Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME – SEMESTER III (NEW) – • EXAMINATION – SUMMER 2016

Subject Code: 2730706 **Date:03/05/2016**

Subject Name: Power System Dynamics and Control

Time:10:30 am to 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)**	Describe the steps for calculating initial conditions of a synchronous generator. Consider a detailed generator model (2.2 model).	**07**
	(b)	Derive the equation of instantaneous electromagnetic torque (T_e), for a synchronous machine, in terms of 'd-q' variables in rotor reference frame.	**07**
Q.2	**(a)**	Briefly describe Park's transformation and explain its importance in power system modeling and analysis.	**07**
	(b)	Write a short note on Hopf bifurcation.	**07**
		OR	
	(b)	Derive the relation between the 'D-Q-0' parameters in synchronous reference frame and 'd-q-0' parameters in rotor reference frame for a synchronous machine.	**07**
Q.3	**(a)**	Explain in detail the types of load models used in power system analysis.	**07**
	(b)	Write a short note on transmission line model using alpha-beta variables.	**07**
		OR	
Q.3	**(a)**	What do you mean by small signal analysis of a system? What are its advantages and limitations in comparison to simulation of a system?	**07**
	(b)	Draw the schematic diagram and explain Power System Stabilizer (PSS).	**07**
Q.4	**(a)**	Draw and explain the functional block diagram of excitation control system.	**07**
	(b)	Briefly describe Sub-Synchronous Resonance (SSR) and explain any one SSR mitigation technique	**07**
		OR	
Q.4	**(a)**	Explain the model of cross compound single reheat steam turbine with necessary schematic diagram.	**07**
	(b)	Draw block diagram of SVC controller and explain the control characteristic of SVC.	**07**
Q.5	**(a)**	Briefly describe transient voltage instability and long term voltage instability.	**07**
	(b)	Explain the transient stability improvement by series capacitor insertion.	**07**
		OR	
Q.5	**(a)**	State the common assumptions in dynamic analysis of a multi machine system. Develop a simplified system model for the same.	**07**
	(b)	Draw the single line diagram of a Single Machine Infinite Bus (SMIB) system and explain its dynamic model.	**07**

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