Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VIII (OLD) EXAMINATION – WINTER 2023

Subject Code:2180909 Date:08-12-2023

Subject Name: Power System Operation 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)**	What are objective of Automatic Generator Control	**03**
	(b)	Discuss concept of blackout.	**04**
	(c)	Design an optimal load frequency controller for a two-area system.	**07**
Q.2	**(a)**	Explain Free governor operation.	**03**
	(b)	List practical aspects for describing the reactive power flow problem in voltage collapse.	**04**
	(c)	A 100 MVA synchronous generator operates on full load at frequency of 50 Hz. The load is suddenly reduced to 50 MW. Due to time lag in governor system, the steam valve begins to close after 0.4 seconds. Determine the change in frequency that occurs in this time.	**07**
		OR	
	(c)	Two generating units rated for 300 MW and 400 MW has governor speed regulation of 6.0 and 4.0 percent from no-load to full load, respectively. They are operating in parallel and share a load of 600 MW. Assuming free governor action, determine the load shared by each unit	**07**
Q.3	**(a)**	Write short note on sensitivity factors used in security analysis.	**03**
	(b)	Discuss reactive power load forecasting	**04**
	(c)	What is power system security? Explain major three function of a power system security and system state classification.	**07**
		OR	
Q.3	**(a)**	Discuss the Application of Power System State Estimation.	**03**
	(b)	Find the capacity of a static VAR compensator to be installed at a bus with +/-5 % voltage fluctuation. The short –circuit ratio is 5000 MVA.	**04**
	(c)	Describe different methods for Reactive power compensation for voltage stability Enhancement.	**07**
Q.4	**(a)**	Explain surge impedance loading with it expression.	**03**
	(b)	Discuss network observability and Pseudo- measurement	**04**
	(c)	Give flow chart of one scheme of fast decoupled state estimation.	**07**
		OR	
Q.4	**(a)**	Discuss Identification of Bad data in case of State Estimation of the power system	**03**
	(b)	Discuss network observability and Pseudo- measurement	**04**
	(c)	For a transmission line connected between two buses, derive the expression of voltage regulation and also establish from the phasor diagram and the equations that the Q and V have a strong coupling.	**07**

Q.5	**(a)**	Summarize nature of load forecasting based on lead time with Application.	**03**
	(b)	List out objectives of State Estimation.	**04**
	(c)	Explain the typical structure of a deregulated power system with necessary diagram.	**07**

OR

Q.5	**(a)**	Explain different entities in deregulated power system	**03**
	(b)	Enumerate the need for restructuring.	**04**
	(c)	Describe Auto-Regressive Model and Auto- regressive Moving Average Model for load forecasting.	**07**

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