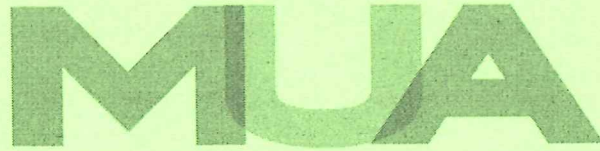


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**UNDERGRADUATE UNIVERSITY EXAMINATIONS**  
**SCHOOL OF MANAGEMENT AND LEADERSHIP**  
**DEGREE OF BACHELOR OF MANAGEMENT AND**  
**LEADERSHIP/BACHELOR OF COMMERCE**

**BML 103/BCM 112 : BUSINESS MATHEMATICS**

**DATE: 28<sup>TH</sup> MARCH 2024**

**DURATION: 2 HOURS**

**MAXIMUM MARKS: 70**

**INSTRUCTIONS:**

1. Write your registration number on the answer booklet.
2. **DO NOT** write on this question paper.
3. This paper contains **SIX (6)** questions.
4. Question **ONE** is compulsory.
5. Answer any other **THREE** questions.
6. Question **ONE** carries **25 MARKS** and the rest carry **15 MARKS** each.
7. **Write all your answers in the Examination answer booklet provided.**

**QUESTION ONE**

- a. Kenneth deposited Ksh. 120,000 in a bank, which gives an interest rate of 10% compounded semiannually. Determine
- How much will Kenneth get when he withdraws all his savings at the end of 5 years **(3 marks)**
  - Calculate the accumulated interest **(1 mark)**
- b. Mary buys 2 skirts and 2 blouses in a shop and in total they cost Ksh. 1,800. Jane buys 3 skirts and 2 blouses in the same shop and they cost Ksh. 2,200
- Form a set of simultaneous equations **(2 marks)**
  - Find the price of each skirt and each blouse **(3 marks)**
- c. Given the set  $A = \{0, 1, 4, 5\}$  and  $B = \{1, 4\}$ . The universal set  $U = \{0,1,2,3,4,5,6,7,8,9,10\}$
- Draw a Venn diagram for the given information **(2 marks)**
  - Find  $A \cup B$  **(2 marks)**
  - Find  $A \cap B$  **(2 marks)**
  - $A^c$  **(1 mark)**
  - $B^c$  **(1 mark)**
- d. Differentiate the following terms used in business mathematics
- Differential calculus and integral calculus **(2 marks)**
  - Simple Interest and Compound Interest **(2 marks)**
  - Equation and Function **(2 marks)**
  - Mutually exclusive events and independent events **(2 marks)**

**QUESTION TWO**

The table below presents the distribution of persons according to different income groups

Income (000)	0-10	10-20	20-30	30-40	40-50	50-60	60-70
Number of Persons	6	8	10	12	7	4	3

**Required:** Calculate

- Arithmetic Mean **(3 marks)**
- Median **(2 marks)**
- Standard Deviation **(6 marks)**
- Coefficient of variation **(2 marks)**
- Coefficient of skewness **(2 marks)**

**QUESTION THREE**

- a) Evaluate  $\int_2^5 (10x^3 + 4x - 1) dx$  (6 Marks)
- b) The sum of two numbers is 100 and their difference is 16. Find the two numbers (4 marks)
- c) An integer  $X$  is picked at random from the set  $1 \leq X \leq 20$ , find
- The probability of picking a prime number (2 marks)
  - The probability of picking a multiple of 5 and a factor of 24 (3 marks)

**QUESTION FOUR**

Solve the following set of simultaneous equations using matrix inverse method

$$6x + 5y + 3z = 110$$

$$8x + 4y + 5z = 130$$

$$7x + 6y + 3z = 125$$

(15 marks)

**QUESTION FIVE**

The following prices and quantities reflect the average weekly consumption patterns of a certain family for the years 2021 and 2022

Item	2021		2022	
	Price (P <sub>0</sub> )	Quantity (Q <sub>0</sub> )	Price (P <sub>1</sub> )	Quantity (Q <sub>1</sub> )
	Shs.		Shs.	
Lime	30	4	50	2
Cheese	60	4	70	4
Cake	60	6	80	6
Beans	100	2	130	2

**Required**

- Price relatives for each item (4 marks)
- Laspeyre's price index (4 marks)
- Paasche's Price Index (4 marks)
- Fisher's Ideal Price Index (3 marks)

**QUESTION SIX**

A survey of 1000 first year students pursuing a Bachelor's degree at a university in 2022 was carried out to determine those taking mathematics, chemistry and physics. The findings of the survey were as follows: 320 students took mathematics, 200 students took chemistry and 450 students took physics. 150 students took mathematics and physics, 70 students took mathematics and chemistry and 100 students took chemistry and physics. 300 students did not take mathematics, chemistry and physics.

- i. Present the above information in a Venn diagram (6 marks)
- ii. Find the number of students who took all three subjects (4 marks)
- iii. Determine the number of students who took exactly one subject (3 marks)
- iv. Determine the number of students who took at least two subjects (2 marks)

**BML 103/ BCM 112: BUSINESS MATHEMATICS - FORMULAS**

$$\text{Mean} = \frac{\sum X}{n}$$

$$\text{Mean,} = \frac{\sum FX}{\sum F}$$

$$\text{Z-Formula} = \frac{\text{Mean Value}}{\text{standard deviation}}$$

$$\text{Mode} = L + (F1 - f0)/(2F1 - f0 - F2) \times i \quad \text{or} \quad \text{Mode} = L + \left( \frac{D_1}{D_1 + D_2} \right) \cdot c$$

$$\text{Median} = L + \frac{i}{F} (m - c) \quad \text{or} \quad \text{Median} = L + \left( \frac{\frac{N}{2} - F_{m-1}}{f_m} \right) \cdot c$$

$$\text{Variance} = \frac{\sum F(X - \text{mean})^2}{\sum F} \quad \text{or} \quad \text{Variance, } S^2 = \frac{\sum fx^2}{\sum f} - \bar{x}^2$$

$$\text{Standard deviation} = \sqrt{\frac{\sum F(x - \text{mean})^2}{\sum F}} \quad \text{or}$$

$$\text{Standard deviation, } S = \sqrt{\frac{\sum fx^2}{\sum f} - \bar{x}^2}$$

$$\text{CV} = \frac{\text{SD}}{\text{Mean}} \times 100$$

$$\text{SKp} = 3 \times \frac{(\text{mean} - \text{median})}{\text{Standard deviation}}$$

$$S = P(1 + r n)$$

$$S = P(1 + r)^n$$

$$L_p = \frac{\sum q_0 p_n}{\sum q_0 p_0} \times 100$$

$$L_Q = \frac{\sum p_0 q_n}{\sum p_0 q_0} \times 100$$

$$P_p = \frac{\sum q_n p_n}{\sum q_n p_0} \times 100$$

$$P_Q = \frac{\sum p_n q_n}{\sum p_n q_0} \times 100$$

$$F_p = \sqrt{L_p \times P_p}$$

$$F_Q = \sqrt{L_Q \times P_Q}$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

