Seat No.: _____ Enrolment No.

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–VIII (NEW) EXAMINATION – WINTER 2020

Subject Code:2180909 **Date:21/01/2021**

Subject Name:Power System Operation and Control

Time:02:00 PM TO 04:00 PM **Total Marks: 56**

Instructions:

1. **Attempt any FOUR questions out of EIGHT questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

			MARKS
Q.1	**(a)**	Explain the generator shift factor and line outage factor concepts of power system security	**03**
	(b)	Discuss surge impedance and surge impedance loading.	**04**
	(c)	Discuss requirements and types of load forecasting. Also discuss auto regressive and auto regressive moving average models.	**07**
Q.2	**(a)**	Explain the load frequency control considering generation rate constraints.	**03**
	(b)	Discuss the effect of Dead-band on Automatic Generation Control.	**04**
	(c)	Two generators (A & B) are operating in parallel with system frequency of 50 Hz at no load. The detailed specifications are given below. Generator-A Capacity = 200 MW, droop characteristic of governor from no load to full load = 4%. Generator-B Capacity = 400 MW, droop characteristic of governor from no load to full load = 5%. calculate the followings (i) How do they share system load of 600 MW? (ii) If both generators offer droop characteristic of governor from no load to full load of the order of 5 %, in this case, how the system load of 600 MW will be shared by them?	**07**
Q.3	**(a)**	Discuss the deregulation of the power system	**03**
	(b)	Discuss the model of speed governing system	**04**
	(c)	Discuss single line contingency of power system and derive the equations	**07**
Q.4	**(a)**	Discuss motivation for restructuring of power system.	**03**
	(b)	Discuss generator load model	**04**
	(c)	Discuss the power system security analysis using performance index criteria.	**07**
Q.5	**(a)**	Define (i) State variables, (ii) Measurement variables, and (iii) Redundancy or degree of freedom	**03**
	(b)	List out objectives of state estimation.	**04**

(c) Using figure 1, determine the elements of H-matrix of first iteration. Discuss the estimation method used for state estimation. **07**

Q.6 **(a)** Define the state estimation and discuss how does it differ from load flow study? **03**

(b) Discuss the Gaussian probability density curve. **04**

(c) Discuss weighted least square estimation technique. **07**

Q.7 **(a)** List out important points of Electricity rules- 2003. **03**

(b) Explain role of reactive power for voltage collapse. **04**

(c) A three-phase, 50 Hz, 200 km long, transmission line operates at 220 kV. It has surge impedance of the order of 400 Ω. Calculate surge impedance loading of it. Analyze the following **07**
(i) If the length of line is increased to double, what will be its effect on surge impedance of transmission line?
(ii) If the length of line is reduced to half, in this case, what will be its effect on surge impedance of transmission line?
(iii) Discuss the effect of surge impedance load on length of transmission line.

Q.8 **(a)** Explain electrical market entities and model in brief **03**

(b) List out the changes in power system contributing to voltage collapse. Further, explain the role of on-line tap changer in this regard. **04**

(c) List out reactive power compensation methods for heavily loaded transmission line. Discuss shunt compensation using P-V curves for different levels of compensation **07**

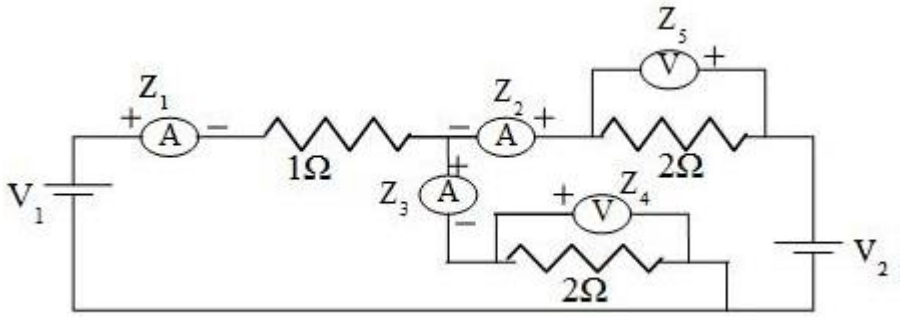

Figure 1

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