B.Tech. III Year II Semester Regular and Supplementary Examinations **Set-3**

April/May - 2013

OPTIMIZING TECHNIQUES

(Common to CSE and CSS)

Time: 3 Hours   Max. Marks: 70

*Answer any **FIVE** Questions*

*All Questions carry **Equal** Marks*

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1. In terminating search methods it is recommended that both the difference in variable values and the difference in the function values be tested. It is possible for one test alone to indicate convergence to a minimum while the point reached is really not a minimum. Illustrate graphically.

2. Prove that $f(x) = 2x_1^2 + 2x_2^2 + 4x_3^2 + 2x_1 x_2 + 2x_1 x_3 + 4x_2 x_3$ is a convex.

3. A small manufacturer employs 5 skilled men and 10 semi-skilled men and makes an article in two qualities, a deluxe model and an ordinary model. The making of a deluxe model requires 2 hours work by a skilled man and 2 hours work by a semi-skilled man. The ordinary model requires 1 hour work by a skilled man and 3 hours work by a semi-skilled man. By union rules no man can work more than 8 hours per day. The manufacturer's clear profit of the deluxe model is Rs. 10 and of the ordinary model is Rs. 8. Formulate the model of the problem as LPP.

4. (a) Distinguish between transportation problem and assignment problem.

   (b) Explain the Hungarian method for solving an assignment problem.

5. (a) What is the significance of Lagrange multipliers?

   (b) Find the maxima and minima if any of the function,

   $$f(x) = 4x^3 - 18x^2 + 27x - 7.$$

6. (a) Why should equality constraints be eliminated before applying direct search optimization methods?

   (b) Why is convexity necessary to guarantee the successful operation of the complex method?

7. Solve the following mixed-integer program by the branch and bound algorithm,

   Minimize $Z = 10x_1 + 9x_2$

   Subjected to $x_1 \le 8$ $x_2 \le 10$

   $$5x_1 + 3x_2 \ge 45$$

   $$x_1 \ge 0, x_2 \ge 0$$

   x_2 is an integer.

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8. A project is compared of eleven activities, the time estimate for which are given below,

Activity	t_0	t_p	t_m(days)
1 - 2	7	17	9
1 - 3	10	60	20
1 - 4	5	15	10
2 - 5	50	110	65
2 - 6	30	50	40
3 - 6	50	90	55
3 - 7	1	9	5
4 - 7	40	68	48
5 - 8	5	15	10
6 - 8	20	52	27
7 - 8	30	50	40

(a)   Draw the network diagram for the project

(b)   Determine the critical path

(c)   What is the probability of finishing the project in 125 days?