



KIBABII UNIVERSITY

UNIVERSITY EXAMINATIONS
2021/2022 ACADEMIC YEAR

SECOND YEAR SECOND SEMESTER
MAIN EXAMINATIONS

FOR THE DEGREE OF BACHELOR OF SCIENCE IN RENEWABLE
ENERGY AND BIO FUELS TECHNOLOGY

COURSE CODE: REN 224

COURSE TITLE: OPERATIONS RESEARCH

DURATION: 2 HOURS

DATE: 12/05/2022

TIME: 2:00PM-4:00PM

INSTRUCTIONS TO CANDIDATES

- Answer **QUESTION ONE** (Compulsory) and any other two (2) Questions.
- Indicate **answered questions** on the front cover.
- Start every question on a new page and make sure question's number is written on each page.

This paper consists of **4** printed pages. Please Turn Over



KIBU observes ZERO tolerance to examination cheating

SECTION A: COMPULSORY

QUESTION ONE (30 MARKS)

(a) Describe the following terms as they are applied in respect to Programme Evaluation and Review Technique

(i) Dummy activity

(ii) Parallel activity

(6 marks)

(b) Highlight the following terms applied in Inventory control

(i) Direct inventory

(ii) Indirect inventory

(iii) Purchased parts inventory

(6 marks)

(c) (i) State FOUR applications of a markov process

(ii) Describe the term “mixed strategy” as it is applied in Game Theory

(6 marks)

(d) Highlight the THREE Queue disciplines and THREE Customer behaviours as they are applied in Queuing models.

(6 marks)

(e) With the aid of a graph determine the feasible space for each of the following constraints given that $x_1, x_2 \geq 0$

(i) $-3x_1 + x_2 \geq 6$

(ii) $-x_1 + x_2 \geq 0$

(6 marks)

SECTION B: ANSWER ANY TWO QUESTIONS FROM THIS SECTION

QUESTION TWO (20 MARKS)

(i) Define the term “Operation’s Research”

(ii) Highlight FIVE applications of Operation’s Research in Industry.

(iii) Explain FOUR limitations of Operations Research.

(iv) Explain the term “unbounded solution space” as it is applied in linear programming.

QUESTION THREE (20 MARKS)

(i)Kanduyi transportation company ships truckloads of maize from three silos to four mills.The supplies and demands are shown in Table 1.The unit cost in dollars is indicated at the Northwest corner of each box. Determine the minimum cost shipping schedule between the silos and the mills using the North-west corner method.

Table 1

		Mill				
		1	2	3	4	supply
Silo	1	10	2	20	11	15
	2	12	7	9	20	25
	3	4	14	16	18	10
Demand		5	15	15	15	

(ii)The owner of Kenor petrol station is studying the effect on his business from a new petrol station, Sherr petrol station that has been opened on the same road. Currently the market share is 80% and 20% between Kenor and Sherr petrol stations respectively. Analysis over the last week has indicated the following probabilities for customers switching from one petrol station to the other. Determine the expected market share for Kenor and Sherr after another TWO weeks have past.

		TO	
		KENOR	SHERR
FROM	KENOR	0.75	0.25
	SHERR	0.55	0.45

(20 marks)

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QUESTION FOUR (20 MARKS)

With the aid of a graphical method determine Anne's mixed strategy from the game between Anne and Paul shown in Table 2.

TABLE 2

		PAUL'S STRATEGIES			
		A	B	C	D
ANNE'S STRATEGIES	1	4	3	1	3
	2	0	5	2	1

QUESTION FIVE (20 MARKS)

(i) Construct the network using the information in Table 3:

Table3

ACTIVITY	IMMEDIATE PREDECESSOR
A	-----
B	A
C	A
D	A
E	D
F	D
G	E
H	F,G
I	C,H
J	B

(ii) A certain transport company receives an average of four customers per hour in the booking bay. Determine the probability that THREE customers will arrive between 9.00pm-10.00pm.