



CBCS SCHEME

21EE72

Seventh Semester B.E./B.Tech. Degree Examination, June/July 2026 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. With a neat block diagram, explain the operating states of power system. (08 Marks)
- b. Explain Preventive and Emergency control in power system operation. (06 Marks)
- c. Explain the major components of energy management center. (06 Marks)

OR

- 2 a. Explain in detail the major components of SCADA in power system. (08 Marks)
- b. Explain in brief the components of remote terminal unit in power system. (06 Marks)
- c. Explain Single master-single remote, Single master – multiple RTU and multiple master-multiple RTUS configuration with neat diagrams. (06 Marks)

Module-2

- 3 a. Explain in brief the function of load frequency control and excitation voltage regulators of turbo generators with a neat schematic diagram. (08 Marks)
- b. Explain the mathematical modeling of Generator Load Model. (06 Marks)
- c. A 100 MVA synchronous generator operates on full load at frequency of 50 Hz. The load is suddenly reduced to 50 MW. Due to time lag in governor system the steam valve begins to close after 0.4 seconds. Determine the change in frequency that occurs in this time. Given, $H = 5 \text{ kW-Sec/KVA}$ of generator. (06 Marks)

OR

- 4 a. Explain in detail the steady state analysis of ALFC. (10 Marks)
- b. With a neat diagram, explain the proportional plus integral controller. (10 Marks)

Module-3

- 5 a. With a neat block diagram, explain two area load frequency control. (10 Marks)
- b. Explain the functions of important components and their transfer functions of automatic voltage regulator of a generator with a neat diagram. (10 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.

OR

- 6 a. With a neat diagram, explain the load frequency control with Generation Rate Constraints (GRCs) (08 Marks)
- b. Explain the effects of the speed governor dead band on AGC. (06 Marks)
- c. Explain the digital load frequency controllers in inter connected power system. (06 Marks)

Module-4

- 7 a. Explain generation and absorption of reactive power in power system. (06 Marks)
- b. Derive the relation between voltage power and reactive power at a node in power system. (06 Marks)
- c. Explain the various methods of voltage control by injection of reactive power in power system. (08 Marks)

OR

- 8 a. Explain the tap changing transformer for voltage control in a power system. (06 Marks)
- b. Explain the methods of voltage control by using booster transformer and phase-shift transformers the power system. (10 Marks)
- c. Write a short note on voltage collapse in a power system. (04 Marks)

Module-5

- 9 a. What are the factors affecting power system security and explain the major functions of power system security. (10 Marks)
- b. With a neat flow chart, explain the contingency analysis procedure using sensitivity factors. (10 Marks)

OR

- 10 a. Explain the AC power flow security analysis with contingency case selection with the help of flow chart. (10 Marks)
- b. Explain linear least square estimations in power system. (10 Marks)

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