DHANAMANJURI UNIVERSITY
DECEMBER- 2022

Name of Programme	**:**	**B.A./B.Sc. Mathematics (Honours)**
Semester	**:**	**I**
Paper Type	**:**	**SEC**
Paper Code	**:**	**SMA-001**
Paper Title	**:**	**Linear Programming and its Applications**

Full Marks : 40

Pass Marks : 16 **Duration:2 Hours**

The figures in the margin indicate full marks for the questions.

Answer all the questions.

1. **Answer the following questions:**

a) Define general linear programming problem. State three characteristics of standard form of LPP. 2+2=4

b) A toy company manufactured two types of dol, a basic version of doll A and a deluxe version doll B. Each doll of type B takes twice as long as to produce 1 doll of type A. Thus the company would have time to make a maximum of 2000 types of doll A per day. The supply of plastic is sufficient to produce 1500 dolls per day (both A and B combined). The deluxe version requires a fancy dress of which 600 are available per day. If the company makes a profit of Rs 300 and Rs 500 per doll respectively on doll A and doll B. Then how many of each dolls should be produced per day in order to maximize the total profit? Formulate the LPP and solve graphically. (Graph paper will not be supplied) 3+3=6

2. Define basic solution. Solve the following LPP by using ***simplex method***.2+8=10

Minimize $Z = x_1 - 3x_2 + 2x_3$

Subject to the constraints $3x_1 - x_2 + 2x_3 \leq 7$

$2x_1 + 4x_2 \leq 12$

$-4x_1 + 3x_2 + 8x_3 \leq 10$

$x_1, x_2, x_3 \geq 0$

Or

Define Convex sets. Solve the following LPP by using ***simplex method***. 2+8=10

Minimize $Z = 4x_1 + 10x_2$

Subject to the constraints $2x_1 + x_2 \leq 50$

$2x_1 + 5x_2 \leq 100$

$2x_1 + 3x_2 \leq 90$

$x_1, x_2 \geq 0$

3. Define artificial variables. Using ***Charnes penalty Big M Method*** to solve the following LPP. 2+8=10

Minimize $Z = 3x_1 - x_2$

Subject to the constraints $2x_1 + x_2 \geq 2$

$2x_1 + 3x_2 \leq 3$

$x_2 \leq 4$

$x_1, x_2 \geq 0$

Or

Use ***two phase method*** to solve the following LPP. 10

Minimize $Z = 3x_1 - x_2$

Subject to the constraints $2x_1 + x_2 \geq 2$

$2x_1 + 3x_2 \leq 2$

$x_2 \leq 4$

$x_1, x_2 \geq 0$

4. Write the algorithm for solving a given LPP by using ***simplex method*** 10

*****