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SAINTGITS COLLEGE OF ENGINEERING
KOTTAYAM, KERALA

(AN AUTONOMOUS COLLEGE AFFILIATED TO
APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

FIRST SEMESTER M.TECH. DEGREE EXAMINATION(R), MARCH 2021
(POWER SYSTEMS)

Course Code: 20EEPST103

Course Name: OPTIMIZATION OF POWER SYSTEM OPERATION

Max. Marks: **60** **Duration:** **3 Hours**

PART A

(Answer all questions. Each question carries 3 marks)

1. Explain the principle of unimodality. Can a multivariable function be unimodal?
2. Discuss about penalty function method.
3. Explain the characteristics associated with steam generating units.
4. Describe the algorithm for obtaining the composite cost curve
5. Discuss about hydroelectric plant models and incremental water rate characteristics.
6. Describe the short - term hydrothermal scheduling problem and derive the lagrange function.
7. Explain the significance of steepest descent technique in short term hydrothermal scheduling.
8. Explain the thermal input-output characteristics for typical load cycles for pumped-storage hydro plants.

PART B

(Answer one full question from each module, each question carries 6 marks)

MODULE I

9. Minimize $f(x_1, x_2) = 6x_1^2 - 3x_1x_2 + 4x_2^2 - 9x_1$ with the starting point as $X_1^T = \{0,0\}$ using Powell's method. (6)

OR

10. Minimize (6)
f(x)=0.65-[0.75/(1+x²)]-0.65 x $\tan^{-1}(1/x)$ in the interval [0,3] by the Golden Section method using n=6.

MODULE II

11. Minimize $f(x_1, x_2, x_3) = 0.5(x_1^2 + x_2^2 + x_3^2)$ subject to $x_1 - x_2 = 0$ and $x_1 + x_2 + x_3 - 1 = 0$ by using Lagrangian method. (6)

OR

12. Propose a method to solve optimization problem with inequality constraints. Derive the suitable expressions. (6)

MODULE III

13. How is generation scheduled among various generators when transmission losses are neglected in thermal systems? (6)

OR

14. Explain the gradient search method for the solution of economic dispatch problem of thermal plants (6)

MODULE IV

15. Develop the criterion of economic operation with restriction on fuel supply. (6)

OR

16. Explain the gradient search technique for optimal scheduling in Take-or-pay fuel supply contract (6)

MODULE V

17. Solve analytically the short-term hydrothermal scheduling problem. (6)

OR

18. In a combined system of one thermal plant and one hydro plant, the total load is a constant of 90MW for a month of 30 days. Find the running time of thermal plant if the maximum hydro energy is 50,000 MWh. The cost function of the thermal plant is given by $F = 54 + 11P_s + 0.02P_s^2$ unit of cost/hr. (6)

MODULE VI

19. Explain the short-Term hydro scheduling using gradient approach (6)

OR

20. Solve analytically the hydrothermal scheduling problem of pumped storage plants. (6)

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