Code No. 3189

FACULTY OF ENGINEERING

B.E. 4/4 (EE/ Inst.) II-Semester **(Main)** Examination, May 2011

Subject : **Optimization Methods**
(Elective-II)

Time : 3 Hours

Max. Marks: 75

Note: Answer **all** questions of Part - A and answer any **five** questions from Part-B.

PART – A (25 Marks)

1. Classify the optimization problems — 2 M
2. Locate the stationary points of the function $y = x^3/2 - x^2/2$ — 3 M
3. State the assumptions made for Linear Programming — 2 M
4. State the rules for finding the Dual of LPP — 3 M
5. What are the limitations of Fibonacci method? — 2M
6. Draw the flow chart of general iterative scheme of optimization — 3 M
7. Write the convergent criteria to terminate iterative process of steepest descent method — 2 M
8. Explain the method of computation of $[B_i]$ in Quasi Newton method — 3 M
9. With an example explain how the non serial system is converted into an equivalent serial system — 3 M
10. Define the following
    a) Principle of optimality
    b) Separable function — 2 M

PART – B (50 Marks)

11. a) Minimize the function $f = x_1^2 + 2x_2^2 + 3x_3^2$

Subjected to the constraints

$$g_1 = x_1 - x_2 - 2x_3 \le 12$$

$$g_2 = x_1 + 2x_2 - 3x_3 \le 18$$

Using Kuhn – Tucker conditions — 6 M

b) State and prove the sufficient condition for a Single Variable Optimization Problem — 4 M

12.a) A company produces washing machines and TV sets. The weekly production cannot exceed 35 washing machines and 30 TV sets. Two workers are required for a washing machine and one worker for a TV per week. Totally there are 85 workers in the company. The profits are Rs. 510 and Rs. 310 on washing machine and TV respectively. How many each item should the company produce in order to maximize the profit. Formulate into LPP and solve it graphically. — 6 M

b) Draw the flow chart for the two phase simplex method — 4 M

13.a) Minimize the function $f = x_1^2 + 3x_2^2 + 6x_3^2$ by Univariate method with starting point as (1, -1, 2) take $\varepsilon = 0.01$. — 6 M

b) Draw the flow chart for Powell's pattern search method of NLPP. — 4 M

14. Minimize the function

$f(x,y) = x - y + 2x^2 + 2xy + y^2$ starting from the point $X_1 = \begin{Bmatrix} 0 \\ 0 \end{Bmatrix}$ by using Fletcher - reeves method 10 M

15. Minimize the function $f(x_1, x_2) = 50x_1 + 100x_2$

Subjected to the constraints

$$10x_1 + 5x_2 \le 1250$$
$$4x_1 + 10x_2 \le 1000$$
$$x_1 + 1.5x_2 \le 225$$
$$x_1 \ge 0, x_2 \ge 0$$

Using Dynamic programming 10 M

16. Maximize $Z = x_1 + 2x_2 + 3x_3 - x_4$

Subjected to

$$x_1 + 2x_2 + 3x_3 = 15$$
$$2x_1 + x_2 + 5x_3 \ge 20$$
$$x_1 + 2x_2 + x_3 + x_4 \ge 10$$

$$x_1, x_2, x_3, x_4 \ge 0$$

Using Big M method 10 M

17. Maximize the function $f(x) = 0.85 - [0.95/(1+x^2)] - 0.85x\tan^{-1}(1/x)$

Using golden section method with n = 8. 10 M