Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – III • EXAMINATION – WINTER • 2013

Subject code: 1724504 **Date: 31-12-2013**

Subject Name: Advanced Electrical Machines

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)**	Discuss reactive power compensation of wind mill generator.	**07**
	(b)	Discuss the basic concepts of energy efficient motor.	**07**
Q.2	**(a)**	Discuss converter fed BLDC drive. Discuss performance for 120°conduction period.	**07**
	(b)	Explain micro stepping control of a stepper motor. Compare variable reluctance, permanent magnet and hybrid step motors.	**07**
		OR	
	(b)	Explain in brief construction and working principle of hybrid stepper motor.	**07**
Q.3	**(a)**	Explain Asymmetric bridge converter used for S.R.M.	**07**
	(b)	Derive winding inductances and voltage equations for induction machines. Mention assumptions made for derivation.	**07**
		OR	
Q.3	**(a)**	How linear induction machine is different than conventional induction machine? State the Advantage and Disadvantage.	**07**
	(b)	Explain Bifilar Winding Type Converter used for S.R.M With proper diagram explains the working of (n+1) Converter used for S.R.M.	**07**
Q.4	**(a)**	Derive expression of total energy supplied to the coupling field for electromechanical system with magnetic and electric field.	**07**
	(b)	Define (i) Détente torque, (ii) start-stop mode, (iii) slewing mode, (iv) pull-in-torque in a stepper motor.	**07**
		OR	
Q.4	**(a)**	Compare VR, permanent magnet and hybrid step motor characteristics based on step angle, phases, drive type and rotor inertia.	**07**
	(b)	Determine the expression for f_{as}, f_{ds} and f_{os} for $f_{as} = \sin(t)$, $f_{bs} = t$, $f_{cs} = -\cos(t)$, assume $\theta(0) = -\pi/2$ and $\omega = 1$ rad/sec, for $t = \pi/6$.	**07**
Q.5	**(a)**	Draw and explain the schematic diagram for the closed loop control of BLDC drives for position control.	**07**
	(b)	Discuss fault detection and diagnosis technique for transformer.	**07**
		OR	
Q.5	**(a)**	Explain the working principle of BLDC machine. Explain difference between BLDC machine and synchronous machine.	**07**
	(b)	How condition monitoring can help in diagnosis of machine health.	**07**

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