CHUKA UNIVERSITY

UNIVERSITY SUPPLEMENTARY/SPECIAL EXAMINATIONS.

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

BCOM/BBAM 371/BCOM 361: OPERATIONS RESEARCH II

STREAMS: BCOM & BBAM **TIME: 2 HOURS**

DAY/DATE: THURSDAY 26/07/2018 **11.30 A.M - 1.30 P.M**

INSTRUCTIONS:

- Answer **Question ONE and any other TWO Questions**
- Do not write anything on the Question paper.

1. (a) Discuss any five reasons for using a simulation process in business decision. [10 Marks]

   (b) Discuss any five reasons to explain why assets are replaced in organizations. [10 Marks]

   (c) Discuss the methods that are used in obtaining optimal solutions in transportation problems. [10 Marks]

2. (a) State and explain the steps in a simulation process. [5 Marks]

   (b) The following table shows the inter arrival times and the service times for customers in a single channel Automated Teller Machine ATM;

Inter arrival times		Service time	
Time in minutes	**probability**	**Time in minutes**	**probability**
1	0.10	1	0.08
2	0.25	2	0.14
3	0.30	3	0.18
4	0.25	4	0.24
5	0.10	5	0.22
		6	0.14

The ATM was opened at 8.30 AM. The management is concerned about the waiting time and the service spent in the ATM system. Simulate 10 ATM runs and estimate the customers waiting time and the time spent in the ATM system using the following random numbers;

7452; 9799; 3096; 9891; 4891; 1513; 3401; 7850; 8862; 2037. Comment on your results. [15 Marks]

3. (a) Using suitable examples, discuss the term absorbing state as used in Markov analysis. [5 Marks]

(b) In a County there are only two daily newspapers namely the Standard and Citizen newspapers. A research was conducted on the daily reading habits of the population of that county. The research found out that of those who read the Standard on a given day, 50% will read the same paper the following day while the rest will change to the Citizen newspaper. Of those who read the Citizen newspaper on a given day, 40% change to the Standard newspaper the following day while 60% read Citizen Newspaper. Yesterday the readership levels were 30% for the Standard newspaper and 70% for the Citizen newspaper. Assuming that the conditions of the first order Markov process apply,

Required:

(i) The state transition matrix for this problem.
(ii) The percentage of readership of the two newspapers today and tomorrow
(iii) The percentage of readership of the two newspapers after a very long time. [15 Marks]

4. (a) Discuss the assumptions of a single channel single phase queuing model. [5 Marks]

(b) A typist in an office receives letters according to the Poisson probability distribution. The typist receives on average 22 letters per day for typing. The typist works for 8 hours a day and it takes on average 20 minutes to type a letter. The typist works on the letters on First Come First Served (FCFS) basis.

Calculate the following:

(i) The typist utilization rate
(ii) The probability that the typist is idle
(iii) The average number of letters waiting to be typed
(iv) The average waiting time needed to have a letter typed
(v) Advice on the work of the typist as a profession person in this area. [15 Marks]

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