Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME - SEMESTER– II(New course) • EXAMINATION (Remedial) – WINTER- 2015

Subject Code: 2720715 **Date: 09/12/2015**

Subject Name: Electrical Machine Modeling and Analysis

Time:2:30 pm to 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)**	Discuss block diagram of typical electromechanical system. Explain energy balance in such systems.	**07**
	(b)	Define energy and co-energy in an electromechanical energy conversion. Derive the expression for the field energy in terms of system variables.	**07**
Q.2	**(a)**	Explain the modeling of electromechanical energy conversion takes place in electromagnetic circuit	**07**
	(b)	Discuss the suitability of different frames of references for IM in power system studies	**07**
		OR	
	(b)	Which are the commonly used reference frames & explain in brief how transformation takes places between reference frames.	**07**
Q.3	**(a)**	Derive voltage equations for Synchronous machine in rotor reference frame.	**07**
	(b)	Discuss the need of dynamic modeling of IM, the necessary assumptions and approximations. Also discuss the shortcoming of the IM dynamic model from view point of losses	**07**
		OR	
Q.3	**(a)**	Derive winding inductances and voltage equations for a 3 phase induction motor Mention assumptions made for derivation.	**07**
	(b)	Derive torque equations for Synchronous machine in rotor reference frame.	**07**
Q.4	**(a)**	Obtain the expression of torque for a three phase dynamic model of IM in terms of stator and rotor Flux Linkages in stationary reference frame	**07**
	(b)	Exp lain in brief the procedure of linearization of machine equations	**07**
		OR	
Q.4	**(a)**	Develop the mathematical model of Induction Motor in arbitrary reference frame. Support your answer with necessary diagrams and equations.	**07**
	(b)	Derive the voltage equation in arbitrary reference frame variables of a synchronous machine.	**07**
Q.5	**(a)**	Analysis the 3 phase induction motor performance when a three phase fault occurs at the machine terminals using dynamic model	**07**
	(b)	Derive the voltage equation in rotor reference frame variable of BLDC Machine	**07**
		OR	
Q.5	**(a)**	Analysis the Synchronous machine performance when a three phase fault occurs at the machine terminals using dynamic model	**07**
	(b)	Derive the torque equation in machine variables of PMBLDC machine.	**07**

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