CHUKA  **UNIVERSITY**

UNIVERSITY EXAMINATIONS

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

BCOM 263: OPERATIONS RESEARCH I

STREAMS: BCOM Y2S2 **TIME: 2 HOURS**

DAY/DATE: MONDAY 27/09/2021 **2.30 P.M. – 4.30 P.M.**

INSTRUCTIONS

- **Answer question ONE and any other TWO questions**

1. a) Discuss any five benefits of using models to solve business problems. (10 marks)

   b) Explain any five operations research techniques that are used to solve problems in Kenya. (10 marks)

   c) The following activities relate to a project to be undertaken soon:

Activity	Preceding activity	Activity duration in months
A	-	12
B	A	13
C	A	15
D	A	18
E	B	16
F	C	11
G	C	12
H	C,D	13
I	E,F	17
J	G,H	14
K	I,J	15

Required

i. Draw a network diagram for the project. (5 marks)

ii. Determine the project duration and critical path. (5 marks)

2. a) Discuss any five advantages of using the reorder level system in managing inventories. (10 marks)

   b) The following data relates to the usage of an important component in a manufacturing organization:

Maximum monthly usage	3000 units
Minimum monthly usage	2000 units
Lead time: Maximum	6 months
Minimum	2 months
Reorder quantity	7,500 units

   Calculate

   i. The reorder level (4 marks)

   ii. The minimum stock level (3 marks)

   iii. The average stock level (3 marks)

3. a) Discuss the steps that are followed in solving assignment problems using the Hungarian method. (10 marks)

   b) Ndagani Secretarial Bureau has employed five copy typists to assist typing reports for their clients. The average time taken in minutes that each typist can take to type a report is as shown in the following table:

TYPISTS	REPORTS				
	R_1	R_2	R_3	R_4	R_5
A	80	140	150	80	120
B	100	150	140	110	120
C	120	140	170	110	140
D	100	110	150	110	150
E	140	170	200	130	170

   There are five reports to be typed and each typist will be assigned one report at a time.

   Required

   Determine the optimal assignment and minimum time required to have all the reports typed. (10 marks)

4. a) Explain any five requirements that are necessary in using the linear programming technique to solve problems. (5 marks)

   b) The following Linear programming problem was formulated by business students:

   Maximize $Z = 300x_1 + 160x_2$

   Subject to the following constraints:

   $2x_1 + 2x_2$ ¿ 1200

   $8x_1 + 4x_2$ ¿ 4000

   $2x_1 + 3x_2$ ¿ 2000

   x_1, x_2 ¿ 0

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

ii. Draw the initial simplex tableau and show the entering variable, leaving variable and the pivot element. (7 marks)

iii. Calculate the new values of the new pivot row. (4 marks)

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