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R7

B.TECH III Year I Semester (R07) Supplementary Examinations, May 2012

OPTIMIZATION TECHNIQUES

(Computer Science and Systems Engineering)

Time: 3 hours Max Marks: 80

Answer any FIVE questions

All questions carry equal marks

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1 (a) Define 'optimization' and 'constraints'.

(b) Explain the process of 'optimal design'.

2 (a) Enumerate various methods that can be used for solving multi variable optimization.

(b) A company is planning to spend Rs 10,000 on advertising. It costs Rs 3000 per minute to advertise on television and Rs 1000 per minute to advertise on radio. If the firm buys x minutes of television and y minutes of radio advertising, then its revenue in thousands of rupees is given by $f(x,y) = -2x^2 - y^2 + xy + 3y$. How can the firm maximize its revenue?

3 (a) Write brief notes on 'geometry of linear programming problems'.

(b) Solve the LPP given below.

Minimize $Z = 40x_1 + 10x_2 + 7x_5 + 14x_6$

Show that $x_1 - x_2 + 2x_5 = 0$

$-2x_1 + x_2 - 2x_5 = 0$

$x_1 + x_3 + x_5 - x_6 = 3$

$2x_2 + x_3 + x_4 + 2x_5 + x_6 = 4$

All $x_i \geq 0$

4 Find the optimum solution to the following transformation problem in which the cells contain the transformation cost in rupees.

	W_1	W_2	W_3	W_4	W_5	Available
F_1	7	6	4	5	9	40
F_2	8	5	6	7	8	30
F_3	6	8	9	6	5	20
F_4	5	7	7	8	6	10
Required	30	30	15	20	5	100

5 (a) Write an algorithm for quadratic interpolation method to minimize a function.

(b) Use Fibonacci method in order to maximize the function:

$f(x) = 10 + x^3 - 2x - 5 \exp(x)$

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6 Solve the following function by using steepest descent method.
Minimize $f(x_1, x_2) = ({x_1}^2 + x_2 - 11)^2 + (x_1 + {x_2}^2 - 7)^2$

7 (a) Explain basic approach of penalty function method.
(b) Write on algorithm for convex programming.

8 (a) Explain the Bellman principle of optimality.
(b) An oil company has 8 units of money available for exploration of three sites. If oil is present at a site, the probability of finding it depends upon the amount allocated for exploiting the site, as given below.

	0	1	2	3	4	5	6	7	8
Site 1	0.0	0.0	0.1	0.2	0.3	0.5	0.7	0.9	1.0
Site 2	0.0	0.1	0.2	0.3	0.4	0.6	0.7	0.8	1.0
Site 3	0.0	0.1	0.1	0.2	0.3	0.5	0.8	0.9	1.0

The probability that oil exists at the sites 1, 2, and 3 is 0.4, 0.3 and 0.2 respectively. Find the optimal allocation of money.

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