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Question Paper Code : R 40585

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2025.

Seventh Semester

Electrical and Electronics Engineering

EE8702 — POWER SYSTEM OPERATION AND CONTROL

(Regulations 2017)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Mention the requirements of a good power system.
2. Why does voltage regulation necessary in transmission networks?
3. Define : Load Frequency Control (LFC).
4. Write the purpose of tie-line control in multi-area systems.
5. Distinguish between generation and absorption of reactive power.
6. Classify the methods of reactive power injection.
7. Plot the incremental cost curve of a thermal generating unit.
8. List out the constraints in UC problem.
9. Identify the sources of measurement errors.
10. How does time synchronization improve the accuracy of system monitoring using PMUs?

PART B — (5 × 13 = 65 marks)

11. (a) (i) Elucidate the working of a speed governor used in synchronous generators. (7)
- (ii) Describe how two generators share load when operating in parallel. (6)

Or

- (b)
 - (i) Explain how reactive power affects voltage magnitude in power systems. (7)
 - (ii) Describe the need for load forecasting in power system planning. (6)

12. (a) Explain the integration of economic dispatch control with LFC and analyze its impact on system economy and frequency stability.

Or

- (b) Analyze the static and dynamic response of a two-area system when a sudden load change occurs in one area.
13. (a) Examine the impact of reactive power imbalance on voltage stability and system security.

Or

- (b) (i) Compare tap-changing transformers SVC and STATCOM for voltage control in transmission networks. (7)
- (ii) Discuss the function of an Automatic Voltage Regulator in a synchronous in generator. (6)
14. (a) (i) Explain the effect of transmission losses on optimal scheduling of generators. (7)
- (ii) Compare the short-term and long-term hydrothermal scheduling. (6)

Or

- (b) Analyze how economic dispatch, unit commitment and hydrothermal coordination together ensure economical and reliable power system operation.
15. (a) (i) Analyze the steps involved in WLS-based state estimation. (7)
- (ii) Describe the functions of system monitoring and data acquisition in a power system. (6)

Or

- (b) Discuss the working of a PMU and analyze its advantages over conventional SCADA measurements.

PART C — (1 × 15 = 15 marks)

16. (a) Analyze the role of NLDC and RLDCs in maintaining grid security and reliability during large-scale disturbances in the Indian power system.

Or

- (b) Analyze the need for computer control in large interconnected power systems and explain the role of Energy Control Centers in ensuring secure operation.