Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–III • EXAMINATION – SUMMER • 2014

Subject Code: 130904 **Date: 28-05-2014**

Subject Name: Electrical Machines-I

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 working principle and derive generated e.m.f equation of d.c. Generator.	**07**
	(b)	A 4-pole, lap-wound, d.c. shunt generator has a useful flux per pole of 0.07Wb.The armature winding consists of 220 turns of 0.004 Ω resistance. Calculate the terminal voltage when running at 900 if armature current is 50 A.	**07**
Q.2	**(a)**	Explain significance of Back e.m.f., state voltage equation, power stages with different losses, and derive condition for maximum power developed for d.c. motor.	**07**
	(b)	Derive the expression of armature torque developed in a dc motor using standard notations. Draw the speed-torque characteristics of shunt, series and compound motors	**07**
		OR	
	(b)	Explain the internal and external characteristic of d.c shunt generator.	**07**
Q.3	**(a)**	Give classification of A.C. motors. Describe construction of Three phase Squirrel cage Induction motor with diagram.	**07**
	(b)	Obtain an expression for the condition of maximum torque of an induction motor. Sketch and explain torque-slip curves for several values of rotor resistance and indicate the condition for maximum torque to be obtained at starting.	**07**
		OR	
Q.3	**(a)**	Explain general principle of Induction motor and describe how rotor rotates when three phase supply is given to three phase induction motor.	**07**
	(b)	In case of an 8-pole induction motor, the supply frequency was 50Hz.and the shaft speed was 735 r.p.m. What were the magnitudes of following? (i) Synchronous speed. (ii) Slip speed. (iii) Percentage slip (iv) the frequency of induced current in the rotor. (v) The frequency of rotor current at standstill.(vi) speed of rotor when slip is 0.04.	**07**
Q.4	**(a)**	Explain indirect test method for determination of voltage regulation and efficiency of a single phase transformer with necessary diagram.	**07**
	(b)	In no-load test of single phase transformer, the following test data were obtained. Primary voltage: 230V; Secondary voltage: 115V; Primary current: 0.5A; Power input: 40W. Find. (i) turn ratio (ii) Magnetizing component of no load current (iii) working component (iv) the iron losses. Resistance of primary winding is0.5Ω.	**07**
		OR	
Q.4	**(a)**	Discuss conditions for parallel operation of two single phase transformers.	**07**
	(b)	The efficiency of a 1000-KVA,110/220V,50Hz,single-phase transformer, is 97.5% at half-full load at 0.8 power factor leading and 98%at full load unity p.f. Determine iron loss and full-load cu losses.	**07**
Q.5	**(a)**	Explain synchronization of alternators with necessary conditions. Give any one	**07**

method in detail.

	(b)	Describe basic concept of alternator. Define and explain (i) Distribution factor (ii) Pitch factor	**07**

OR

Q.5	**(a)**	Find the no load phase and line voltage of a star –connected 3-ph, 6 pole alternator which runs at 1200 rpm. Having flux per pole of 0.1 Wb sinusoidally distributed. Its stator has 54 slots having double layer winding. Each coil has 8 turns and the coil is short pitched by 1 slot.	**07**
	(b)	Explain the necessity of starter for D.C. Motor. Discuss three point starter for D.C. Motor.	**07**

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