Code: 9A02709 **R09**

B.Tech IV Year I Semester (R09) Supplementary Examinations June 2017

OPTIMIZATION TECHNIQUES

(Electrical & Electronics Engineering)

Time: 3 hours Max. Marks: 70

Answer any FIVE questions

All questions carry equal marks

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1 (a) What is the difference between constraint surface and composite constraint surface?

(b) State five engineering applications of optimization.

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

(b) Find the dimensions of a cylindrical tin (with top and bottom) made up of sheet metal to maximize its volume such that the total surface area is equal to $A_0 = 24\pi$.

3 Solve the following system of equations using pivot operations.

$6x_1 - 2x_2 + 3x_3 = 11$

$4x_1 + 7x_2 + x_3 = 21$

$5x_1 + 8x_2 + 9x_3 = 48$

4 Determine an initial feasible solution to the following transportation problem by VAM method and test for its optimality.

		Destination			
		D_1	D_2	D_3	Supply units
Source	S_1	2	8	12	20
	S_2	10	6	18	29
	S_3	12	5	4	40
	S_4	3	2	8	25
Demand (units)		30	20	15	

5 (a) Find the minimum of f = x(x – 1.5) by starting from (0, 0) with an initial step size of 0.05.

(b) Derive the one-dimensional minimization problem for the following case. $Minf(x) = (x_1^2 - x_2)^2 + (1 - x_1)^2$, from the starting point $x_1 = \begin{bmatrix} -2 \\ -2 \end{bmatrix}$ along the search direction $S = \begin{bmatrix} 1.00 \\ 0.25 \end{bmatrix}$

6 Minimize $f(x_1x_2) = x_1 - x_2 + 2x_1^2 + 2x_1x_2 + x_2^2$ starting from the point $x = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$.

7 Minimize $f(x_1x_2) = \frac{1}{3}(x_1 + 1)^3 + x_2$, subject to $g_1(x_1x_2) = -x_1 + 1 \leq 0$, $g_2(x_1x_2) = -x_2 \leq 0$

8 Solve the following problem by dynamic programming

$$Max. \sum_{i=1}^{3} d_i^2$$

Subject to $d_i = x_{i+1} - x_i,\ i = 1, 2, 3$

$x_i = 0, 1, 2, \ldots \ldots 5, i = 1, 2$

$x_3 = 5,\ x_4 = 0.$

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