B.Tech III Year II Semester (R13) Regular Examinations May/June 2016

OPTIMIZATION TECHNIQUES

(Electrical & Electronics Engineering)

Time: 3 hours Max. Marks: 70

PART - A

(Compulsory Question)

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1 Answer the following: (10 X 02 = 20 Marks)

(a) Define design variables.
(b) Explain object function surfaces.
(c) Write Kuhn Tucker conditions.
(d) Define multivariable optimization problem with no constraints.
(e) What is Fibonacci method?
(f) What is nonlinear programming?
(g) Discuss penalty function.
(h) Write characteristics of constrained problem.
(i) What is dynamic programming?
(j) Give an example to multistage decision process.

PART - B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT - I

2 Determine maximum and minimum values of the function $f(x) = 12x^5 - 45x^4 + 40x^3 + 5$.

OR

3 Find extreme points of the function $f(x_1, x_2) = x^3{}_1 + x^3{}_2 + 2x^2{}_1 + 4x^2{}_2 + 6$

UNIT - II

4 Find all the basic solutions corresponding to the system of equations:

$$2x_1 + 3x_2 - 2x_3 - 7x_4 = 1$$
$$x_1 + x_2 + x_3 + 3x_4 = 6$$
$$x_1 - x_2 + x_3 + 5x_4 = 4$$

OR

5 Maximize $F = x_1 + 2x_2 + x_3$ Subjected to $2x_1 + x_2 - x_3 \leq 2$
$-2x_1 + x_2 - 5x_3 \geq -6$
$4x_1 + x_2 + x_3 \leq 6 \quad x_i \geq 0,\ i = 1,2,3$

UNIT - III

6 Show that the Newton's method finds the minimum of a quadratic function in one iteration.

OR

7 Discuss Powell's method using quadratically convergent method.

UNIT - IV

8 Write algorithm used for interior penalty function method.

OR

9 Write algorithm used for exterior penalty function method.

UNIT - V

10 Discuss computational procedure in dynamic programming.

OR

11 A small machine tool manufacturing company entered into a contract to supply 80 drilling machines at the end of month and 120 at the end of second month. The unit cost of manufacturing a drilling machine in any month is given by $\$(50x + 0.2x^2)$, where x denotes the number of drilling machines manufactured in that month. If the company manufactures more than needed in the first month, there is an inventory carrying cost of $\$8$ for each unit carried to next month. Find the number of drilling machines to be manufactured in each month to minimize the total cost. Assume that the company has enough facilities to manufacture up to 200 drilling machines per month and that there is no initial inventory. Solve the problem as a final value problem.

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