

CHUKA



UNIVERSITY

**UNIVERSITY EXAMINATION  
RESIT/SUPPLEMENTARY / SPECIAL EXAMINATIONS FOR THE AWARD OF  
DEGREE OF BACHELOR OF AGRIBUSINESS MANAGEMENT**

**BCOM 361: OPERATIONS RESEARCH II**

**STREAMS: AGBM, BEEM**

**TIME: 2 HOURS**

**DAY/DATE: THURSDAY 12/08/2021**

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

**INSTRUCTION**

- **Answer question one and any other two questions.**
- **Time allowed two hours**

1 (a) Discuss any **Five** reasons that explain why assets are replaced in organizations.

**(10**

**Marks)**

(b) Using suitable examples, discuss the term absorbing state as used in Markov process.

**(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	0.1
Q	0.5	0.5

If P commands 60% of the market share, calculate the market shares at steady state **(10 Marks)**

2 (a) Explain the steps that are followed in solving simulation problems. **( 5 Marks)**

( b ) A doctor opened a clinic in the middle of a town. The patient's arrival and service times can be described using the following time distributions:

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

**(15 Marks)**

3. (a) Discuss the assumptions of a single channel single phase queuing model **( 7 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 **( 13Marks)**

4. (a) Explain the steps that are involved in arriving at the equilibrium conditions in the Markov process **(10 Marks)**

(b) Discuss the methods used to get optimal solutions in transportation problems. **(10 Marks)**

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