

GUJARAT TECHNOLOGICAL UNIVERSITY

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

Subject Code: 3170919

Date:01-06-2024

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) Discuss System State Classification in detail	03
(b) Differentiate the role of security assessment and security control in power system security analysis.	04
(c) Discuss different sensitivity factors used for power system security analysis.	07
Q.2 (a) What is load ability?	03
(b) Define voltage collapse. List out the main factors which contribute the phenomena of voltage collapse.	04
(c) The governor speed regulation of Gen-1 and Gen-2 is of the order of 5.0 and 4.0 percentage from no-load to full load, respectively. The generation capacity of Gen-1 and Gen-2 is 100 MW and 200 MW, respectively. They are operating parallel and sharing a load of 300 MW. Assuming free governor action and no-load frequency of the generator is 50 Hz. Determine the load shared by each unit.	07
OR	
(c) Discuss Load Frequency Control with Generation Rate Constraints and optimal two area load frequency control.	07
Q.3 (a) What is state estimation? Compare static and dynamic state estimations.	03
(b) State and explain briefly the applications of state estimation in power system.	04
(c) Determine the following terms from Figure-1. It is to be noted that the accuracy offered by all three ammeters (Z1, Z2, and Z3) is 90%. Considering Weighted least square estimation technique determine (i) Size and Elements of weighting matrix. (ii) Size of H-matrix. (iii) Size of Gain matrix (G). (iv) Size of measurement variable matrix. (v) Size of state variables matrix (vi) Size of error matrix	07
OR	
Q.3 (a) Elaborate importance of Pseudo measurement used in state estimation.	03
(b) Discuss network observability.	04
(c) Discuss Chi-square test used in state estimation	07

- Q.4** (a) Differentiate voltage stability and angle stability of the power system **03**
 (b) List out the method for improving voltage stability **04**
 (c) Discuss the reactive power requirement of an uncompensated transmission lines **07**

OR

- Q.4** (a) What is Surge impedance loading? **03**
 (b) Discuss voltage regulation of the transmission line **04**
 (c) What is decoupling concept? Discuss Q-V and P- δ quantities for lossless transmission of two-bus model **07**

- Q.5** (a) Discuss the different nature of load forecasting. **03**
 (b) Discuss Estimation of Average and Trend Terms used for load forecasting. **04**
 (c) Explain the factors which motivate for the Restructuring and Deregulation of Power System. **07**

OR

- Q.5** (a) Discuss auto regressive models used for load forecasting **03**
 (b) Discuss Estimation of Periodic Components used in load forecasting, **04**
 (c) List the entities involved in Electricity market and its role in restructuring power system. **07**

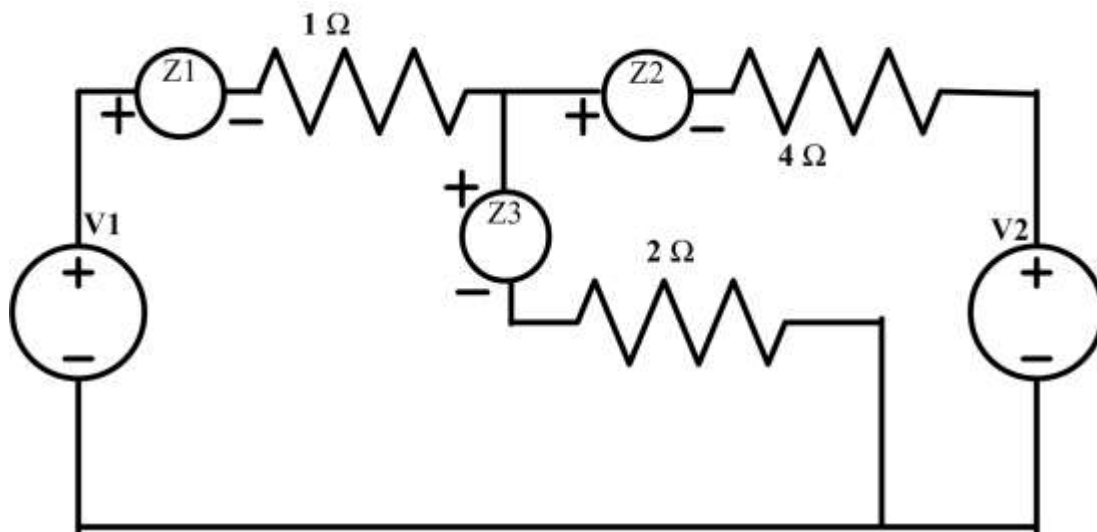


Figure 1
