



**NATIONAL OPEN UNIVERSITY OF NIGERIA
FACULTY OF SOCIAL SCIENCES
DEPARTMENT OF ECONOMICS
2020_2 EXAMINATION**

COURSE TITLE: OPERATIONS RESEARCH

COURSE CODE: ECO314

UNITS: 2 UNITS

TIME ALLOWED: 2 HOURS

INSTRUCTION: ANSWER ANY THREE (3) QUESTIONS. ALL QUESTIONS CARRY EQUAL MARKS

QUESTION ONE

(a). Suppose an industry is manufacturing two types of products P1 and P2. The profits per Kg of the two products are ₦30 and ₦40 respectively. These two products require processing in three types of machines. The following table shows the available machine hours per day and the time required on each machine to produce one Kg of P1 and P2. Formulate the problem in the form of linear programming model.

Profit/kg	P1 (₦30)	P2 (₦40)	Total available machine hour/day
Machine 1	3	2	600
Machine 2	3	5	800
Machine 3	5	6	1100

(16 marks)

(b). A company owns two flour mills viz. A and B, which have different production capacities for high, medium and low quality flour. The company has entered a contract to supply flour to a firm every month with at least 8, 12 and 24 quintals of high, medium and low quality respectively. It costs the company ₦2000 and ₦1500 per day to run mill A and B respectively. On a day, Mill A produces 6, 2 and 4 quintals of high, medium and low quality flour, Mill B produces 2, 4 and 12 quintals of high, medium and low quality flour respectively. How many days per month should each mill be operated in order to meet the contract order most economically.

(7.3 marks)

QUESTION TWO

- (a). Explain the term 'Linear programming'. **(7.3 marks)**
- (b). List and explain five (5) assumptions in Linear Programming Models. **(10 marks)**
- (c). Linear programming can be used for optimization problems if some conditions are satisfied. What are the conditions? Discuss. **(6 marks)**

QUESTION THREE

- (a). Discuss the assumptions of transportation model. **(6.3 marks)**
- (b). Briefly Discuss three (3) methods of developing an initial basic feasible solution in transportation model. **(10 marks)**
- (c). Discuss the Vogel's Approximation Method in transportation model. **(7 marks)**

QUESTION FOUR

- (a). Discuss the term Project Management. **(6.3 marks)**
- (b). Discuss the phases of decision analysis. **(7 marks)**
- (c). Explain in details three (3) qualitative approaches to decision making. **(10 marks)**

QUESTION FIVE

A farmer is considering his activity in the next farming season. He has a choice of three crops to select from, for the next planting season – Groundnuts, Maize, and Wheat. Whatever is his choice of crop; there are four weather conditions that could prevail: heaving rain, moderate rain, light rain, and no rain. In the event that the farmer plants Ground nuts and there is heavy rain, he expects to earn a proceed of ₦650,000 at the end of the farming season, if there is moderate rain ₦1,000,000, high rain – ₦450,000 and if there is no rain – (-₦1,000). If the farmer plants Maize, the following will be his proceeds after the harvest considering the weather condition: heavy rain – ₦1, 200,000, moderate rain – ₦1, 500,000, Light rain – ₦600, 000 and no rain ₦2000. And if the farmer decides to plant wheat, he expects to make the following: heavy rain – ₦1,150,000, moderate rain – ₦1,300,000, Light rain- ₦800,000 and No rain – ₦200 -000. The farmer has contacted you, an expert in operations research to help him decide on what to do. Construct a payoff matrix for the above situation, analyze completely and advise the farmer on the course of action to adopt. Assume $\alpha = 0.6$.

(23.3 marks)