

Eighth Semester B.E. Degree Examination, Feb./Mar. 2022

Power System Operation and Control

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions, selecting at least TWO full questions from each part.

PART – A

- 1 a. With neat sketch, explain the Dual Digital computer configuration. (07 Marks)
- b. Explain power system operation without central computer / AGC. (09 Marks)
- c. Two synchronous generators are initially supply common load at 1pu frequency (50Hz). The rating of unit-1 is 337MW and has 0.03pu droop built into its governor. Unit-2 is rated 420MW and has 0.05pu droop. Find each units share of a 0.1pu (10% of the total generation) increase in the load demand. Also, find the new line frequency. (04 Marks)
- 2 a. With block diagram, explain Automatic Voltage Regulator (AVR) and Automatic Load Frequency Control (ALFC) loops. (08 Marks)
- b. Explain the modeling of static excitor. (06 Marks)
- c. Consider a 100MW generator. It has a regulation parameter of 4%.
 - i) By how much will the turbine power increases if the frequency drops by 0.1Hz with the reference unchanged. (06 Marks)
 - ii) If the frequency drops by 0.1Hz but the turbine power must remain unchanged. By how much should the reference setting be changed? (06 Marks)
- 3 a. With block diagram, explain the static response of two area systems. (08 Marks)
- b. What is tie line? Obtain the modeling of tie line. (06 Marks)
- c. Determine the primary loop parameters for a control area having the following data:

Total rated area capacity	$P_r = 2000\text{MW}$
Normal operating load	$P_D^0 = 1000\text{MW}$
Inertia constant	$H = 5.0 \text{ sec}$
Regulation	$R = 2.40\text{Hz/Pu MW}$

Assume that the load frequency dependency is linear i.e., old load would increase 1% for 1% frequency increase. (06 Marks)
- 4 a. What are the sources of reaction power in power system? (05 Marks)
- b. Obtain the relationship between voltage real power and reactive power. (05 Marks)
- c. Explain method of reactive power injection by static series capacitor. (04 Marks)
- d. Write note on voltage collapse. (06 Marks)

PART – B

- 5 a. What is unit commitment problem? Explain various constraints in solving the unit commitment problem. (10 Marks)
- b. With the help of flow chart, explain the dynamic programming method of unit commitment. (10 Marks)
- 6 a. What is system security? Explain the major functions involved in the system security. (10 Marks)
- b. With flow chart, explain the procedure of contingency analysis. (10 Marks)
- 7 a. What is power system state estimation? Explain the basics of power system state estimation. (10 Marks)
- b. Explain the least square solution technique for power system state estimation. (10 Marks)
- 8 a. Explain modes of failures of a system. (06 Marks)
- b. Derive the steady state and general reliability expressions. (08 Marks)
- c. Draw the loss of load probability flow chart. (06 Marks)

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Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.