Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII EXAMINATION – SUMMER 2025

Subject Code:3170915 Date:23-05-2025

Subject Name:Power System Dynamics and Control

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.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	Describe the significance of Park's transformation.	**03**
	(b)	What is the main purpose of the power system dynamics study?	**04**
	(c)	Draw general functional block diagram of an excitation control system and explain the function of each block.	**07**
Q.2	**(a)**	Define power system stabilizer.	**03**
	(b)	Distinguish between steady state and transient stability of power system network	**04**
	(c)	Explain general model for speed governor for steam turbine using block diagram.	**07**
		OR	
	(c)	Derive the swing equation of a single generator connected to infinite bus in per unit form.	**07**
Q.3	**(a)**	State basic assumptions made in steady state analysis of an alternator	**03**
	(b)	Draw the systematic diagram for 3phase synchronous machine.	**04**
	(c)	Briefly describe the phenomenon of Sub-Synchronous Resonance. Describe any two techniques for SSR mitigation.	**07**
		OR	
Q.3	**(a)**	Describe the classification of load models used in power system.	**03**
	(b)	Express in detail Transient Analysis of a Synchronous Machine	**04**
	(c)	Describe in detail transmission line modeling by D-Q transformation using α-β variables.	**07**
Q.4	**(a)**	Write the preference of using per unit system for modeling of synchronous machine	**03**
	(b)	Briefly explain the procedure of small signal analysis	**04**
	(c)	Define the Classification of stability and Explain with neat diagrams about voltage stability	**07**
		OR	
Q.4	**(a)**	What is the reason for considering load as a constant impedance model?	**03**
	(b)	Express the stator voltage equation in dq-axis.	**04**
	(c)	Briefly explain Equivalent Circuits of Synchronous Machine with the determination of Parameters of Equivalent Circuits	**07**
Q.5	**(a)**	Mention the common assumptions in transient analysis of a multi-machine system.	**03**
	(b)	Draw the control characteristic and briefly explain the Static Var Compensator.	**04**
	(c)	Briefly explain: Dynamic Braking.	**07**

OR

Q.5	**(a)**	Demonstrate the application of Model 1.1.	**03**
	(b)	Describe the steps for calculating initial conditions of a synchronous generator.	**04**
	(c)	Illustrate the equal area criterion for single machine infinite bus system with the help of power angle curves. State the assumptions used in it.	**07**

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