

Register No.: Name:

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

SIXTH SEMESTER B.TECH DEGREE EXAMINATION (R), MAY 2023

(2020 SCHEME)

Course Code : 20EET396

Course Name: Operation and Control of Power Systems

Max. Marks : 100

Duration: 3 Hours

PART A

(Answer all questions. Each question carries 3 marks)

1. Explain the idea of unit commitment.
2. Explain the significance of participation factor in power system.
3. Compare long range and short-range Hydro-scheduling.
4. Formulate the objective function and constraints for a hydro thermal scheduling problem.
5. Explain the concept of wheeling.
6. List out the advantages of centrally dispatched power pool.
7. What are the main basic ways to accomplish security analysis?
8. Enumerate the factors that affect power system security.
9. Describe about the main sources of error in state estimation.
10. Explain the significance of Pseudo measurement in network observability.

PART B

(Answer one full question from each module, each question carries 14 marks)

MODULE I

11. a) Derive the equation for optimal load sharing among 'n' units in a power system by neglecting transmission losses. (10)
- b) Distinguish between incremental fuel rate and heat rate. (4)

OR

12. a) A power plant has three units with the following cost characteristics.

$C_1 = 0.5P_1^2 + 215P_1 + 5000$ Rs/hr.
 $C_2 = 1.0P_2^2 + 270P_2 + 5000$ Rs/hr.
 $C_3 = 0.7P_3^2 + 160P_3 + 9000$ Rs/hr.

(10)

where P_i 's are the generating powers in MW. The maximum and minimum loads allowable on each unit are 150 and 39 MW respectively. Find the economic scheduling for a total load of i) 320 MW and ii) 200 MW

- b) Which are the main thermal unit constraints? (4)

MODULE II

13. a) Explain complex take-or-pay fuel supply models. (8)
b) Describe the main types of scheduling problems. (6)

OR

14. a) Explain λ - Y iteration scheme for hydrothermal scheduling with the help of flow chart. (8)
b) Illustrate the working of pumped storage hydro plants. (6)

MODULE III

15. a) Describe the process involved in inter-utility economy energy evaluation. (8)
b) Explain the events included in longer term interchange transaction. (6)

OR

16. a) Explain the interchange evaluation by unit commitment. (10)
b) Explain the significance of energy broker system in power pools. (4)

MODULE IV

17. a) Illustrate any method for contingency analysis using flow chart. (9)
b) Define Linear sensitivity factor and explain its classifications. (5)

OR

18. a) Explain the impacts of generator outages and transmission outages in power system. (10)
b) Enumerate the reason for voltage collapse. (4)

MODULE V

19. Explain the role of state estimation in power system. Illustrate weighted least square estimation using flowchart. (14)

OR

20. a) What is observability? Explain different types of observability. (8)
b) List out the advantages of adding PMU data to state estimator. (6)
