CHUKA  **UNIVERSITY**

UNIVERSITY EXAMINATIONS

THIRD YEAR EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF PROCUREMENT AND LOGISTICS MANAGEMENT

BCOM 361: OPERATIONS RESEARCH II

STREAMS:Y3S2 **TIME: 2 HOURS**

DAY/DATE: TUESDAY 17/04/2018 **11.30 A.M – 1.30 P.M**

INSTRUCTION:

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

1. (a) Discuss any five queue displines that are used in Kenya in serving customers. [10marks]

(b) Using suitable examples, distinguish between gradual failure and sudden failure as used in replacement theory. [10marks]

(c) ABC co ltd produces two products A and B that complete in the same markets. The marketing department of the company has determined the stale transition matrix for the two products to be ;

$$\begin{matrix} A \\ B \end{matrix}\begin{pmatrix} A & B \\ 0.75 & 0.25 \\ 0.40 & 0.60 \end{pmatrix}$$

At the moment product A has 70% of the market. It is assumed that the assumptions of a first order markov process will apply .

Required :

(i) Market share of the two products in the first two periods. [4marks]
(ii) Market share of the products at steady. [6marks]

2. (a) Discuss the steps in Monte Carlo simulation . [5marks]

(b) Achieng is a trader at Gikomba market dealing in selling fresh fish which is a perishable commodity. She buys the fish at 200 per kilogram and sells it at ksh 350 per kg if sold on the same day. If she sells the fish the following day the selling price is ksh 100 per kg. Thereafter the fish is worthless. In order to maximize her profits, she uses the last in first out method. The following information relates to her sales pattern for a sale periods.

Quantity purchase (kgs)	**No of days**	**Quantity demanded(kgs)**	**No of days**
100	140	100	155
200	150	200	165
300	190	300	180
400	180	400	170
500	140	500	130

Required :

Simulate the operations for a period of 10 days and show the profits made per day using the following random numbers; 44849792393383458392254964310932813648519770233457084667421607766

3. (a) Using suitable examples discuss the two important replacement policies of assets. [10marks]

(b) A mobile phone repair workshop receivers jobs for repair in a very unpredictable pattern. The inter arrival time on a average follow a Poisson distribution on average of a job in every five minutes . The service rate deffers from one customer to another and is characterized by an exponential distribution. The minimum time that a job takes is two minutes and the maximum time is 30 minutes depending on each jobs requirements. The average service time is four minutes per job. Assume that the conditions of single channel with Poisson arrivals and exponential service times queuing model will apply.

Required :

(i) The probability that the shop is idle. [2marks]
(ii) Expected number of customers in the queue. [2marks]
(iii) Average length of the queue. [2marks]
(iv) The mean time in the system. [2marks]
(v) Average time a customer spends waiting in a queue. [2marks]

4. (a) Discuss the two methods that are used to determine the optimal solution in transportation problem. [10marks]

(b) Grain handlers ltd has three warehouses $w_{1,}w_{2}and\ w_{3}$ that store rice. The capacity of each of the three warehouses is as shown in the table below.

Ware house	$w_{1,}$	$w_{2,}$	w_{3}
Capacity in bags	260	168	172

The company is required to supply three of its customers $C_{1,}C_{2}$ and C_{3} with rice. The requirements of the customers is as follows.

Ware house	$C_{1,}$	$W_{2,}$	W_{3}
Requirements in bags	280	120	200

The cost of transporting one bags of rice from the warehouse to the customer is as follows.

warehouse		C_1	C_2	C_3
	$w_{1,}$	100	80	120
	$w_{2,}$	140	80	140
	$w_{3,}$	160	120	140

Required :

(i) Formulate the problems as a transportation problem. [4marks]
(ii) The minimum transportation cost using the Vogels Approximation Method (VAM) [6marks]
