5E5046

Roll No. :

Total Printed Pages : 4

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B. Tech. (Sem. V) (Main & Back) Examination November / December 2018
Electronics Engineering
5EE6.1A Optimization Techniques

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 26

*Attempt any **five** questions, selecting **one question** from **each unit**. All questions 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 clearly.*

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 ? Give five applications of optimization in engineering. 8

(b) A firm manufacturing two types of electrical items, A and B can make a profit of Rs. 20 per unit of A and Rs. 30 per unit of B. Each unit of A requries 3 motors and 2 transformers and each unit of B requires 2 motors and 4 transformers. The total supply of these per month is restricted to 210 motors and 300 transformers. Type B is an expert model requiring a voltage stabilizer, which has a supply restricted to 65 units per month. Formulate above as a linear programming problem for maximum profit. 8

OR

1 (a) Describe various mathematical programming methods used in operation research.

8

(b) The data for two foods x_1 and x_2 are given below :

	Per unit		minimum
	x_1	x_2	requirements
Prices	60 paise	21 paise	
Calories	1000	2000	3000
Proteins	25 gms.	100 gms.	100 gms

Fomulate the LPP for minimizing expenditure on food.

8

UNIT - II

2 (a) Minimize $z = \frac{1}{2}\left(x^2 + y^2 + z^2\right)$

Subjected to $x - y = 0$

$x + y + z - 1 = 0$

by any suitable method.

8

(b) Find the optimum value of the function $f(x) = (x-2)^4$ and also state if the function attains a maximum or minimum at $x = 2$.

8

OR

2 (a) Find the extreme point of the function.

$f(x_1 y) = x^3 + y^3 + 2x^2 + 4y^2 + 6$

8

(b) Show that the height of the cylinder of maximum volume inscribed in a sphere of radius (r) is

$\frac{2r}{\sqrt{3}}$

8

UNIT - III

3 (a) Solve the following problem by using Big M-method.

Max. $z = 3x + 2y + 2$

Subjected to $-3x + 4y + z = 7$

$-3x + 2y + 2z = 8$

and $x, y, z \geq 0$

8

OR

(a) Use simplex method to solve LPP

Minimize $Z = x_1 + 4x_2$

Subjected to $2x_1 + x_2 \geq 4$

$x_1 + 7x_2 \geq 7$

and $x_1, x_2 \geq 0$

8

(b) Solve graphically the problem :

Min. $z = 3x + 5y$

Subjectd to $-3x + 4y \leq 12$

$2x - y \geq -2$

$x \leq 4, \; y \geq 2$

and $x, y \geq 0$

8

UNIT - IV

4 (a) Minimize $f = 2x^2 + y^2$ from the starting point $\begin{pmatrix} 1 \\ 2 \end{pmatrix}$ using the univariate method. **8**

(b) Find the minimum of the function $f(x) = x_1 - x_2 + 2x_1^2 + 2x_1x_2 + x_2^2$ and starting point is $x_1 = \begin{pmatrix} 0 \\ 0 \end{pmatrix}$ by using Newton's method. **8**

OR

4 Find the maximum of the function $f(x) = x(5-x)$ in the interval [0, 8] using golden section method. It is given that the function is unimodel in this interval. **8**

UNIT - V

5 Min. $f(x) = x^2 + 2y^2$

subjected to $2x + 5y - 10 \leq 10$

by using exterior penalty method and final solutions for $r = 1, 10$ and $r \to \infty$. **16**

OR

5 Min $f(x) = (x_1 - 1)^2 + (x_2 - 2)^2$

Subjected to $4 - x_1 - x_2 \geq 0$

$2 - x_1 + x_2 \geq 0$

$x_1, x_2 \geq 0$

using complex method with the starting point $\begin{bmatrix} 0.5 \\ 1.5 \end{bmatrix}$ **16**