Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI • EXAMINATION – WINTER • 2014

Subject Code: 160901 **Date: 26-11-2014**

Subject Name: Electrical Machine - III

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)**	Explain Hopkinson's test for determination of efficiency of DC shunt machine.	**07**
	(b)	A 3 phase, 8 pole, 750 rpm, star connected alternator has 72 slots, on the armature. Each slot has 12 conductors and winding is shorted by 2 slots. Find the pitch factor and distribution factor for the winding and calculate the induced e.m.f. between the lines if the flux per pole is 0.06 webers.	**07**
Q.2	**(a)**	Why synchronous motor is not self starting? Explain the methods of starting of synchronous motor.	**07**
	(b)	List different methods for finding voltage regulation of an alternator and explain any one method.	**07**
		OR	
	(b)	Explain Armature reaction and its effects at different power factor in Alternator.	**07**
Q.3	**(a)**	A 3 phase star connected 1000KVA, 11000V alternator has rated current of 52.5 A. The ac resistance of the winding per phase is 0.45 ohm. The test results are given below: O.C. Test: field current = 12.5 A, voltage between lines = 422 V S.C. Test : field current = 12.5A, line current = 52.5A Determine the full load voltage regulation of the alternator for (i) 0.8 p.f. lagging and (ii) 0.8 p.f. leading loads by synchronous impedance method.	**07**
	(b)	Explain the slip test for measurement of X_d and X_q of synchronous machines.	**07**
		OR	
Q.3	**(a)**	Explain brake test for DC machine.	**07**
	(b)	Explain the two reaction theory of salient pole machine in detail with phasor diagram.	**07**
Q.4	**(a)**	State the conditions necessary for paralleling alternators. Explain one dark and two bright lamp method with necessary electrical circuit diagram.	**07**
	(b)	Derive the expression for the input and output power developed by synchronous motor. Also derive the maximum input and output power developed by synchronous motor.	**07**
		OR	
Q.4	**(a)**	Explain V and inverted V curve of synchronous motor.	**07**
	(b)	A 3.5 MVA, 3-phase synchronous generator rated at 6.6 KV has 32 poles. Its direct and quadrature axis synchronous reactance as measured by the slip test are 9.6 Ω and 6 Ω respectively. Neglecting armature resistance, determine the regulation and excitation emf needed to maintain 6.6 KV at the terminals when supplying a load of 2.5 MW at 0.8 p.f. lagging. What maximum power can generator supply at the rated terminal voltage, if the field becomes open circuited?	**07**
Q.5	**(a)**	Explain 3 phase induction regulator.	**07**
	(b)	Write short note on Auto Synchronous motor.	**07**
		OR	

Q.5	**(a)**	Explain the operation of d.c. servo motor	**07**
	(b)	Explain construction, working & applications of switched reluctance motor.	**07**

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