Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE – SEMESTER V • EXAMINATION – WINTER - 2012

Subject code: 152001 Date: 11-01-2013

Subject Name: Electromechanical Energy Conversion

Time: 02:30 pm to 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 various types of magnetic materials.	**07**
	(b)	Explain flux of an electric field through a surface.	**07**
Q.2	**(a)**	Explain various effects of air gap in ferromagnetic circuits.	**07**
	(b)	Derive the expression for magnetic field due to current in straight wire	**07**
		OR	
	(b)	State and explain Ampere's and Biot-Savart's law.	**07**
Q.3	**(a)**	Explain energy stored in capacitor and energy density in electric field with suitable expressions	**07**
	(b)	Derive the equation for the force density of attraction of the magnetic field on the armature	**07**
		OR	
Q.3	**(a)**	Write a short note on electromagnet.	**07**
	(b)	A steel ring has a mean diameter of 20 cm and a cross section of 25 cm^2 and a radial air gap of 0.8 mm is cut across it. When excited by a current of 1 A through a coil of 1000 turns wound on the ring, it produces an air gap flux of 1 mWb. Neglecting leakage and firing, calculate relative permeability of steel and total reluctance of the magnetic circuit.	**07**
Q.4	**(a)**	Explain working of an induction motor with suitable diagrams.	**07**
	(b)	Explain construction & working of an elementary generator.	**07**
		OR	
Q.4	**(a)**	What do you mean by rotating magnetic field? Explain the rotating magnetic field in three phase A.C. motor with necessary diagrams.	**07**
	(b)	Explain magnetization characteristics of DC machine.	**07**
Q.5	**(a)**	Explain: Self excited D.C. generator and separately excited D.C. generator.	**07**
	(b)	Explain reluctance motor.	**07**
		OR	
Q.5	**(a)**	Why single phase induction motor is not self started? Explain the methods used to start the single phase induction motor in brief.	**07**
	(b)	Discuss the synchronous machine (from construction and working point of view).	**07**

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