Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE – SEMESTER- VII EXAMINATION-SUMMER 2023

Subject Code: 3170919 Date: 19/06/2023

Subject Name: Power System Operation 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)**	Explain speed governor dead-band and its effect on AGC.	**03**
	(b)	Discuss concept of blackout.	**04**
	(c)	Explain Least square approximation method for state estimation.	**07**
Q.2	**(a)**	Explain Active, Reactive and Apparent power with power tringle	**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 500 MVA.	**04**
	(c)	Explain why voltage control is necessary in power system. Describe methods to control voltage	**07**
		OR	
	(c)	How do you obtain a relation for maximum power and line angle/line length of power line?	**07**
Q.3	**(a)**	Compare static state estimation and dynamic state estimation.	**03**
	(b)	Summarize nature of load forecasting based on lead time with Application.	**04**
	(c)	Explain operation of transmission line for no load condition.	**07**
		OR	
Q.3	**(a)**	Discuss the deregulation of the power system	**03**
	(b)	With neat schematic diagram, explain the process of selective frequency control	**04**
	(c)	Explain Implications of Surge Impedance Loading.	**07**
Q.4	**(a)**	Explain classification of Voltage Stability.	**03**
	(b)	Draw Block diagram model of load frequency control for isolated power system	**04**
	(c)	Explain Milestones of deregulation in the world	**07**
		OR	
Q.4	**(a)**	Expression for power flows at the sending and receiving ends of power line.	**03**
	(b)	Interpret Identification of Bad data in case of State Estimation	**04**
	(c)	What is power system security? Explain Power system security levels in detail	**07**
Q.5	**(a)**	List out important points of Electricity rules- 2003.	**03**
	(b)	Write short notes on sensitivity factors used in security analysis.	**04**
	(c)	Two turbo alternators rated for 110MW and 210MW have governor drop characteristics of 5% from no load to full load. They are connected in parallel to share a load of 250MW.Determine the load shared by each machine assuming free governing action.	**07**
		OR	
Q.5	**(a)**	Explain the generator shift factor and line outage factor concepts of power system security	**03**

(b) What is meant by free governor operation? **04**

(c) Enlist different types of reactive power compensation methods for heavily loaded and voltage stressed power systems. Explain static VAR compensators in detail **07**