



**MASINDE MULIRO UNIVERSITY OF SCIENCE AND  
TECHNOLOGY**

**SCHOOL OF BUSINESS AND ECONOMICS**

**(MAIN CAMPUS)**

**UNIVERSITY EXAMINATIONS (SPECIAL)**

**2021/2022 ACADEMIC YEAR**

**SECOND YEAR, TRIMESTER**

**FOR THE DEGREE**

**OF**

**BACHELOR OF COMMERCE**

**COURSE CODE:     BCB 206**

**COURSE TITLE: MANAGEMENT DECISION MODELS**

**DATE: MONDAY, 1<sup>ST</sup> AUGUST 2022 TIME: 8:00 – 10:00AM**

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**INSTRUCTIONS TO CANDIDATES**

Answer **QUESTION ONE** and **any other Two**

**TIME: 2 Hours**

**QUESTION ONE (COMPULSORY) 30 MARKS**

a) A Company manufactures; maize flour, wheat flour and animal feeds. The company has 50 employees including the management and the support staff. The company has faced challenges that include rejection of its products on market, transportation challenges and huge losses. You have been invited by the management as an expert to give advice to improve the situation. Given that management involves decision-making, briefly discuss how you could assist the management under the following concepts:

i) Definition of the term “**decision**” as used in management models. (3marks)

ii) Defintion of “**linear programming**” as used in management models (3 marks)

ii) Assumptions made in solving transportation problems (4 marks)

b) A firm has three production stations; S1, S2 and S3. Weekly productions are; 7 tons of goods at S1, 9 tons of goods at S2 and 18 tons of goods at S3. These goods are to be transported to four Districts named as; D1, D2, D3 and D4, with respective requirements of 5, 8, 7 and 14 tons per week. The transportation costs in U.S. dollars (\$) per ton between the firm and the Districts locations are as shown in the table below.

	D1	D2	D3	D4	Production Capacity
S1	19	30	50	10	7
S2	70	30	40	60	9
S3	40	8	70	20	18
Requirements	5	8	7	14	34

Construct a suitable linear programming model to minimize the total cost of transportation. (10 marks).

c) Write any three and relevant rules used in construction of a network as applied in decision models (3 marks).

d) Outline three goals of queuing systems design (3 marks)

e) Using simulation approach, analysts introduce constants and variables related to a problem, then set up possible course of actions and establish criteria which serves as a measure of effectiveness. Outline any four and relevant steps used in constructing a simulation model. (4 marks)

**QUESTION TWO (20MARKS)**

a) Write the dual model designated by G, given the following primal model of a linear programming problem designated by Z. (5marks).

Maximize:  $Z = 25x_1 + 12x_2 + 15x_3$

Subject to:

$$x_1 + x_2 \leq 20,$$

$$3x_1 + 5x_2 + 3x_3 \leq 55,$$

$$x_1, x_2, x_3 \geq 0$$

b). A Firm manufacture two types of products designated by A and B. Product A consumes 2Kg of raw material and 4 hours of labor per unit. Product B consumes 3Kg of raw material and 3 hours of labor per unit. 60Kg of raw material and 96 hours of labor are available per week. The profit on one unit of product A is Ksh.40. The profit on one unit of product B is Ksh.35. Formulate a linear programming model to maximize profit for the firm given that all the products are sold. (10mks).

c). Explain five assumptions of a linear programming model (5mks)

**QUESTION THREE (20 MARKS)**

a) Briefly explain the following terminologies as used in management decision models:

- i) Decision making under certainty. (2marks)
- ii) Decision making under risk (2marks)
- iii) Decision by Maximin criterion (2marks)

b) A distributing company has noted delays in provision of its services. To alleviate the problem, the production manager is considering the following courses of action; engage a sub-contract S1, introduce overtime work S2, buy new carriers (S3). However, the correct choice depends majorly upon the future demand, which has been categorized as; low demand with probability (0.1), medium demand with probability (0.5) or high demand with probability (0.4). A cost analysis forecasts the effect upon the profit as tabulated below.

Demand	Probability	S1	S2	S3
Low (L)	0.10	10	-20	-150
Medium (M)	0.50	50	60	20
High (H)	0.40	50	100	200

Construct a decision tree diagram for the given situation showing the expected monetary value (EMV) for each alternative, and determine the most preferred decision and its corresponding EMV. (14marks).

**QUESTION FOUR (20 MARKS)**

Use simplex method to solve the following linear programming problem. (20mks).

Maximize:  $Z = 3x_1 + 5x_2 + 4x_3$

Subject to:

$$2x_1 + 3x_2 \leq 8$$
$$2x_2 + 5x_3 \leq 10$$
$$3x_1 + 2x_2 + 4x_3 \leq 15.$$
$$x_1, x_2, x_3 \geq 0$$

**QUESTION FIVE (20 MARKS)**

A firm that produce computer softwares has three programmers designated as A, B, C. The management wants three new programs to be developed by the programmers. The manager estimates time in minutes required by each programmer for the development of the programs as shown in the table below.

		Programmers		
		A	B	C
Programs	1	120	100	80
2	80	90	110	
3	110	140	120	

Assign the programmers in such a way that can minimize the total time that is required to develop the programs. (20 marks)

**END**