CHUKA   **UNIVERSITY**

UNIVERSITY EXAMINATION

RESIT/SPECIAL EXAMINATION

EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF COMMERCE

BCOM 263: OPERATIONS RESEARCH 1

STREAMS: **TIME: 2 HOURS**

DAY/DATE: MONDAY 01/11/2021   **2.30 P.M – 4.30 P.M**

INSTRUCTIONS:

ANSWER QUESTION ONE AND ANY OTHER TWO QUESTIONS. TIME ALLOWED. TWO HOURS.

1 (a) Discuss any Five benefits of using Operations Research Models to solve business problems
                                                        (10 Marks)

(b) Discuss any Five different rules or guidelines that assist in drawing network diagrams in project management   **(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 weaknesses 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 methods that are used to solve assignment problems   **(8 Marks)**

 (b) Five machines are to be allocated to Five Operators. The following table gives the weekly
     output of the machines with different operators in thousands of units.

OPERATORS	WEEKLY OUTPUT OF MACHINES (000)				
	M_1	M_2	M_3	M_4	M_5
O_1	20	22	27	32	36
O_2	19	23	29	34	40
O_3	25	28	35	39	34
O_4	21	24	31	37	42
O_5	24	28	31	36	41

     Assign the operators the different machines in an optimal manner and determine the
     maximum weekly output.   **(12 Marks)**

4.(a) Give Five benefits of using Linear programming technique to solve business problems
(5 Marks)

(b) A company produces two products A and B that share the total production capacity of ten tones per week. The Company has a permanent contract of supplying at least four tones of product A and at least five tones of product B per week to other companies. Each tone of product A requires 20 machine hours production time and each tone of product B requires 50 machine hours production time. The weekly maximum available machine time is 400 hours. All the firms output can be sold and the profit made is Kshs. 90 per ton of product A and Kshs. 130 per ton of product B. The company wants to use the linear programming technique to maximize its weekly profits.

REQUIRED
(i) Formulate the problem as a linear programming problem **(5 Marks)**
(ii) Write the problem in standard form **(2 Mark**s).

(iii) Draw the initial simplex tableau and show the Entering Variable, the Leaving Variable and the Pivot Element **(8 Mark**s).