The Management University of Africa

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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: **5TH DECEMBER 2023**

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) Explain three importance of matrices in business management **(3 Marks)**

b) Find the nature of the turning points of the function

$Y=X^3 - 6X^2 + 9X + 4$ **(5 Marks)**

c) An integer X is picked at random from the set: $1 \leq X \leq 20$. Find;

i. The probability of picking a prime number **(2 Marks)**

ii. The probability of picking a multiple of 5 or a factor of 24 **(3 Marks)**

d) A soda retailer noted that twice the number of crates, of two brands Fanta and Sprite exceeded three times their difference by 8, while half the sum was one more than their difference. If the number of Fanta crates was X and the number of Sprite crates was Y, find X and Y **(4 Marks)**

e) How long will it take to accumulate Ksh. 112,900 from an investment of Ksh. 90,000 at a rate of 10% per annum compound interest **(3 Marks)**

f) Calculate the standard deviation of the following data **(5 Marks)**

119, 130, 132, 138, 143, 145, 150, 152, 153

QUESTION TWO

a) Consider the following data that represent the marks scored by 50 students in a test:

Marks	20-29	30-39	40-49	50-59	60-69	70-79	80-89
No. of students	2	3	9	14	17	4	1

Required:

i. Calculate the coefficient of variation **(8 Marks)**

ii. Calculate the coefficient of skewness **(5 Marks)**

b) Solve for x in; $5(x-4) = 2(x+1) - 7$ **(2 Marks)**

QUESTION THREE

a) Solve the following system of simultaneous equation using Cramer's rule

$X - Y + 2Z = 20$

$-X + 2Y - 3Z = 31$

$2X + Z - 2Y = -23$

(9 Marks)

b) What is implied about A and B if $n(AUB) = n(B)$ **(2 Marks)**

c) Using a diagram illustrate relative positioning of the three measures of central tendency on the two types of skewness **(4 Marks)**

QUESTION FOUR

a) A business woman invested Shs. 420,000 at 12% p.a. compound interest over 5 years. How much did her investment amount to, if:

i. Compounded semi-annually? **(3 Marks)**

ii. Compounded quarterly? **(3 Marks)**

b) Of the 20 girls in a team, 16 play hockey, 12 play tennis and 4 play basketball. Every girl plays at least 1 game and 2 plays all the three. How many plays two and only two games **(6 Marks)**

QUESTION FIVE

a) Evaluate $\int_1^5 (3x^4 - 2x)dx$ **(5 Marks)**

b) Let $A = \begin{pmatrix} 2 & 2 \\ 3 & -3 \end{pmatrix}$

Find F(A) if $F(A) = 3A^2 + A^{-1} - A^T$ **(7 Marks)**

c) Explain why Fisher's index number is referred to as an 'ideal' method **(3 Marks)**

QUESTION SIX

a) The following data related to commodity X,Y and Z for a period of two years.

	2021		2022	
Commodity	**Price**	**Quantity**	**Price**	**Quantity**
X	10,500	40	13,000	70
Y	9,800	60	45,300	60
Z	12,000	55	20,900	54

Compute Fisher's 'ideal' price index number **(8 Marks)**

b) Define the following terms as used in probability. Give example in each case

i. Independent event **(2 Marks)**

ii. Mutually exhaustive event **(2 Marks)**

iii. Mutually exclusive events **(2 Marks)**

iv. Statistical experiment **(1 Mark)**

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Mean $= \frac{\Sigma X}{n}$ Mean, $= \frac{\Sigma FX}{\Sigma F}$ Z-Formula $= \frac{\text{Mean Value}}{\text{standard deviation}}$

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

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

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

Standard deviation, $S = \sqrt{\frac{\Sigma F(x - mean)^2}{\Sigma F}}$ or $\sqrt{\frac{\sum fx^2}{\sum f} - \bar{x}^2}$

$CV = \frac{SD}{Mean} \times 100$ $SKp = 3 \times \frac{(\text{mean} - \text{median})}{\text{Standard deviation}}$

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

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

$P_P = \frac{\sum q_n p_n}{\sum q_n p_0} \times 100$ $P_Q = \frac{\sum p_n q_n}{\sum p_n q_0} \times 100$

$F_P = \sqrt{L_P \times P_P}$ $F_Q = \sqrt{L_Q \times P_Q}$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$