Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY
BE SEM-IV Examination-Nov/Dec-2011

Subject code: 142401 **Date: 25/11/2011**

Subject Name: Electro Mechanical Energy Conversion-I

Time: 02.30 pm -5.00 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)**	Give the classification of dc generators. Derive E.M.F. equation of simplex wave-wound and simplex lap-wound generators.	**07**
	(b)	Explain the voltage build up a dc shunt generator. List the conditions for build up of a shunt generator.	**07**
Q.2	**(a)**	Explain the working principle of dc motor. Explain the significance of back E.M.F. Derive equation for armature torque of a dc motor.	**07**
	(b)	Explain the Ta / Ia, N / Ia, and N / Ta characteristics of dc series and dc shunt motor.	**07**
		OR	
	(b)	Explain the Swinburne's test. Derive equations of efficiency for motoring and generating mode. List advantages and disadvantages of the test.	**07**
Q.3	**(a)**	Explain the torque-slip characteristics of the 3-Φ induction motor. Describe the effect of change in the supply voltage and frequency on the torque and speed of the motor.	**07**
	(b)	Derive the equation for the torque of the 3-Φ induction motor under running conditions. Derive the condition for the maximum torque under running conditions.	**07**
		OR	
Q.3	**(a)**	Explain star-delta starter of 3-Φ induction motor with neat diagram.	**07**
	(b)	Explain the general principle of 3-Φ induction motor. Give detailed classification of A.C. motors. List advantages and disadvantages of 3-Φ induction motor.	**07**
Q.4	**(a)**	Explain the basic theory of an ideal 1-Φ transformer. Derive E.M.F. equation for it.	**07**
	(b)	Explain the O.C. and S.C. test of 1-Φ transformer.	**07**
		OR	
Q.4	**(a)**	Draw the vector diagrams of 1-Φ transformer considering the effect of winding resistance and leakage reactance.	**07**
	(b)	Explain different losses occurring in the 1-Φ transformer. Derive the condition for the maximum efficiency.	**07**
Q.5	**(a)**	Explain the parallel operation of 3-Φ alternators in detail.	**07**
	(b)	Explain the linear induction motor and magnetic levitation.	**07**
		OR	
Q.5	**(a)**	Explain the synchronous impedance and ampere-turn methods of finding the regulation of 3-Φ alternators.	**07**
	(b)	List the advantages of servo motors. Explain 2-Φ ac servo motor with neat diagrams.	**07**

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