

**2021**

**Applied Mathematics with Oceanology and  
Computer Programming**

**[P.G.]**

**(CBCS)**

**(M.Sc. Third Semester End Examinations-2021)**

**MTM – 305 B**

***Full Marks: 50***

***Time: 02Hrs***

*The figures in the right hand margin indicate marks  
Candidates are required to give their answers in their own words as  
far as practicable  
Illustrate the answers wherever necessary*

**[ADVANCED OPTIMIZATION AND OPERATIONAL  
RESEARCH]**

**Answer question No. 1 and four from the rest.**

**1. Answer any four questions. 2x4=8**

- a) What is the importance of integer programming problem?
- b) Find the conjugate directions for the matrix  $\begin{pmatrix} 4 & 5 \\ 5 & 4 \end{pmatrix}$
- c) What do you mean by post optimality analysis?
- d) What are the limitation of Fibonacci method?

(2)

- e) Write down the iterative scheme of steepest Descent method?
- f) What are the advantages of revised simplex method over simplex method?

2. Write down the special structure of large scale L.P.P

Make the L.P.P.  $Max z = 6x_1 + 7x_2 + 3x_3 + 5x_4 + x_5 + x_6$

Subject to

$$\begin{aligned}
 x_1 + x_2 + x_3 + x_4 + x_5 + x_6 &\leq 50 \\
 x_1 + x_2 &\leq 10 \\
 x_2 &\leq 8 \\
 5x_3 + x_4 &\leq 12 && 2+6 \\
 x_5 + x_6 &\geq 5 \\
 x_5 + 5x_6 &\leq 50
 \end{aligned}$$

$x_1, x_2, \dots, x_6 \geq 0$

To an elegant form of L.P.P by decomposition principle.

3. The optimal simplex table for the L.P.P is given below

	$c_j$		2	1	1	2	0
$C_B$	$Y_B$	$X_B$	$Y_1$	$Y_1$	$Y_1$	$Y_1$	$Y_1$
2	$Y_1$	3	1	0	-1	3	2
1	$Y_2$	4	0	1	4	-1	-2
	$Z_j - C_j$		0	0	1	3	2

(3)

- i) Find the limits of variation of the costs  $c_3$  and  $c_1$  for which the current solution will remain optimal.
- ii) Find the optimal solution to the problem if  $c_3$  is increased by 3. 2+2+4

4. Solve the following IPP by Gomory's cutting plane method.

Maximize  $z = 2x_1 + 2x_2$

Subject to

$$\begin{aligned}
 5x_1 + 3x_2 &\leq 8 \\
 x_1 + 2x_2 &\leq 4 \\
 x_1, x_2 &\geq 0 \text{ and integers} && 8
 \end{aligned}$$

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

b) When required an artificial constraint method to solve an LPP. Explain it with an example. 4+4

6. Use modified simplex method to solve the goal programming problem

$$\begin{aligned}
 \text{Minimize } Z &= P_1(2d_2^- + d_3^-) + P_2d_1^- + P_3d_1^+ \\
 \text{Subject to} \\
 x_1 + d_1^- - d_1^+ &= 450 \\
 x_2 + d_2^- - d_2^+ &= 600 \\
 x_1 + x_2 + d_3^- - d_3^+ &= 800 \\
 \text{and } x_1, x_2, d_1^+, d_1^-, &\geq 0, i=1,2,3 && 8
 \end{aligned}$$

7. Discuss how to compute  $B^{-1}$  in revised simplex method.

**(4)**

Solve the following L.P.P by revised simplex method

$$\text{Maximize } z = 6x_1 - 2x_2 + 3x_3 \leq 2$$

Subject to

$$2x_1 - x_2 + 2x_3 \leq 2$$

$$x_1 + 4x_3 \leq 4$$

$$x_1, x_2, x_3 \geq 0$$

8

**[INTERNALASSESSMENT – 10]**