(University of Choice)

MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY (MMUST)

UNIVERSITY EXAMINATIONS

2021/2022 ACADEMIC YEAR

(Main Exams)

THIRD YEAR FIRST SEMESTER EXAMINATIONS

FOR THE DEGREE

OF

BACHELOR OF SCIENCE INFORMATION TECHNOLOGY

COURSE CODE: BIT 311

COURSE TITLE: OPERATIONS RESEARCH

DATE: 05/12/2022   **TIME:** 08:00-10:00AM

INSTRUCTIONS TO CANDIDATES

Question ONE (1) in Section A is compulsory
Answer any other 2 questions from Section B

TIME: 2 Hours

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MMUST observes ZERO tolerance to examination cheating

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QUESTION 1:

a) Define Linear Programming?   (2 Marks)

b) Identify and state any three main roles of Operations Research?(3 Marks)

c) The development of Operation Research generally involves *six* steps.

Identify the six steps and briefly describe what each of the steps entails.

(9 Marks)

d) Bata Factory in Limuru, Kiambu County is producing two products Open shoes and closed shoes. The processing hours are 3 and 4 hours per unit for Open shoes on operations one and two respectively, and 4 hours and 5 hours per unit for Closed shoes on operations on one and two respectively. The available time is 18 hours and 21 hours for operations one and two respectively. Open shoes can be sold at KES 300/- profit per unit and closed shoe at KES 800/- profit per unit. Using graphical method, solve for the optimal solution (Optimal Profit)?   (8 Marks)

e) Discuss the limitations of Operations Research.   (8 Marks)

SECTION B: ANSWER ANY THREE QUESTIONS {20MARKS, EACH}

QUESTION 2:
a) Discuss the various steps involved in solving an assignment problem?
(8 Marks)
b) A company has four plants, each of which can manufacture any one of the four products. Production costs differ from one plant to another, as do the cost of raw material.
Given the profit data as below, assign the products to plants for maximum profit.   (12 Marks)

		Products (Profit in KES 000)			
		A	**B**	**C**	**D**
	1	9	8	4	1
Plant	**2**	5	7	28	5
	3	3	10	4	2
	4	3	1	5	3

QUESTION 3:

a) Why is simplex method a better techniques than the graphical approach

for most of the cases? (4 Marks)

b) What is meant by the term "sensitivity analysis" in linear programming?

(4 Marks)

c) Identify any five changes that when effected would alter the product mix?

(5 Marks)

d) List the advantages of linear programming (3 Marks)

e) Describe the limitations of linear programming. (4 Marks)

QUESTION 4:

a) Differentiate between the following models: (3 Marks)

    i.   Transportation Model

    ii.   Assignment Model

b) State the *four major* methods of solving transportation model problems.

(4 Marks)

c) A transportation problem involves the following costs, supply, and

demand:

To					
From	1	2	3	4	Supply
1	KES 500	KES 750	KES 300	KES 450	12
2	650	800	400	600	17
3	400	700	500	550	11
Demand	10	10	10	10	

i. Find the initial solution using the northwest corner method,

(3 Marks)

ii. Find the optimal solution using the modified distribution method (MODI). (7 Marks)

iii. Formulate this problem as a linear programming model.(3 Marks)

QUESTION 5:

a) Explain the following terminologies as used in Linear Programming;

   i. Linear constraints (2 Marks)

   ii. Optimum Solution (2 Marks)

   iii. Feasible Solution (2 Marks)

b) Discuss how linear programming is applied in management?(6 Marks)

c) A power generator manufacturer makes generators and air-conditioners in a factory that is divided into two shops. Shop A, which performs the basic assembly operation must work 5 man-days on each generator but only 2 man-days on each air-conditioned. Shop B which performs finishing operation must work 3 man-days for each air-conditioner or generator that it produces. Because of men and machine limitations, shop A has 180 man-days per week available while shop B has 135 man-days per week. If the manufacturer makes a profit of KES 3000 on each generator and KES 2000 on each air-conditioner.
Required

   i. Generate the basic solution (5 Marks)
   ii. Give the second generation feasible solution (3 Marks)