Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI • EXAMINATION – SUMMER • 2014

Subject Code: 160901 **Date: 19-05-2014**

Subject Name: Electrical Machine - III

Time: 10:30 am - 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)**	Explain concept of pitch factor and distribution factor in case of an alternator. How these values change with harmonics.	**04**
	(b)	Explain hunting in synchronous machine.	**03**
	(c)	A 3-phase star connected 2300V, 50 Hz, alternator has armature resistance of 0.2 ohm. A field current of 35 A produces currents of 150 A on short circuit and an open circuit emf of 780 V line. Determine the full load voltage regulation with for full load current of 25 A. (i) 0.8 p.f. lagging load (ii) 0.8 p.f. leading load	**07**
Q.2	**(a)**	List different methods for finding voltage regulation of an alternator and explain Potier method.	**07**
	(b)	Calculate the r.m.s. value of the induced emf/phase of a 10-pole, 3-phase, 50 Hz, star connected alternator with 2 slots per pole per phase and 4 conductors per slot in two layers. The coil span is 150 degree. The flux per pole has a fundamental component of 0.12 Wb and 20% third harmonic component.	**07**
		OR	
	(b)	Explain Armature reaction and its effects at different power factor in alternator.	**07**
Q.3	**(a)**	Draw experimental setup diagram of Brake test for DC motor and write its efficiency equation.	**07**
	(b)	I-Φ, 1500 rpm, 4 pole alternator has 8 conductors per slot with total 24 slots. The winding is short pitched by $1/6^{th}$ of full pitch. If the flux per pole is 0.05 wb then find out induced emf.	**07**
		OR	
Q.3	**(a)**	Two identical DC machines when tested by Hopkinson's test gave the following test results: Field currents are 5 Amp and 4.2 Amp Line voltage is 250V. Line current including both the field currents is 50Amp. Motor armature current is 380 A. The armature resistance of each machine is 0.02 ohm. Calculate the efficiency of both machines.	**07**
	(b)	Explain the field's test for D.C. series motor.	**07**
Q.4	**(a)**	State the conditions necessary for paralleling alternators. Explain one dark and two bright lamp methods with necessary electrical circuit diagram.	**07**
	(b)	Explain why synchronous motor is not self starting and explain methods of starting in brief.	**07**
		OR	
Q.4	**(a)**	Explain three phase induction regulator.	**07**
Q.4	**(b)**	Explain "V" curves and inverted "V" curves for synchronous motor.	**07**
Q.5	**(a)**	Explain construction, working & applications of switched reluctance motor.	**07**
	(b)	Short Note : Auto synchronous motor.	**07**
		OR	
Q.5	**(a)**	Explain the two reaction theory of salient pole synchronous machine.	**07**
	(b)	Explain the operation of D.C. servo Motor	**07**

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