Roll No. ....

DD–768

M. A./M. Sc. (Fourth Semester) EXAMINATION, 2020

MATHEMATICS

(Optional—A)

Paper Fourth

(Operations Research)

Time : Three Hours

Maximum Marks : 80

Note : Attempt any *two* parts from each question. All questions carry equal marks.

Unit—I

1. (a) Use Dynamic Programming to solve the following problem :

Minimize :

$$u_1^2 + u_2^2 + u_3^2$$

subject to :

$$u_1 + u_2 + u_3 = 10$$

and $u_1, u_2, u_3 \geq 0.$

(b) Write the applications of Dynamic Programming.

(c) Solve the following LPP by using dynamic programming :

Maximize :

$$z = 3x_1 + 4x_2$$

subject to :

$$2x_1 + x_2 \leq 40$$

$$2x_1 + 5x_2 \leq 180$$

$$x_1, x_2 \geq 0.$$

Unit—II

2. (a) Calculate the value of game and probability of playing each strategy in the following game theory matrix :

	A		
B	30	40	60
	35	42	11

(b) Solve the following 2 × 4 game by graphical method :

		Player B			
		1	2	3	4
Player A	1	3	3	4	0
	2	5	4	4	7

(c) Solve the following 3 × 3 game by linear programming method :

		Player B		
		B_1	B_2	B_3
Player A	A_1	1	–1	3
	A_2	3	5	–3
	A_3	6	2	–2

Unit—III

3. (a) Solve the following integer programming problem using branch and bound method :

Min. :

$$z = 3x_1 + 2.5x_2$$

subject to :

$$x_1 + 2x_2 \geq 20$$

$$3x_1 + 2x_2 \geq 50$$

and $x_1, x_2 \geq 0$ and integer.

(b) Write the limitations of integer programming.

(c) Solve the mixed integer programming problem :

minimize :

$$z = 2x_1 + 2x_2 + 4x_3$$

subject to :

$$2x_1 + 3x_2 + 5x_3 \geq 2$$

$$3x_1 + x_2 + 7x_3 \leq 3$$

$$x_1 + 4x_2 + 6x_3 \leq 5$$

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

Unit—IV

4. (a) Write a short note on economic interpretation of dual linear programming.

(b) Explain about input-output analysis.

(c) Write a short note on indecomposable and decomposable economics.

Unit—V

5. (a) Determine x_1 and x_2 so as to :

Maximize :

$$z = 12x_1 + 21x_2 + 2x_1x_2 - 2x_1^2 - 2x_2^2$$

by using Kuhn-Tucker condition, subject to :

$$x_2 \le 8$$

$$x_1 + x_2 \le 10$$

and $$x_1, x_2 \ge 0 .$$

(b) Solve the following quadratic programming problem using Wolf's method :

Maximize :

$$z = 6x_1 + 3x_2 - 2x_1^2 - 3x_2^2 - 4x_1x_2$$

Subject to :

$$x_1 + x_2 \le 1$$

$$2x_1 + 3x_2 \le 4$$

and $$x_1, x_2 \ge 0.$$

(c) Solve the following non-linear programming problem using separable programming :

Maximize :

$$z = 2x_1^3 + \frac{5}{2}x_2$$

Subject to :

$$2x_1^2 + 3x_2 \le 16$$

and $$x_1, x_2 \ge 0.$$