R09

Code No: D1503

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.TECH II - SEMESTER EXAMINATIONS, APRIL/MAY 2012
ADVANCED OPTIMIZATION TECHNIQUES
(MACHINE DESIGN)

Time: 3hours **Max. Marks: 60**

Answer any five questions
All questions carry equal marks

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1.a) State the arithmetic-geometric inequality theorem and using it derive a dual problem for an unconstrained GP problem.

b) Wheat is to be transported by boat across a river in an open rectangular box. The four sides of the box cost Rs.20 per m^2 and bottom costs Rs.80 per m^2. The transportation cost per trip is Rs.10. Assuming that the box will have no value after use; find by GP the dimensions of the box to minimize the cost of transporting 32 m^3 of wheat.

2.a) Define the degree of difficulty for constrained GP problem.

b) Solve the following GP problem

$$Minimize\ Z = 0.188yd$$

$$st \quad 1.75yh^{-1}d^{-1} \le 1$$

$$900y^{-2} + y^{-2}h^2 \le 1$$

3. Find the shortest path from A to E in the following network using Dynamic Program.

	B1	B2	B3
A	2	2	2

	C1	C2
B1	3	4
B2	4	-
B3	5	2

	D1	D2
C1	-	2
C2	5	3

	E1
D1	3
D2	4

4. Using branch and bound method; solve the following integer linear programming problem

$Max\ Z = 2x_1 + 3x_2 \quad st$

$5x_1 + 7x_2 \le 35,\ 4x_1 + 9x_2 \le 36$

$x_i \ge 0 \forall i$

and x_1, x_2 are integers

5. Maximize $f = 4x_1+2x_2+3x_3+c_4x_4$

st $x_{1+}x_3+x_4 \leq 24$

$3x_1+x_2+2x_3+4x_4 \leq 48$

$2x_1+2x_2+3x_3+2x_4 \leq 36$; $x_i \geq 0$

Where c_4 is discrete random variable that can take values of 4, 5, 6 or 7 with probabilities of 0.1, 0.2, 0.3 and 0.4 respectively. Using the simplex method, find the solution that maximizes the expected values of f.

6.a) Explain the steps involved in simulated annealing algorithm.

b) Explain the similarities between GA and traditional methods.

7. Using Hook-Jeeves method, Min $Y=2+(x_1^2-x_2)^2+x_2^2$. Take starting point as (-3,-4), $\Delta x_1 = \Delta x_2 = 0.5$. Show calculations for complete two cycles.

8. Using the D.F.P method find the minimum of the function
Min $f(X) = x_1^2-x_1x_2+3x_2^2$. Take initial point as [1, 2].

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