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6E3093

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B.Tech VI Semester (Main/Back) exam. May, 2012

Electronics & Comm. Engg.

6EC6.3 Optimization Techniques

Time : 3 Hours **Maximum Marks : 80**

Min. Passing Marks : 24

Instructions to Candidates:

*Attempt any **five questions,** selecting one question from each unit. All Question carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/ calculated must be stated clerly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1.________**Nil**________ 2.________**Nil**________

Unit - I

1. (a) What is optimization technique? Write down a short note on engineering applications of optimization. 8

(b) ABC Ltd is assembling two products P_1 and P_2 The cost of assembling one unit of products P_1 and P_2 is Rs. 200 and Rs. 400 respectively. The availability of work station for two products is limited to 60 hours and the two products spend 6 hours and 2 hours respectively on the work station. The products can be sold for Rs. 280 and Rs. 320 respectively. Total man-hours available are 400 and P_1 requires 2 man-hours and P_2 requires 4 man-hours.Formulate the problem as a LPP. 8

Or

1. Write down a short note on "classification of optimization problems" based on following : 4x4=16

(a) Classification based on the nature of the design variabes

(b) Classification based on the nature of the equations involved

(c) Classification based on the permissible values of the design variables

(d) Classification based on the number of objective functions.

Unit-II

2. (a) solve the following LPP by Big-M method:

Min $Z = x_1 + x_2$

s.t. $2x_1 + x_2 \geq 4$

$x_1 + 7x_2 \geq 7$

and $x_1, x_2 \geq 0$ 8

(b) Use revised simplex method to solve the following LPP

Max $Z = x_1 + x_2$

s.t. $3x_1 + 2x_2 \leq 6$

$x_1 + 4x_2 \leq 4$

and $x_1, x_2 \geq 0$ 8

Or

2. (a) Find teh dual of the following LPP

Max. $Z = x_1 + 3x_2$

s.t. $3x_1 + 2x_2 \leq 6$

$3x_1 + x_2 = 4$

and $x_1, x_2 \geq 0$ 4

(b) Find the optimal solution of the given LPP

Max $Z = 3x_1 + 5x_2$

s.t. $3x_1 + 2x_2 \leq 18$

$x_1 \leq 4$

$x_2 \leq 6$

and $x_1, x_2 \geq 0$

Discuss the effect on the optimality of the solution when the objective function is changed to $Z = 3x_1 + x_2$. 12

Unit-III

3. (a) Solve the following assignment problem

	P	Q	R	S	T
A	85	75	65	125	75
B	90	78	66	132	78
C	75	66	57	114	69
D	80	72	60	120	72
E	76	64	56	112	68

8

(b) Solve the following by Vogel's approximation method (VAM) and test its optimality by MODI method:

	I	II	III	IV	Supply ↓
A	4	6	8	13	50
B	13	11	10	8	70
C	14	4	10	13	30
D	9	11	13	8	50
Demand→	25	35	105	20	200 / 185

8

Or

(a) Find the assignment of salesman to districts that will result in maximum sales

Salesman ↓ \ Districts→	A	B	C	D	E
1	30	38	40	28	40
2	40	24	28	21	36
3	41	27	33	30	37
4	22	38	41	36	36
5	29	33	40	35	39

8

(b) Solve the following by NorthWest Corner Rule (NWCR) and test its optimaility by MODI method. The shipping costs are given

A	B	C		Capacity↓
W	4	8	8	56
X	16	24	16	82
Y	8	16	24	77
Requirement →	72	102	41	215

8

Unit-IV

4. (a) Minimize $f(x_1,x_2) = 2x_1^2 + x_2^2$ by Steepest Descent method. The starting point is ( ) and solve upto two iterations. 8

(b) Min $f(x) = x^2 + 2y^2$

s.t. $2x + 5y - 10 \leq 0$

by using exterior penalty method and final solutions for $r=1$, 10 and $r \to \infty$. 8

Or

Minimize $f(x) = x_1 - x_2 + 2x_1^2 + 2x_1x_2 + x_2^2$ starting from the point $x_1 \left(\begin{smallmatrix}0\\0\end{smallmatrix}\right)$ along the directions $S = \left(\begin{smallmatrix}-1\\0\end{smallmatrix}\right)$ by quadratic interpolation method with an initial step lengh to = 0.1 16

Unit-V

5. (a) Determine the value of u_1, u_2 and u_3 so as to

maximize $Z = u_1.u_2.u_3$

s.t. $u_1 + u_2 + u_3 = 10$

and $u_1, u_2, u_3 \geq 10$ 8

(b) Solve the following LPP by dynamic program approach

Max. $Z = 8x_1 + 7x_2$

s.t. $2x_1 + x_2 \leq 8$

$5x_1 + 2x_2 \leq 15$

and $x_1, x_2 \leq 0$ 8

Or

5. (a) Use dynamic programming approach to solve

Minimize $Z = y_1^2 + y_2^2 + \ldots\ldots + y_n^2$

s.t. $y_1\ y_2\ y_3 \ldots\ldots\ldots\ldots\ y_n = C;\ (C \neq 0)$

and $y_j \geq 0; j=1,2, \ldots\ldots n.$ 8

(b) Write down short notes on following

(i) Stage

(ii) State

(iii) Return function

(iv) Bellman's principle of optimality 2x4=8
