



NATIONAL OPEN UNIVERSITY OF NIGERIA  
FACULTY OF SOCIAL SCIENCES  
DEPARTMENT OF ECONOMICS  
2023\_1 POP EXAMINATION

COURSE TITLE: APPLIED QUANTITATIVE ANALYSIS  
COURSE CODE: ECO 729  
UNITS: 2  
TIME ALLOWED: 2 HOURS  
INSTRUCTION: ANSWER ANY THREE QUESTIONS: ALL QUESTIONS CARRY  
EQUAL MARKS

**QUESTION ONE**

1a. A company makes three products and has available 4 workstations. The production time (in minutes) per unit produced varies from workstation to workstation (due to different manning levels) as shown below:

		Workstation			
		1	2	3	4
Product	1	5	7	4	10
	2	6	12	8	15
	3	13	14	9	17

Similarly the profit (₦) contribution (contribution to fixed costs) per unit varies from workstation to workstation as below:

		Workstation			
		1	2	3	4
Product	1	10	8	6	9
	2	18	20	15	17
	3	15	16	13	17

If, one week, there are 35 working hours available at each workstation how much of each product should be produced given that we need at least 100 units of product 1, 150 units of product 2 and 100 units of product 3. Formulate this problem as an LP. (NB. Stop at only the formulation of problem stage. Do NOT proceed to solve graphically)  
(18 Marks)

1b. A time series typically has four components. List them. (5.3 Marks)

## QUESTION TWO

- 2a. List six (6) steps in decision making. (6 Marks)
- 2b. Given the equation  $Y = 156 + 10x$ , forecast for years 2 to 10 (9 Marks).
- 2c. Like any other business decision variables there are some of concepts associated with inventory control theories. Explain the following inventory concepts (8.3 Marks):
- Ordering (Replacement) Costs
  - Holding (Carrying) Costs
  - Stock out Costs
  - Lead Time
  - Economic Ordering Quantity (EOQ)
  - Economic Batch Quantity (EBQ)

## QUESTION THREE

- 3a. Consider the following finite population that has these observations: 2, 4, 6, 8, and 10. Calculate the variance and the standard deviation for this population. (7 Marks)
- 3b. (i) Find the **union** of two sets, if A is {1, 2, 3} and Y is {2, 3, 4, 5}. (2 Marks)  
(ii) Find the **intersection** of two sets if A is {1, 2, 3} and B is {2, 3, 4, 5}, the union of sets A and B. (2 Marks)  
(iii) Find the **complement** of an event if the sample space is {1, 2, 3, 4, 5, 6, 7}, and B is {2, 3, 4, 5}. (2 Marks)
- 3c. What is the probability that a card taken from a standard deck is an Ace? (5.3 Marks)
- 3d. What are the measures of central tendency? Explain with the aid a graph. (5 Marks)

## QUESTION FOUR

- 4a. The following measurements of the specific heat of a certain chemical were made in order to investigate the variation in specific heat with temperature:

Temp $^{\circ}\text{C}$	0	10	20	30	40
Specific Heat	0.51	0.55	0.57	0.59	0.63

Estimate the regression line of specific heat on temperature and interprets the result, then predict the value of the specific heat when the temperature is  $25^{\circ}\text{C}$ . (16 Marks).

- 4b. Compute the coefficient of determination (R-squared) and find the unexplained variation. (7.3 Marks)