CHUKA   **UNIVERSITY**

UNIVERSITY EXAMINATIONS

SECOND YEAR EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF COMMERCE

BCOM 263: OPERATIONS RESEARCH I

STREAMS: BCOM (ODEL) Y2S2   **TIME: 2 HOURS**

DAY/DATE: TUESDAY 11/04/2023   **2.30 P.M. – 4.30 P.M.**

INSTRUCTIONS: Answer question ONE and any other TWO questions

QUESTION ONE

(a)   Operations research has grown and become a major discipline in Kenya of today. Discuss five characteristics of operation research.   [10 marks]

(b)   Discuss the importance of using models in solving business problems.   [10 marks]

(c)   Bidii ltd has four plants namely P, Q, R and S and manufactures four products P1, P2, P3, and P4. Each of the plants can manufacture any of the four products. The following data relates to the company.

Plants	Products profitability ('000')			
	P1	P2	P3	P4
P	22	36	28	22
Q	30	34	32	30
R	26	30	28	24
S	26	22	32	26

Determine the assignment that will maximize profits for the company.   [10 marks]

QUESTION TWO

(a)   State and explain any five requirements for linear programming.   [10 marks]

(b)   A company produces two products A and B and are processed through three operations namely painting, assembly and testing. The relevant data concerning the two products are shown in the following table:

Time in hours required for each unit

Product	Selling price	Assembly	Painting	Testing
A	50	1	2	0.5
Y	80	1.5	3	1.0

The total available time in hours for each operation is as follows;

Painting 150 hours

Testing 50 hours

The company wishes to determine the product mix that will maximize revenue

Required:

(i)   Formulate the problem as a linear programming problem   [6 marks]

(ii)   Write the problem in standard form   [4 marks]

QUESTION THREE

(a)   Discuss five benefits of using network diagrams in managing projects.   [10 marks]

(b)   A project consists of the following activities;

Activity	Name of the activity	Preceding activity	Estimated time in weeks
1-2	A	NONE	1
1-3	B	NONE	4
1-4	C	NONE	6
2-5	D	A	2
3-5	E	B	3
4-6	F	C	7
5-7	G	D, E	6
3-6	H	B	7
6-7	I	H, F	6

Required:

(i)   Draw a network diagram for the project   [6 marks]

(ii)   Determine the critical path and project duration   [4 marks]

QUESTION FOUR

(a)   The demand for a particular item is 10,000 units per year. The cost per unit is kshs. 20 and it costs an average kshs. 3600 to place an order and process the delivery. The inventory carrying cost is estimated to be 9% of the average inventory investment. Shortages are not allowed.

Required:

(i)   Calculate the economic order quantity   [6 marks]

(ii)   The number of orders per year   [4 marks]

(b)   Discuss any five limitations of using the Reorder level system in managing inventories.

[10 marks]