Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 30586

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2024.

Seventh Semester

Electrical and Electronics Engineering

EE 8702 — POWER SYSTEM OPERATION AND CONTROL

(Regulations 2017)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. List out the national and regional load dispatching centers in India.

2. Mention the significance of load forecasting.

3. Compare the functions of "speed governor and speed changer in a speed governing system of a turbine generator set.

4. Define tie-line modeling.

5. Name the various components in AVR loop.

6. Write the specific features of tap changing transformer

7. Compare the objectives of economic dispatch and unit commitment problems

8. Define participation factor.

9. What is meant by PMU?

10. List out the causes of bad measurements.

PART B — (5 × 13 = 65 marks)

11. (a) Draw and explain the basic P-f and Q-V control loops.

Or

(b) What are the components of speed governor system of an alternator? Derive the transfer function and sketch a block diagram.

12. (a) Discuss in detail the dynamic response of a single area system, without integral control, following a step load disturbance.

Or

(b) Explain in detail the static response of a two area system, without integral control, following a step load disturbance.

13. (a) Discuss the methods of generation and absorption of reactive power.

Or

(b) Explain how voltage control can be effected by injection of reactive power.

14. (a) Give iteration algorithm for solving economic scheduling problem, without transmission loss.

Or

(b) Explain Priority list method using full load average production cost. State the merits and demerits.

15. (a) Discuss about automatic substation control using SCADA.

Or

(b) Explain briefly how the system states are continuously monitored and controlled.

PART C — (1 × 15 = 15 marks)

16. (a) The data pertaining to a single area power system with linear load-frequency characteristics are as follows : Rated Capacity = 1200 MW, System Load = 600 MW, Inertia Constant = 4 sec Speed regulation = 4%, Load damping factor = 0.85 p.u. Nominal Frequency = 50 Hz, Governor Time constant = 0 sec Turbine time constant = 0 sec. For a sudden change in load of 40 MW, determine the stead state frequency deviation.

Or

(b) Obtain the priority list of unit commitment using full load average production for the given data for the load level of 900 MW.

$F_1 = 392.7 + 5.544\ P_1 + 0.001093\ P_1^2$

$F_2 = 217 + 5.495\ P_2 + 0.001358\ P_2^2$

$F_3 = 65.5 + 6.695\ P_3 + 0.004049\ P_3^2$, P_1, P_2, P_3 in MW

Generation limits: $100 \leq P_1 \leq 600$ MW, $100 \leq P_2 \leq 400$ MW, $50 \leq P_3 \leq 200$ MW.

There are no other constraints on system operation. Obtain an optimum unit commitment table.
