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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIRST SEMESTER M.TECH DEGREE EXAMINATION, FEBRUARY 2016

Electrical and Electronics Engineering

(Power Systems)

04EE 6401 Optimization of Power System Operations

Max. Marks : 60 Duration: 3 Hours

Part A - Answer All Questions (Each Question carry 3 Marks)

1. Give ant three classification of optimization problems with examples.
2. Discuss about penalty function method.
3. What is incremental fuel cost? Discuss the characteristics.
4. Explain the term 'pseudo price' in the case of generation with limited energy supply.
5. Discuss about the importance and necessity of hydrothermal co-ordination.
6. What are the constraints to be considered for mathematical modeling of hydro-thermal scheduling?
7. Discuss about hydraulic continuity equations.
8. What are the assumptions to be made while pumped storage hydro scheduling with lambda-gamma iteration?

Part B – Answer All Questions

9. Minimize the function $f(x) = x^5 - 5x^3 - 20x + 5$ for an interval of [0,5] and n=3 using golden section method.

Or

10. Optimize $f(x_1, x_2) = x_1 - x_2 + 2x_1^2 + 2x_1x_2 + x_2^2$ from the starting point $X = \{0 \ \ 0\}^T$ using uni-variate method up to 2 iterations.
11. Maximize the function $f(x_1, x_2) = \pi\, x_1^2\, x_2$ subject to the condition $2\pi\, x_1^2 + 2\pi\, x_1\, x_2 = 24\pi$ using Lagrange method.

Or

12. What do you mean by penalty function method? Ex plain in detail about the process involved in interior penalty function and Exterior penalty function with necessary iteration algorithm.
13. Explain i) Variation in steam units characteristics ii) cogeneration plants

Or

14. Determine the economic operation points for a three unit generating units using First Order Gradient Approach when delivering a total load of 800 MW by making suitable assumptions. Up to 2 iterations after the initial assumptions.

    $H1 = 510 + 7.2\ P_1 + 0.00142\ P_1^2$ (Mbtu/H); $600MW \leq P_1 \leq 150MW$

    $H2 = 310 + 7.85\ P_2 + 0.00194\ P_2^2$ (Mbtu/H); $400MW \leq P_2 \leq 100MW$

    $H1 = 78 + 7.97\ P_3 + 0.00482\ P_3^2$ (Mbtu/H); $200MW \leq P_3 \leq 50MW$

    The fuel cost for the units are, 1.1 Rs/hr, 1 Rs/hr, 1 Rs/hr respectively for the plants.

15. What are B coefficients and their role in economic dispatch problems? Derive them.

Or

16. Discuss about the role of hard limits and slack limits in finding a solution for generation units taking part in Take-or-pay fuel supply contract using suitable derivations.
17. Discuss about short-term hydrothermal scheduling problem in detail draw the flow chart for the same including lambda-gamma iteration. (12 marks)

Or

18. Discuss about the scheduling of pumped storage hydro plants with lambda-gamma iterations. (12 marks)