National Open University of Nigeria
FACULTY OF COMPUTING

Department of Computer Science
2024_2 EXAMINATION

CIT425 - Operations Research
Instruction: Answer Question 1 and any other three questions
Time Allowed: 2 ¾ hours

Question 1:

a. (i) Define "model" in the context of Operations Research. ***2 marks***
   (ii) Name two types of models used in Operations Research ***4 marks***
b. (i) State the objective of the simplex method? ***2 marks***
   (ii) Explain why the simplex method becomes cumbersome for problems with more than two variables ***4 marks***
c. Explain the principle of optimality in dynamic programming ***4 marks***
d. What are the three methods of solution for obtaining an initial feasible solution in a transportation problem? Briefly explain each method. **9 marks**

Question 2:

a. Critique the appropriateness of using standard models versus custom-made models in Operations Research. ***8 marks***
b. Synthesize the various fields and applications where Operations Research is currently being used and explain its impact on diverse sectors. ***7 marks***

Question 3:

A farmer has 100 acres on which to plant maize or millet. To produce these crops, there are certain expenses as shown in the table below.

	Maize			Millet		
Items	Seed	Fertilizer	Labour	Seed	Fertilizer	Labour
Cost/acre (x₦ 1000)	12	58	50	40	80	90
Total cost (x₦ 1000)	120			210		

After the harvest, the farmer must store the crops awaiting proper market conditions. Each acre yields an average of 110 tonnes of corn or 30 tonnes of wheat. The limitations of resources are as follows:

- Available capital: ₦ 15,000,000 .
- Available storage facilities: 4,000 tonnes.

If net profit (the profit after all expenses have been subtracted) per tonne of maize is #1300 and for millet is #2000, how should the farmer plant the 100 acres to maximize the profits? ***15 marks***

Question 4: Assess the effectiveness of the dynamic programming approach in solving real-world planning problems. Provide examples to support your arguments. ***15 marks***

Question 5: Compare and contrast the North-West Corner method and the Vogel's Approximation method in terms of their effectiveness in finding an initial feasible solution for a transportation problem. ***15 marks***

Question 6:
If a company has six projects and three employees, explain how to handle this situation using dummy rows and columns in the assignment table. **15 marks**