

CHUKA



UNIVERSITY

**UNIVERSITY EXAMINATIONS  
RESIT/SPECIAL EXAMINATIONS**

**EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF COMMERCE  
BCOM 361: OPERATION RESEARCH II**

**STREAMS:**

**TIME: 2 HOURS**

**DAY/DATE: MONDAY 01/02/2021**

**8.30 A.M – 10.30 A.M**

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**INSTRUCTIONS:**

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

1a) Discuss any five reasons for replacement of assets in organizations. [ 10 marks]

b) Discuss any five reasons why organizations may opt to use a simulation technique to solve problems. [10 marks]

c) A microfinance company has a single cashier. During the normal working hours, customers arrive at the rate of one customer in every three minutes. The average number of customers that can be processed by the cashier is 24 per hour. Assume that the condition of single channel queuing model applies.

Calculate:

(i) The customer utilization value (2marks)

(ii) The number of customers in the queuing system (2marks)

(iii) The average time that customers spend in the system (2marks)

(iv) The average number of customers in the queue (2marks)

(v) The average time that customer spends in the queue waiting for service. ( 2marks)

2. (a) Discuss any five business applications of Markov analysis. [10 marks]

(b) A company produces two competing products A and B. products A commands 70% of the market while product B commands the remaining 30% of the marker share. The marketing department has projected the state transition matrix for the two products as follows:

	A	B
A	0.60	0.40
B	0.40	0.60

(i) Calculate the market shares of the two products in the next two periods. [4 marks]

(ii) The market shares at equilibrium [6 marks]

3. (a) Using suitable examples, distinguish between sudden failure and gradual failure of assets.

(5marks)

(b) Discuss any five benefits of using the replacement models to manage assets. [5 marks]

C) A company has three factories I, II and III which make weekly dispatches of four depots A, B, C and D. The transport cost per crate of goods dispatched along each route is as follows:

		Cost per crate				
	Depot	A	B	C	D	Quantity available
Factory	I	4	7	9	2	200
	II	1	8	3	9	400
	III	4	6	3	5	200
Quantity Required		250	250	420	80	1000

Using Vogel's approximation method (VAM) determine the number of crates to be sent along each of the routes to minimize the transportation cost. [10 marks]

4. (a) An automobile company manufactures around 150 scooters per day. The daily production varies from 146 to 154 depending on many variables that include the availability of raw materials and other working conditions as follows:

<b>Production per day</b>	<b>Probability</b>
146	0.04
147	0.09
148	0.12
149	0.14
150	0.11
151	0.10
152	0.20
153	0.12
154	0.08

The finished scooters are transported in a specially designed lorry that can accommodate 150 scooters at the end of each working day. Using the following random numbers 80,81,76,75,64,43,18,26,10,12,65,68,69,51,57

- (i) Simulate the process to determine the daily production [7 marks]
- (ii) Determine the average number scooters waiting in the factory. [4 marks]
- (iii) Determine the average number of empty spaces in the lorry . [4 marks]
- (b) Discuss any five limitation of simulation in relation to problem (a) above. [5 marks]

