



GRETSA UNIVERSITY - THIKA

UNIVERSITY EXAMINATIONS JANUARY – APRIL 2025 SEMESTER

BACHELOR OF COMMERCE

COURSE CODE: BCBA 202

COURSE TITLE: MANAGEMENT DECISION MODELS

DATE: APRIL 2025

TIME: 2 HOURS

INSTRUCTIONS TO CANDIDATES

1. SECTION A IS **COMPULSORY**.
2. SECTION B: ANSWER ANY OTHER **TWO** QUESTIONS.
3. **DO NOT** WRITE ANYTHING ON THIS QUESTION PAPER AS IT WILL BE AN EXAM IRREGULARITY.
4. ALL ROUGH WORK SHOULD BE AT THE BACK OF YOUR ANSWER BOOKLET AND CROSSED OUT.

CAUTION: *All exam rooms are under CCTV surveillance during the examination period.*

SECTION A: COMPULSORY

Question One

- a) At a nearby market, a merchant, offers his items for sale. He purchases the items for Sh. 200 per kilogram and, if it is sold that same day, sells it for Sh. 300 per kilogram. The items will sell for Sh. 110 per kilogram if he sells it the next day. After that, the items loses all of its value, and each kilogram that is not sold by the end of the second day costs sh. 50. The data below pertains to her sales trends over a 320-day period.

Quantity Purchased	Number of days	Quantity demanded	Number of days
100	40	100	65
200	60	200	65
300	90	300	80
400	80	400	70
500	<u>50</u>	500	<u>40</u>
	<u>320</u>		<u>320</u>

Required;

Simulate the operations for a period of 10 days and show the profit made per day

Use the following random numbers:

Quantity purchased: 04, 33, 58, 98, 39, 22, 54, 96, 45, 23

Quantity sold: 21, 34, 36, 48, 12, 51, 72, 57, 02, 33

[15 Marks]

- b) A large distributor sells 35,000 units of a commodity to a manufacturing facility each year for Sh. 35 each. The distributor has since sent the business an updated price schedule for large purchases:

Order quantity Quantity Discount (sh.)

Less than 5000 units 3.50

Between 5000 and 12500 units 4.0

12500 units or more 5.50

The total amount of placing an order and executing the delivery of the items is sh. 27.

Inventory carrying cost as a percentage is 18% of average inventory investment.

Required:

Determine the best procurement policy for this firm.

[15 Marks]

- c) Discuss the procedure of converting an unbalanced Transportation problem into a balanced transportation problem and the procedure of dealing with a degenerate problem. **[6 marks]**
- d) Briefly discuss the origin of Operations Research **[4 marks]**

SECTION B: ANSWER ANY TWO QUESTIONS

Question Two

- a) A Logistics firm operates three warehouses spread across the nation's towns. The business must supply its clients, who are spread out across the nation, with the inventory. The inventories in the three warehouses are listed below, along with the customers' requirements:

Warehouse	Nairobi	Kisumu	Mombasa
Inventory (bags)	280	186	162
Customer	Bidco	Pwani Life	Menengai
Requirement (bags)	286	125	205

The table below shows the cost of transporting one bag of wheat from the warehouse to the customer

		Customer		
		A	B	C
Warehouse	1	80	150	120
	2	140	90	140
	3	160	110	136

Required

- i. Determine the minimum total transportation cost using North West Method **[6 marks]**
- ii. Optimize the initial solution above using MODI method **[9 marks]**
- b) Discuss the costs associated with inventories **[5 marks]**

Question three

a) Based on past data, a store seller calculates that, 12 customers arrive per hour. She estimates that one person can get served every five minutes. Given exponential service times and Poisson arrivals, determine the

i. Average number of customers in line [2 marks]

ii. Average time a customer waits [2 marks]

iii. Utilization rate of the store [2 marks]

iv. Average time the customer spends in the system [2 marks]

v. Probability that no customers are in the system [2 marks]

b) The table below summarizes information for employees in an organization. The manager wants to assign the duties to individuals while minimizing the cost incurred to have the workers perform their tasks.

Employees/Tasks	1	2	3	4
K1	8	7	10	6
K2	5	7	9	6
K3	4	5	11	7
K4	10	4	8	3

How should the jobs be assigned to various employees so that the total cost is minimized?

[10 marks]

Question Four

a) A housing project comprises of the following eight activities

Activity	preceding activity	Normal Time	Normal Cost
A	-	6	270
B	-	15	260
C	A	5	150

D	A	17	170
E	A	8	260
F	B, C	6	200
G	D	3	180
H	E, F, G	8	190

Required

- i. Draw a network diagram to represent the above project information **[8 marks]**
 - ii. Show the critical path for the project and determine the duration for the project **[4 marks]**
- b) Explain the application of queuing models in business management **[8 marks]**

Question five

- a) "Discuss the characteristics of operations research **[10 marks]**
- b) Explain the behavior of individuals in queues. **[10 marks]**