Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VIII (NEW) EXAMINATION – SUMMER 2021

Subject Code:2180909 Date:04/08/2021

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.**

			MARKS
Q.1	**(a)**	Discuss restoration process after black out of power system.	**03**
	(b)	Discuss the term line load-ability.	**04**
	(c)	Discuss the behaviour of uncompensated radial transmission line under heavy load condition using P-V curve at different power factors	**07**
Q.2	**(a)**	Discuss the motivation for re-structuring of the power system.	**03**
	(b)	Discuss the advantages of deregulation of the power system	**04**
	(c)	Discuss security assessment and security control of the power system.	**07**
		OR	
	(c)	Discuss direct and in-direct methods used for contingency selection	**07**
Q.3	**(a)**	Discuss long term load forecasting of the power system.	**03**
	(b)	Discuss the role of congestion management in deregulated power system	**04**
	(c)	Two generating units rated for 100 MW and 200 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 300 MW. Assuming free governor action, determine the load shared by each unit.	**07**
		OR	
Q.3	**(a)**	Discuss reactive power load forecasting	**03**
	(b)	Explain functions of different entities in deregulated power system.	**04**
	(c)	Discuss steady states analysis of load frequency control of single area	**07**
Q.4	**(a)**	Discuss comparative analysis between load flow study and State Estimation techniques.	**03**
	(b)	Discuss network observability and Pseudo- measurement	**04**
	(c)	Determine the elements of H-matrix of weighted least square estimation technique used for state estimation from Fig.1	**07**
		OR	
Q.4	**(a)**	Discuss the Application of Power System State Estimation.	**03**
	(b)	Discuss Identification of Bad data in case of State Estimation of the power system	**04**
	(c)	Determine the weighting matrix of weighted least square estimation technique used for state estimation from Fig.1. The accuracy of meters 1,2 and 3 is 100% whereas accuracy of	**07**

meters 4& 5 are 90%.
On same regard, determine the size of following matrices.
(i) Gain Matrix (G) [G= H^t*W*H]
(ii) Matrix of measurement variable
(iii) Matrix of state variables
(iv) Size of Error matrix

Q.5 **(a)** Discuss the nature of load forecasting, lead time and applications. **03**

(b) Auto- regressive Moving Average Model for load forecasting **04**

(c) A lossless three-phase transmission line has inductive reactance and capacitive admittance is found of the order of 0.5 Ω/km and 50μS/km. If the system voltage at the sending end is 220 kV at 50 Hz rated frequency. The length of the transmission line is of the order of 100 km. Considering open circuit condition of the line calculate the followings **07**
(i) Surge impedance of the line
(ii) Surge impedance loading of the line
(iii) Sending end current
(iv) Reactive power at sending end

OR

Q.5 **(a)** Discuss the Harmonic load model for load forecasting **03**

(b) Compare Auto- regressive Model with Auto- regressive Moving Average Model used for load forecasting. **04**

(c) Develop an expression to find the magnitude of reactive power requirement for voltage control for long transmission lines. **07**

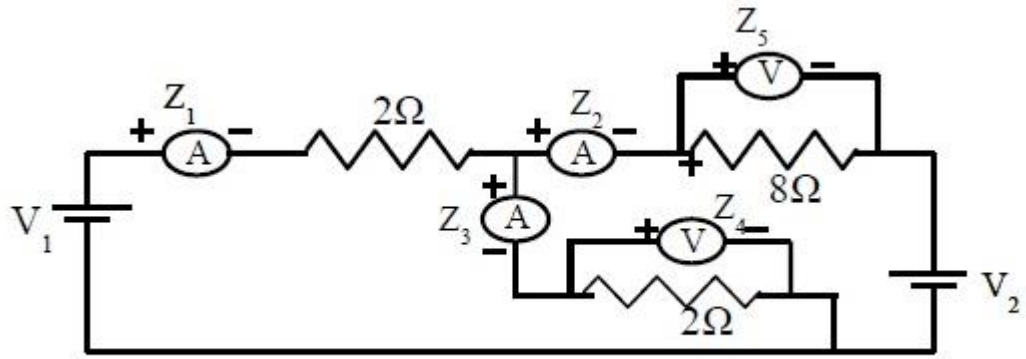

Fig.1

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