Question Paper

Exam Date & Time: 19-Dec-2022 (09:30 AM - 12:30 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

INTERNATIONAL CENTRE FOR APPLIED SCIENCES
END SEMESTER THEORY EXAMINATION - DECEMBER 2022
III SEMESTER B.Sc. (Applied Sciences) in Engg.

Mathematics -III [IMA 231 - S2]

Marks: 50 **Duration: 180 mins.**

Answer all the questions.

1) (5)

A) How many ways are there to distribute eight different chocolates among four children if the first child gets at least two chocolates?

B) Use the generating function method to find the number of ways to place 25 people in five different rooms. Solve the problem with additional constraint that at least one person in each room. (5)

2) (10)

Consider the following LP with two variables:

$$\text{Minimize } z = x_1 + 4x_2$$

subject to

$$x_1 + 3x_2 = 3$$
$$3x_1 + 4x_2 \geq 6$$
$$2x_1 + x_2 \leq 4$$
$$x_1, x_2 \geq 0.$$

Show that the M- method produces the optimal solution at $x_1 = 9/5, x_2 = 2/5$. Find Minimum value of z.

3) (5)

A) Show algebraically that all the basic solutions of the following LP are infeasible.

$$\text{Maximize } z = x_1 + x_2$$

subject to

$$x_1 + 2x_2 \leq 3$$
$$2x_1 + x_2 \geq 8$$
$$x_1, x_2 \geq 0.$$

B) (5)

Consider the following LP with two variables:

$$\text{Maximize } z = 2x_1 + 3x_2$$

subject to

$$2x_1 + x_2 \leq 4$$
$$x_1 + 2x_2 \leq 5$$
$$x_1, x_2 \geq 0.$$

Show that the simplex method produces the optimal solution at $x_1 = 1, x_2 = 2$.

4) (5)

Let X is a continuous random variable with pdf