Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M.E –IIst SEMESTER–EXAMINATION – JULY- 2012

Subject code: 1720701 Date: 06/07/2012

Subject Name: Advanced Electrical Machines

Time: 10:30 am – 13:00 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)**	Compare conventional dc machine and brushless dc machine. Explain working of a brushless dc motor.	**07**
	(b)	Explain micro stepping control of a stepper motor. Compare variable reluctance, permanent magnet and hybrid step motors.	**07**
Q.2	**(a)**	Compare the axial and radial types of permanent magnet motors. Discuss any one type of power controller of a brushless dc motor.	**07**
	(b)	Define step angle in a stepper motor. Explain in brief construction and working of hybrid stepper motor.	**07**
		OR	
	(b)	Explain construction and working of a switched reluctance motor with one power converter for its operation.	**07**
Q.3	**(a)**	Define (i) Détente torque, (ii) start-stop mode, (iii) slewing mode, (iv) pull-in-torque in a stepper motor	**08**
	(b)	The stator and rotor poles of a switched reluctance motor are not same. Justify. Also discuss the merits and demerits of SRM.	**06**
		OR	
Q.3	**(a)**	Define energy and co-energy in an electromechanical energy conversion. Derive the expression for the field energy in terms of system variables.	**07**
	(b)	Derive the expression for winding inductances and voltage of an induction machine.	**07**
Q.4	**(a)**	Discuss the basic concepts of energy efficient motor.	**07**
	(b)	Explain salient points of a linear induction motor, its construction and applications.	**07**
		OR	
Q.4	**(a)**	Explain direct saving and pay back analysis of energy efficient motor.	**07**
Q.4	**(b)**	State different types of wind mill generators. Compare conventional synchronous generator and induction generator.	**07**
Q.5	**(a)**	Discuss various static methods to compensate reactive power.	**07**
	(b)	What is significance of transformation equations in a reference –frame theory? Derive the relation $P_{qdos} = P_{abcs} = 3/2(v_{qs}i_{qs} + v_{ds}i_{ds} + 2v_{os}i_{os})$	**07**
		OR	
Q.5	**(a)**	Carry out transformation of a balanced set from (a,b,c) to (d,q,0) reference frame.	**07**
	(b)	Determine the expression for f_{qs}, f_{ds} and f_{os}, if $f_{as} = \cos t$, $f_{bs} = t$ and $f_{cs} = -\sin t$. Assume that $\theta(0) = -\pi/12$, $\omega = 1$ rad/s and $t = \pi/3$ s.	**07**

****