Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – II • EXAMINATION – SUMMER • 2013

Subject code: 1724504 **Date: 03-06-2013**

Subject Name: Advance 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)**	Explain construction and principle of operation of Permanent Magnet Hybrid Stepper Motor. Draw static characteristics of PMH stepper motor (both torque-angle and torque-current).	**07**
	(b	With help of suitable block diagram, explain closed loop control of a Brushless DC motor with voltage-fed inverter.	**07**
Q.2	**(a)**	Describe various types of stepper motor.	**07**
	(b)	Define following terms for a stepper motor: micro-stepping, holding torque, detent torque, pull in torque, pull out torque, slew rate, step position error, step angle.	**07**
		OR	
	(b)	Compare radial and axial permanent magnet BLDC motors.	**07**
Q.3	**(a)**	Briefly explain switched reluctance motor control scheme using asymmetric bridge converter.	**07**
	(b)	Illustrate principle of operation of a linear induction motor and its applications.	**07**
		OR	
Q.3	**(a)**	Compare direct measurement method with loss segregate method of efficiency evaluation of a motor.	**07**
	(b)	Define condition monitoring. How it is beneficial for electrical assets?	**07**
Q.4	**(a)**	How wind mill generator differs from a synchronous alternator?	**07**
	(b)	Illustrate fault detection and diagnosis techniques used for transformer.	**07**
		OR	
Q.4	**(a)**	How an energy efficiency motor differs from standard motor.	**07**
	(b)	In a factory a 4-pole, 400V, 3-phase, 37.38 H.P. Induction motor is operated for 16 hrs per day and 325 days per year at full load. The electricity tariff rate is Rs. 1.80/kWh. Take rate of interest and depreciation @12%. Determine: a. Saving in the cost of energy by use of EEM, b. Pay-back period in months, c. ROI (Return on investment).	**07**
Q.5	**(a)**	Derive relation between Magnetic Field Energy and Mechanical Force considering non-linearity of magnetic core.	**07**
	(b)	Transform stationary variable the rotating reference frame for an inductive element.	**07**
		OR	
Q.5		Write short notes on:	
	(a)	Equation of transformation in reference frame theory.	**07**
	(b)	Magnetically coupled circuits.	**07**

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