Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–VII (NEW) EXAMINATION – WINTER 2024

Subject Code:3170915 Date:11-12-2024

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

			Marks
Q.1	**(a)**	Write the advantages of using per unit system for modelling of synchronous machine.	**03**
	(b)	Define steady state stability and transient stability.	**04**
	(c)	With the help of a neat block diagram, explain different operating states of a typical power system network.	**07**
Q.2	**(a)**	What is the primary objective of studying power system dynamics?	**03**
	(b)	State the assumptions made in classical model of the synchronous generator in steady state stability analysis.	**04**
	(c)	Derive the swing equation of a single generator connected to infinite bus in per unit form.	**07**
		OR	
	(c)	Draw general functional block diagram of an excitation control system and explain the function of each block.	**07**
Q.3	**(a)**	Discuss with reasons: Load are modelled as constant impedance in stability studies.	**03**
	(b)	Briefly discuss short circuit tests of synchronous machine.	**04**
	(c)	Explain the equal area criterion for single machine infinite bus system with the help of power angle curves.	**07**
		OR	
Q.3	**(a)**	What is meant by speed governing system?	**03**
	(b)	Explain power invariant form of park's transformation.	**04**
	(c)	Explain general model for speed governor for steam turbine using neat block diagram.	**07**
Q.4	**(a)**	Sketch the schematic representation of a three-phase synchronous generator.	**03**
	(b)	Explain modelling of transmission network using π equivalent circuit.	**04**
	(c)	Briefly explain Park's transformation and mention its importance for power system modeling and analysis.	**07**
		OR	
Q.4	**(a)**	What is the basic function of power system stabilizer?	**03**
	(b)	Express the stator voltage equation in dq-axis.	**04**
	(c)	Explain the static load representation in electrical power systems, incorporating its mathematical formulation.	**07**
Q.5	**(a)**	State the assumptions made in derivation of the basic equation of a synchronous machine.	**03**
	(b)	List various models of synchronous machine based on the windings used in dq-axis.	**04**
	(c)	Explain the steps for calculating initial conditions of a synchronous generator with phasor diagram.	**07**

OR

Q.5	**(a)**	What are the types of excitation systems?	**03**
	(b)	What specific base quantities are typically selected for the per unit conversion of stator dq-winding quantities in synchronous machines?	**04**
	(c)	Explain transmission line modeling by D-Q transformation using α-β variables.	**07**

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