Roll No. ..... Printed Pages: 3

PG-20415

TERM END EXAMINATION – 2020

M. Sc. FINAL YEAR

MATHEMATICS

Operation Research

[Maximum Marks: **70**

***Note** : Time – According to University Timing.*

All questions are compulsory. All questions carry equal marks.

1. (a) Using Simplex method: **[7]**

Max. $Z = 3x_1 + 2x_2 + 5x_3$,

Subject to the constraints:

$x_1 + 2x_2 + x_3 \leq 430$

$3x_1 + 2x_3 \leq 460$

$x_1 + 4x_2 \leq 420$ and $x_1, x_2, x_3 \geq 0$

OR

Discuss about, Phases or Methodology of operations research and classification of models.

(b) Construct the dual of following LPP: **[7]**

Minimize $Z = x_1 + x_2 + x_3$

Subject to:

$x_1 + 2x_2 \geq 20$

$3x_1 + 2x_2 \geq 50$

Where x_1 and x_2 are non-negative integers.

OR

Apply the principle of duality to solve the LPP:

Max. $Z = 3x_1 - 2x_2$,

Subject to

$x_1 + x_2 \leq 5$,

$x_1 \leq 4$, $1 \leq x_2 \leq 6$ and $x_1, x_2 \geq 0$.

2. Any two: **[2×7=14]**

(a) Solve the following transformation problem to maximize the profit:

Sources	Destinations D_1	D_2	D_3	D_4	Supply
S_1	15	51	42	33	23
S_2	80	42	26	81	44
S_3	90	40	66	60	33
	23	31	16	30	

(b) What is PERT and CPM? Also compare how they are different?

(c) Explain Transportation Problems and Assignment Problems in short. Also differentiate them.

3. Solve any two parts: **[2×7=14]**

(a) Solve the following LPP using dynamic programming-

Maximize $Z = 3x_1 + 4x_2$

Subject to:

$2x_1 + x_2 \geq 40$

$2x_1 + 5x_2 \leq 180$

Where $x_1, x_2 \geq 0$

(b) Solve the following game-

$$\begin{array}{ll} & \text{Player B} \\ & \begin{array}{cc} B_1 & B_2 \end{array} \\ \text{Player A} \quad \begin{array}{l} A_1 \\ A_2 \end{array} & \begin{bmatrix} 3 & 5 \\ 4 & 1 \end{bmatrix} \end{array}$$

(c) By using dynamic programming, solve the following problem:

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

Subject to $u_1 + u_2 + u_3 = 10$

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

4. Solve any two: **[2×7=14]**

(a) Discuss simulation with terminology steps and advantages.

(b) Discuss advantages and limitations of integer programming.

(c) Solve the following integer programming problem by using branch and bound method:

Minimize $Z = 3x_1 + 2.5x_2$

Subject to

$x_1 + 2x_2 \geq 20$

$3x_1 + 2x_2 \geq 50$

Where integers, $x_1, x_2 \geq 0$

5. Solve any two: **[2×7=14]**

(a) Discuss the difference in between Linear programming problem and Non-linear programming problem.

(b) Explain about classification of non-linear programming problem.

(c) Find the extreme value of

$z = f(x_1, x_2) = 2x_1x_2$

Subject to: $x_1^2 + x_2^2 = 1$

……..XX……..