Total pages: 02

PG (CBCS)
M.SC. Semester- III Examination, 2023
MATHEMATICS
PAPER: MTM 305A
(ADVANCED OPTIMIZATION)

Full Marks: 50 **Time: 2 Hours**

The figures in the right-hand margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.

GROUP-A

1. Answer any **FOUR** of the following questions: 4×2=8

a) Write the limitations of Fibonacci searching method.
b) State the integer and mixed integer programming problem.
c) Explain the deletion of an existing variable from the optimal table of an LPP
d) What do you mean by exact and inexact one dimensional search?
e) Explain the concept of deviational variable in goal programming problem.
f) Show that the optimum point can be obtained for a quadratic objective function in a single step by Newton's method.

GROUP-B

2. Answer any **FOUR** of the following questions: 4×4=16

a) Following is the optimal solution of an LPP

		c_j	4	6	2	0	0
c_B	B	x_B	y_1	y_2	y_3	y_4	y_5
4	x_1	1	1	0	-1	4/3	-1/3
6	x_2	2	0	1	2	-1/3	1/3
$z_j - c_j$		16	0	0	6	10/3	2/3

If the cost coefficients c_1 changes to 8, then find the optimal basic feasible solution of the modified problem.

b) Maximize $f(x) = \begin{cases} 2x/3, & x \leq 3 \\ 5 - x, & x > 3 \end{cases}$ in the interval $[1, 4]$ by Fibonacci method for $n = 5$.

c) Determine the value of x_1, x_2, x_3 so as to maximize $\{x_1, x_2, x_3\}$, subject to $x_1 + x_2 + x_3 = 10$ and $x_1, x_2, x_3 \geq 0$.

d) Write the procedure of Golden section method to optimize an unimodal minimization problem.

e) Write the steps of Steepest Descent method.

f) Using Newton's method Minimize $f(x_1, x_2) = x_1 - x_2 + 2x_1^2 + 2x_1x_2 + x_2^2$ with $\begin{pmatrix} 0 \\ 0 \end{pmatrix}$ as a starting point.

P.T.O

GROUP-C

3. Answer any **TWO** of the following questions: 2×8=16

a) Solve the following IPP using Gomory's cutting plane method

$$Maximize\ z = 7x_1 + 9x_2$$
$$subject\ to - x_1 + 3x_2 \leq 6$$
$$7x_1 + x_2 \leq 35$$
$$x_1, x_2 \geq 0\ and\ are\ integers$$

b) Using Gradient Projection method solve

$$Minimize\ f = x_1^2 + x_2^2 - 2x_1 - 4x_2$$

Subject to,
$$x_1 + 4x_2 \leq 5$$
$$2x_1 + 3x_2 \leq 6$$
$$x_1, x_2 \geq 0$$

c) Use dynamic programming to solve the following LPP

$$Maximize\ z = 3x_1 + 5x_2$$
$$subject\ to, x_2 \leq 6$$
$$x_1 \leq 4$$
$$3x_1 + 2x_2 \leq 18$$
and $x_1, x_2 \geq 0$

d) Graphically solve the following goal programming problem

$$Minimize\ z = P_1 d_1^- + P_2 d_2^- + P_3 d_3^-$$

subject to, $2x_1 + 3x_2 \leq 30, 6x_1 + 4x_2 \leq 60, x_1 + x_2 + d_1^- - d_1^+ = 10; x_1 + d_2^- - d_2^+ = 7, x_2 + d_3^- - d_3^+ = 8\ and\ x_1, x_2, d_i^-, d_i^+ \geq 0 (i = 1,2,3).$

[Internal Assessment- 10 Marks]

******