods for finding voltage regulation of an alternator and explain ZPF method.	**07**
Q.5	**(a)**	Explain circle diagram of auto synchronous motor.	**07**
	(b)	Explain three phase induction regulator.	**07**
		OR	
Q.5	**(a)**	Explain the operation of A.C. servo motor.	**07**
	(b)	Explain construction, working & applications of switched reluctance motor	**07**

****