Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

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

Subject code: 1724504 **Date: 20-06-2014**

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)**	Discuss the construction and working of a Brushless DC motor. State its applications.	**07**
	(b)	Compare conventional DC machine and Brushless DC Machine.	**07**
Q.2	**(a)**	Define step angle in a stepper motor. Explain in brief construction and working of hybrid stepper motor.	**07**
	(b)	Explain concept of micro stepping control of stepper motor.	**07**
		OR	
	(b)	Define the terms for stepper motor : (i) Detente torque, (ii) Holding torque, (iii) Pull in torque, (iv) Slewing range, (v) Pull out torque, (vi) Response range	**07**
Q.3	**(a)**	Derive expression of total energy supplied to the coupling field for electromechanical system with magnetic and electric field.	**07**
	(b)	Derive voltage equation to represent two magnetically coupled circuits with leakage. Assume magnetic system to be linear. Draw equivalent T circuit with coil 1 as reference coil.	**07**
		OR	
Q.3	**(a)**	Derive the expression for winding inductances and voltage of an induction machine. Mention assumptions made for derivation.	**07**
	(b)	Carry out transformation of a balanced set from (a,b,c) to (d,q,0) reference frame.	**07**
Q.4	**(a)**	Explain electromechanical energy conversion in S.R.M.	**07**
	(b)	Discuss direct saving and pay back analysis of energy efficient motor.	**07**
		OR	
Q.4	**(a)**	With proper diagram explains the working of bifilar type converter used for S.R.M.	**07**
	(b)	Explain the concept of energy efficient motor. Explain various efficiency evaluation techniques.	**07**
Q.5	**(a)**	Explain fault detection and diagnosis technique for 3 phase induction motor.	**07**
	(b)	Discuss the construction and working of a linear induction motor. Compare the conventional Induction motor and Linear induction motor.	**07**
		OR	
Q.5	**(a)**	Discuss typical root causes and failure modes of electrical machines. How condition monitoring can help in diagnosis of machine health.	**07**
	(b)	Discuss various static methods to compensate reactive power.	**07**

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