National University of Computer and Emerging Sciences

Lahore Campus

0136

Operations Research (MT4031)

Sessional-I Exam

Date: September 24, 2024

Course Instructor(s)

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Total Time (Hrs):	**1**
Total Marks:	**30**
Total Questions:	**3**

Roll No _____ Section _____ Student Signature _____

Do not write below this line

i) Attempt all the questions neatly on the answer sheet.
ii) Solve all the parts of a question together in order.
iii) Don't use a red pen or lead pencil to solve the paper.

CLO #1:

Q1:

a. Formulate the following problem as a linear mathematical model and find its solution graphically.

A farmer has 20 hectares to grow barley and swedes. The farmer has to decide to decide how much of each to grow. The cost per hectare for barley is $30 and swedes is $20. The farmer has budgeted $480. Barley requires 1 man-day per hectare and swedes require 2 man-days per hectare. There are 36 man-days available. The profit of barley is $100 per hectare and on swedes is $120 per hectare.

b. With reference to the model constructed in part 'a', answer the following questions.
   i. What will be the optimality range of the model.
   ii. Suppose that the unit revenues for products barley and swedes are changed to $150 and $95, respectively. Will the current optimum remain the same?

[6+3+1]

CLO # 1:

Q2: Solve the following model using an appropriate method.

$$\text{Max } z = 3x_1 + 2x_2 + 3x_3$$

subject to

$$2x_1 + x_2 + x_3 \leq 2$$
$$3x_1 + 4x_2 + 2x_3 \geq 8$$
$$x_1, x_2, x_3 \geq 0.$$

[10]

CLO #1:

Q3:

a. Solve the following LPP using Simplex method.

b. What do you find special about the solution? Explain.

$$\text{Max } z = x_1 + 2x_2$$

subject to

$$x_1 + x_2 \leq 3$$
$$x_2 \leq 2$$
$$\frac{1}{2}x_1 + x_2 \leq \frac{5}{2}$$
$$x_1, x_2 \geq 0.$$

[7+3]