

**CHUKA**



**UNIVERSITY**

**SUPPLEMENTARY / SPECIAL EXAMINATIONS**

**THIRD YEAR EXAMINATION FOR THE AWARD OF BACHELOR DEGREE IN**

**BCOM 361/ B. COM 371/BBAM 371 :OPERATIONS RESEARCH II**

**STREAMS:**

**TIME: 2**

**HOURS**

**DAY/DATE: TUESDAY 17/11/2020**

**8.30 A.M - 10.30 A.M.**

**INSTRUCTIONS:**

- Answer question one and any other two questions.

1 (a) Discuss any **Five** benefits of using the Simulation in solving business problems **(10 Marks)**

(b) Discuss the methods that are used to get an optimal solution in transportation problems **( 10 Marks)**

(c) 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 news paper 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 tomorrow

- (iii) The percentage of readership of the two newspapers after a very long time ( 10 Marks)

- 2 (a) Discuss the methods that are used to determine the initial solution in solving a transportation problem ( 8 Marks)  
 ( b ) A queue was analyzed and the following distribution for arrivals and service time formed.

Till next arrival		Service time	
Time in minutes	Probability	Time in minutes	Probability
1	0.14	1	0.19
2	0.10	2	0.34
3	0.40	3	0.25
4	0.36	4	0.22

The business opens at 8.00 Am in the morning

**Required**

Using the following Random numbers, simulate the first Six arrivals and determine the time the last customer left the service point. 8060; 3449; 6055; 9055; 7685; 7250 (12 Marks)

3. (a) Discuss Four assumptions of a single channel single phase queuing model ( 8 Marks)  
 (b) During the rush hour in a supermarket, customers arrive at a mean rate of every four minutes. Their service time vary in a very unpredictable manner depending on the service required. While some customers take 30 minutes to be served others take as low as one minute. The average service time is two and half minutes. The customers are served on a first come first served basis. Assuming conditions of single phase single channel waiting queuing system calculate:
- (i) The Number of customers in the system
  - (ii) The average queue length
  - (iii) The average time a customer spends in the system
  - (iv) The average time that a waits before being served (12 Marks)

4. (a) Explain the steps that are involved in arriving at the equilibrium conditions in the Markov process (10 Marks)  
 (b) State and Explain any Five reasons for replacement of assets in any organization (10 Marks)

.....