



CBCS SCHEME

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18EE81

Eighth Semester B.E. Degree Examination, June/July 2024 Power System Operation and Control

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Discuss the various operating states of power system with neat block diagram. (06 Marks)
- b. What is energy control center? Explain the functions of energy control center. (07 Marks)
- c. List out the objectives of power system control. Explain the various controls involved. (07 Marks)

OR

- 2 a. With a neat diagram, explain the components of RTU (Remote Terminal Unit). (08 Marks)
- b. What are Intelligent Electronic Devices [IED's]? Explain its functional block diagram. (07 Marks)
- c. Discuss the classification of SCADA system with neat sketches wherever necessary. (05 Marks)

Module-2

- 3 a. Explain the AVR and ALFC control loops with schematic block diagram. (07 Marks)
- b. Explain the different modes of Governor operation. (05 Marks)
- c. Draw the schematic diagram of a steam turbine governing system and explain the functions of various components. (08 Marks)

OR

- 4 a. Obtain the transfer function for the complete ALFC system. (10 Marks)
- b. Obtain the overall expression of an AGC with PI controller from its relevant block diagram representation of ALFC. (10 Marks)

Module-3

- 5 a. Obtain the state space model of an isolated system with necessary equations. (10 Marks)
- b. Explain the two area load frequency control with neat block diagram and necessary equations. (10 Marks)

OR

- 6 a. With a schematic block diagram, explain Automatic Voltage Control (AVR). With necessary equations and mathematical models. (10 Marks)
- b. Explain the decentralized control of AGC. (04 Marks)
- c. Two generators rated 200 MW and 400 MW are operating in parallel. Their droop characteristics are 4% and 5% respectively from no load to full load. The speed changers are so set that the generators operate at 50 Hz sharing a full load of 600 MW in the ratio of their ratings. If the load reduces to 400 MW, how will it be shared among the generators and what will be the system frequency? (06 Marks)

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.

Module-4

- 7 a. Explain briefly the various elements of power system that can generate or absorb reactive power. (10 Marks)
- b. Show that the real power flow between two nodes is determined by the transmission angle, and the reactive power flow is determined by the scalar voltage difference between the nodes. (10 Marks)

OR

- 8 a. Explain the different methods of voltage control by reactive power injection. (10 Marks)
- b. With neat diagram, explain Booster transformers and phase shift transformers used for voltage control. (06 Marks)
- c. Discuss the process of voltage collapse with a neat sketch. (04 Marks)

Module-5

- 9 a. Explain the security constrained optimal power flow with the help of an example showing various states involved. (07 Marks)
- b. List out the factors affecting the Power System Security. (05 Marks)
- c. With a neat flow chart, discuss the process involved in AC power flow security analysis with contingency case selection. (08 Marks)

OR

- 10 a. With neat diagrams and necessary equations, explain:
(i) Generation shift factors
(ii) Line outage distribution factors (10 Marks)
- b. Explain the linear least square estimation technique used for state estimation in power system with flow chart. (10 Marks)
