

## Operations Research (MT 4031)

Date: 24-09-2025

### Course Instructor(s)

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## Sessional I

Total Time 60 mins

Total Marks: 30

Total Questions: 3

ROLL NO

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Section

A

Student Signature

Attempt all the questions.

**CLO #:** 1 *Recognize the importance of operations research and linear programming by learning the characteristics of different types of decision-making environments, appropriate decision-making approaches, and tools to be used in each type.*

**Q.1: [10]**

A beverage company makes three types of drinks — A ( $x_1$  liters), B ( $x_2$  liters), and C ( $x_3$  liters) that are blended into a single limited-edition drink. The number of units of drinks contributed to recipe balance per liter is 1 unit of A, 2 units of B and 1 unit of C and the mixture must total 6 units. The marketing team insists the batch must score at least 25 quality points. A gives 3 points per liter, B gives 5, C gives 4 points per liter. The cost per unit of A, B and C is \$2, \$3 and \$2 respectively. Find the optimal mix of the drinks A, B and C.

**CLO #:** 1

**Q2: [10]**

For the linear model given below, enumerate all basic solutions. Classify them as feasible and infeasible. Verify your findings by showing these solutions in the graphical solution space.

$$\begin{aligned} \max z &= 5x - 10y \\ 2x + 5y &\leq 80 \\ x + y &\leq 20 \\ x, y &\geq 0. \end{aligned}$$

CLO #: 1

Q3: [10]

A basic feasible and optimal solution for the linear model

$$\max z = 3x + 2y$$

$$x + y \leq 10$$

$$2x + y \leq 14$$

$$x, y \geq 0.$$

is  $x = 4, y = 6$ .

Find

- a) The range so that the current solution remains optimal. If the objective function is replaced by  $\max z = 10x + 3y$ , will the current solution remain optimal?
- b) Find the dual price of both the constraints. If you are suggested to decrease the capacity of one constraint, what will be your choice?