GRETSA UNIVERSITY - THIKA

UNIVERSITY EXAMINATIONS

MAY – AUGUST 2023 SEMESTER

BACHELOR OF COMMERCE

COURSE CODE: BCBA 201

COURSE TITLE: MANAGEMENT DECISION MODELS

DATE:3 AUGUST 2023 **TIME: 8.00 AM – 11.00 AM**

INSTRUCTIONS TO CANDIDATES

1. SECTION A IS **COMPULSORY.**
2. SECTION B: ANSWER ANY OTHER **THREE** 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) The following table summarises transportation costs for an organization with various factories in different locations. These factories are required to send their processed goods to different parts of the country. The manager of this factory wants to establish the most reasonable routes to use so as to minimise the total cost of transport. Requirements (in 000s) tonnes for the destinations are as follows: 50, 35, 40 and 30 respectively. On the other hand availability at sources are: 30, 45 and 70 respectively.

		Destinations			
		Nairobi	Ravine	Turkana	Elgon
Sources	Factory A	16	9	14	9
	Factory B	6	12	9	7
	Factory C	10	13	8	5

i. Obtain the initial feasible solution using the following methods:

a. Least Cost Method **[4 Marks]**

b. Vogel's Approximation Method **[4 Marks]**

ii. Find the optimal solution using the results obtained from the Vogel's Approximation Method **[7 Marks]**

b) A manufacturer of household items based in Nairobi City receives supplies for his production from various suppliers within the country. The following information follows

Monthly demand for production items: 5000 units

Price per unit: sh. 15

Ordering costs per order: sh. 30

Holding cost: 15% of basic price

Quantity discounts are offered on the basic price to the manufacturer as follows:

1400 – 1799 units less sh. 2

1800 – 2199 units less sh. 3

Over 2200 units less sh. 4.5

i. Determine the basic EOQ **[3 Marks]**

ii. Advise the trader on the most economic quantity to order **[12 Marks]**

c) Discuss the various features of operations research. **[10 Marks]**

SECTION B: ANSWER ANY THREE QUESTIONS

QUESTION TWO

a) The owner of a carwash business in town has hired an employee to operate his automatic cleaning machine. Requests are received from random clients. His clients normally require the service to be offered in the minimum time possible. Records obtained from previous operations indicate that clients arrive at a rate of 12 clients per hour. They are served at a rate of 13 clients per hour

Determine:

i. The probability that the carwash is busy **[2 Marks]**

ii. The average time a client spends in the system **[2 Marks]**

iii. The average number of clients in the system **[2 Marks]**

iv. The average number of clients in the queuing system **[2 Marks]**

v. The probability of having zero clients in the queue **[2 Marks]**

b) The manager of a water and sewerage company has a number of engineers to service and repair company equipment in various locations. The following tables provides a summary of cost of wages incurred by the company when an engineer is sent to a certain location.

	Thika	**Ruiru**	**Githurai**	**Kimbo**	**Makongeni**
Queen	55	175	185	130	105
Richard	80	160	170	80	80
Stevie	190	130	155	120	70
Taylor	110	155	110	50	35
Usama	160	135	140	50	200

Assign the engineers to the different locations so that the total cost of assignment is minimized. **[10 Marks]**

QUESTION THREE

a) The following table summarises activities related to a house construction project. The project manager wants to establish the duration of constructing the house and he also wishes to deliver the project before the stipulated time.

Activity	Normal Time (Months)	Crash Time (Months)	Normal Cost (000s)	Crash Cost (000s)
1-2	7	5	120	150
1-3	4	2	80	90
1-4	6	4	150	180
2-3	8	6	80	120
2-5	9	6	160	200
3-5	3	2	100	130
4-5	6	5	120	170

i. Represent this information in a network diagram and determine the critical path. **[5 Marks]**

ii. Determine the optimum duration of the project and the associated total cost. **[3 Marks]**

iii. Establish the minimum duration of delivering this project and the cost associated with the reduction of the project duration **[7 Marks]**

b) Discuss the importance of holding stock in an organization **[5 Marks]**

QUESTION FOUR

a) The following information relates to a retailer of basic household items. He buys goods in bulk and resells to his customers who live in nearby estates. His buying price is fixed at sh.40, while his selling price sh. 55. He realises a profit when all commodities bought are sold within a week. He however incurs a penalty of sh. 8 for unmet customer requirements.

The following data summarises demand and supply information concerning this retailer for the past 600 days.

Demand (000 liters)	No of Days	Supply (00s liters)	No of Days
100	83	100	55
140	85	140	70
170	98	170	95
150	105	150	115
160	19	160	29
175	38	175	58
250	112	250	98
270	60	270	80

Random Numbers for supply

110	93	89	52	37	48	77	08	38	42	85	73
61	68	08									

Random Number for Demand

103	83	65	53	90	08	37	59	68	14	09	18
50	73	07									

Simulate a 15 day trading period and advice this retailer **[15 Marks]**

b) Discuss the following terms:

i. Network Analysis **[1 Marks]**

ii. Game Theory **[1 Marks]**

iii. Simulation **[1 Marks]**

iv. Queue **[1 Marks]**

v. Activity **[1 Marks]**

QUESTION FIVE

a) Discuss the advantages and disadvantages of simulation **[10 Marks]**

b) Explain the behaviour of calling units in queues **[5 Marks]**

c) Discuss Zero sum game as well as the Prisoner's dilemma. **[5 Marks]**