CHUKA  **UNIVERSITY**

UNIVERSITY EXAMINATIONS

RESIT/SPECIAL EXAMINATION

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

BCOM 361: OPERATIONS RESEARCH II

STREAMS: BPLM Y3S2 **TIME: 2 HOURS**

DAY/DATE: MONDAY 28/08/2023 **11.30 A.M – 1.30 P.M.**

INSTRUCTIONS:

ANSWER QUESTION ONE AND ANY OTHER TWO QUESTIONS. TIME ALLOWED. TWO HOURS.

1.(a) Discus any five reasons to explain why organizations may decide to use simulation in the decision process **(10 Marks)**

(b)Discuss any Five benefits of replacing assets at the appropriate time of usage **(10 Marks)**

(c) A company produces two products P and Q that compete in the same market. The marketing department has calculated the state transition matrix for the products to be

	P	Q
P	0.9	0.I
Q	0.5	0.5

If P commands 50% of the market share, calculate the market shares at steady state **(10 Marks).**

2. (a) Discuss the two methods that are used to determine the optimal solution in a transportation problem **(6 Marks)**

(b)A doctor opened a clinic in the middle of a town. The patients arrival and service times can

Inter Arrival Times in Minutes	Probability
10	0.10
15	0.25
20	0.30
25	0.25
30	0.10

Service Time in Minutes	Probability
5	0.08
10	0.14
15	0.18
20	0.24
25	0.22
30	0.14

The doctor opens the clinic at exactly 8.00 Am in the morning. Patients have complained about the waiting time and the service time that they spend in the clinic.

REQUIRED

Simulate the arrival of ten patients and estimate;

(i) The customers waiting time

(ii) The time spent in the system and

(iii) Advise on the customer's complaints using the following Random numbers.

52 99 96 91 14 13 01 50 62 37

74 97 30 98 48 15 34 78 88 20

(14 Marks)

3 (a)Using suitable examples distinguish between single channel and multiple channel queuing models **(6 Marks)**

(b) A dentist receives on average 22 patients per day for different services. The dentist works for eight hours per day. The patients require different services that include cleaning that may take forty five minutes, filling that may take fifty minutes, tooth removal that takes ten minutes, and general consultancy that takes about fifteen minutes. However the average time that patient take with the dentist is twenty minutes.

Assume that the condition of single channel single phase queuing model applies, determine

(i) The Dentist utilization value

(ii) The probability that the Dentist is idle

(iii) The number of customers in the queuing system

(iv) The average number of customers in the queue

(v) The average time that a customer spends in the system

(vi) Give professional advice on the utilization of this facility **(14Marks)**

4.a) State and explain the assumptions of a single phase single channel queuing model **(10 Marks)**

(b) Using suitable examples, discuss the term Equilibrium condition as used in Markov analysis **(10 Marks)**
