CHUKA UNIVERSITY

UNIVERSITY EXAMINATIONS

FOURTH YEAR EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF ECONOMICS AND STATISTICS AND DEGREE OF ECONOMICS AND SOCIOLOGY

ECON 431/438: OPERATIONS RESEARCH

STREAMS: B (ECON/STAT) & (ECON/SOCI) Y4S1 **TIME: 2 HOURS**

DAY/DATE: MONDAY 29/03/2021 **11.30 A.M. – 1.30 P.M.**

INSTRUCTIONS:

- **Answer question one and any other two questions.**

Q1. (a) Discuss any five benefits of using operations research techniques to solve business problems in Kenya. (10 marks)

(b) State and explain the steps that are followed in solving operations research problems. (10 marks)

(c) A computer servicing company has several technicians who service computers. The technicians have different capabilities is servicing computers. The manager of the company has obtained four computer servicing jobs that need to be done immediately. He has selected the best technicians to do the jobs. The time in minutes that each technician can take to service a machine is as shown below:

	Machine to be serviced			
	A	B	C	D
Technician 1	120	160	140	100
2	90	80	130	70
3	150	120	90	110

Required

Assign the technicians the servicing jobs in an optimal manner. Explain your assignment.

(10 marks)

2. (a) Discuss any five qualities of a mode that can be used in solving operations research problems. (10 marks)

(b) A construction company has described the following activities as necessary for a project.

Activity	Preceding activity	Activity duration in months
A	-	5
B	A	7
C	A	8
D	C	2
E	-	3
F	E	6
G	-	1
H	G	2
I	B, D	10
J	F, I	8
K	H	17
L	K,J	3

Required:

(i) Draw a network diagram for the project.

(ii) Determine the critical path and project duration. (10 marks)

3. (a) Discuss any five benefits of good inventory management practices. (10 marks)

(b) Explain any five assumptions in the calculation of the Economic Order Quantity (EOQ). (5 marks)

(c) Give any five benefits of using the reorder level system in managing inventories. (5 marks)

4. (a) A company manufacturers two products A and B. Product A contributes Ksh. 60 per unit to profit while product B contributes of 40 per unit to profits. It is estimated that in the coming season the sales for product A will not exceed 20. The sales for product B have not been estimated but the company has a contract of supplying at least 10 units to a regular customer. There are only 100 machine hours available in the season. Product A requires 4 hours machine time per unit while product B require 2 hours machine time per unit. There are only 180 labour hours available in the season product A requires 4 hours while product B requires 6 hours labour time per unit. The materials available

in the season are restricted to 40 units and the two products each use one unit of material per unit. The company plans to maximize its profits in the coming season.

Required:

(i) Formulate the problem as a linear programming problem. (8 marks)

(ii) Write the problem in standard form. (4 marks)

(iii) Determine the leaving variable, entering variable and the pivot element. (6 marks)

(iv) Give two limitations of using the graphical method in solving linear programming problems. (2 marks)
