Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – II • EXAMINATION – WINTER • 2014

Subject code: 1720701 **Date: 02-12-2014**

Subject Name: Advanced Electrical Machines

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 of BLDC machine. Explain unipolar and bipolar drive circuits used for BLDC machine.	**07**
	(b)	Compare BLDC and conventional dc motors. Explain Axial flux and radial flux motors	**07**
Q.2	**(a)**	Explain energy relationship in electromechanical system. Derive the expression for energy stored in a magnetic field. Also define energy and co-energy.	**07**
	(b)	Explain the working, construction of Linear Induction Motor. Compare LIM and 3-phase induction motor	**07**
		OR	
	(b)	The number of stator pole and rotor pole in a switched reluctance motor are not same. Justify. State the merits and demerits of SRM.	**07**
Q.3	**(a)**	Discuss various types of stepper motors.	**07**
	(b)	Explain concept of micro-stepping control of a stepper motor. A single-stack, 8-phase (stator) multipole, stepper motor has 6 rotor teeth. The phases are excited one at a time. Determine (a) step size, (b) steps per revolution, (c) speed, if the excitation frequency is 120 Hz.	**07**
		OR	
Q.3	**(a)**	Develop a T equivalent circuit with one coil as the reference coil in magnetically coupled circuits.	**07**
	(b)	Carry out transformation of a balanced set from (a, b, c) to (d, q, 0) reference frame.	**07**
Q.4	**(a)**	If f_{as} = cos t, f_{bs} = ½ t and f_{cs} = -sin t. Carry out transformation to find out f_{qs}, f_{ds} and f_{0s}. Assume Ø(0) = -´ /12 and ɤ = 1rad/sec for t = ´ /3.	**07**
	(b)	Discuss the basic concepts of energy efficient motor. State its advantages.	**07**
		OR	
Q.4	**(a)**	Compare wind mill generator with synchronous generator. State the significance of capacitor bank in a Squirrel cage induction generator when connected to an isolated load.	**07**
	(b)	Discuss methods to compensate reactive power in wind mill generator.	**07**
Q.5	**(a)**	Explain direct saving and pay back analysis of energy efficient motor.	**07**
	(b)	Discuss fault detection and diagnosis techniques for transformer.	**07**
		OR	
Q.5	**(a)**	Discuss various root causes and failures of electrical rotating machines. Also discuss condition monitoring that can help in diagnosis.	**07**
	(b)	Define the terms (i) Pull-out torque, (ii) Pull-in torque, (iii) Pull-in rate, (iv) Pull-out rate, (v) Response range, (vi) Slewing range and (vii) Synchronism, in a stepper motor.	**07**

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