CHUKA   **UNIVERSITY**

UNIVERSITY EXAMINATIONS

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

BCOM 361: OPERATIONS RESEARCH II

STREAMS: Y3S1   **TIME: 2 HOURS**

DAY/DATE: TUESDAY 23/03/2021   **11.30 A.M – 1.30 P.M**

INSTRUCTIONS:

Answer question one and any other two questions

1. (a) Discuss any reasons to explain why organization replace assets.   [10 marks]

    (b) Explain why managers may use simulation process in decision making.

    [10 marks]

    (c) A bank plans to open a single server drive in ATM banking facility at a particular centre in town. It is estimated that 28 customers will arrive per hour on average. Customer service time vary depending on the service required but the average service time is 2 minutes. The assumptions of single phase single channel queuing system will apply.

    Required :

    (i)   The proportion of time that the facility is idle.   [2 marks]

    (ii)   Average number of customers in the system   [2 marks]

    (iii)   Average number of customers is the queue   [2 marks]

    (iv)   Average time a customer spends in the queue   [2 marks]

    (v)   Average time a customer spends in the system.   [2 marks]

2. (a) Discuss the methods that are used to determine the initial feasible solution in solving transportation problems.   [6 marks]

(b) A company has three warehouse A,B and C and four stores W,X,Y and Z. The warehouses have a combined 150 tones of a given commonly that is distributed as follows:

Ware house   **quantity**

A   50 tonnes

B   60 tonnes

C   40 tonnes

The four stores need the following amount .

Store   **quantity (tonnes)**

W   20

X   70

Y   50

Z   10

The cost of transporting one unit of the commodity from the various warehouses to different stores is as follows;

	W	X	Y	Z
Store A	50	150	70	60
B	80	70	90	10
C	15	87	79	81

Required :

(i)   Formulae the problem as a transportation problem.   [5 marks]
(ii)   Determine the transportation schedule using Vogel's method.   [6 marks]
(iii)   What is the associated transportation cost .   [3 marks]

3. (a) Explain any five assumption of a markov process.   [10 marks]
    (b) A company produces two competing products A and B in the same market . The marketing department has estimated the state transition matrix for the two products to be

$$\begin{pmatrix} 0.7 & 0.3 \\ 0.1 & 0.9 \end{pmatrix}$$

Initially product A commands 70% of the available market. It is assumed that the assumptions of a first order markov process will apply.
Required :
(i)   Market shares of the two product in the first two periods.   [4 marks]

(ii)   Market shares of the two products at equilibrium.   [6 marks]

4. (a) Discuss the steps that are used in solving simutation problems.   [10 marks]
     (b) Explain any five limitations of a simulation process.   [10 marks]