



National Open University of Nigeria
Plot 91, Cadastral Zone, Nnamdi Azikiwe Expressway, Jabi - Abuja
Faculty of Science
2023_1 POP EXAMINATION

COURSE CODE: CIT756

COURSE TITLE: OPERATIONS RESEARCH

CREDIT: 2 Units

TIME ALLOWED: 2HRS

INSTRUCTION: Answer Question ONE (1) and any other THREE (3) Questions

- 1 (a) Elucidate on the concept of Operations Research. (4marks)
(b) Identify the five basic facts about the operations research? (5 marks)
(c) Distinguish between the Standard versus Custom-made Models (7 marks)
(d) Summarize the four basic properties that all linear programming models have in common. (4 marks)
(e) Illustrate the three reasons that make stocks accumulation for businesses, less praiseworthy? (5 marks)
2 (a) A bank plans to open a single server drive-in banking facility at a particular centre. It is estimated that 28 customers with arrive each hour on an average. If on an average, it requires 2 minutes to process a customer's transaction, determine
i. The probability of time that the system will be idle
ii. On the average how long the customer will have to wait before receiving the server.
iii. The length of the drive way required to accommodate all the arrivals. On the average 20 feet of derive way is required for each car that is waiting for service. (9 marks)
(b) Different types of customers behave in different manner while they are waiting in queue; state and briefly compare four patterns of their behavior (6 marks)
3 (a) A NOUN university hospital wishes to provide at a minimum cost, a diet that has minimum of 200g of carbohydrates, 100g of protein and 120g of fats per day. These requirements can be met with two foods:

Table with 4 columns: Food, Carbohydrates, Protein, Fats. Row 1: A, 10g, 2g, 3g. Row 2: B, 5g, 5g, 4g.

If food A cost 29k per ounce and food B cost 15k per ounce, using LP model to formulate how many ounces of each food should be purchased for each patient per day in order to meet the minimum requirements at the lowest cost? (12 marks)

(b) Briefly illustrate the concepts of testing the model

- 4 (a) Assume a single channel service system of a library in a school. From past experiences it is known that on an average, every hour 8 students come for issue of the books at an average rate of 10 per hour. Determine the following
- i. Probability of the assistant librarian being idle
 - ii. Probability that there are at least 3 students in the system
 - iii. Expected time that a student is in queue
- (9 marks)
- (b) Identify the six reasons for holding the stocks (6 marks)

- 5 (a) Solve the following sequencing problem when passing off is not allowed

| Job | Machine Processing time in hours | | | |
|-----|----------------------------------|---|----|----|
| | A | B | C | D |
| I | 15 | 5 | 4 | 15 |
| II | 12 | 2 | 10 | 12 |
| III | 16 | 3 | 5 | 16 |
| IV | 17 | 3 | 4 | 17 |

(13 marks)

- (b) Illustrate the concepts the EOQ Model with gradual replenishment (2 marks)