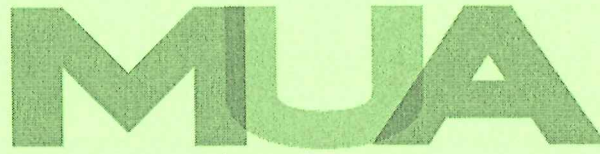**The Management University of Africa**

Sponsored by the Kenya Institute of Management

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: *2ND AUGUST 2018*

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) Differentiate between

    i.   Independent events and mutually exclusive events   **(2 Marks)**

    ii.   Continuous Variables and Discrete Variables   **(2 Marks)**

b) Solve the following equations using matrix method   **(4 Marks)**

$$2x + 4y = 20$$
$$x - 3y = 18$$

c) Explain any two methods used to construct simple index numbers   **(2 Marks)**

d) Calculate the amount to be paid after 6 years if Ksh. 80,000 is borrowed at 15% p.a compounded quarterly   **(4 Marks)**

e) Solve for x given: **(4 Marks)**

$$\frac{1+x}{2x} = \frac{x-5}{20}$$

f) Find the nature of the turning point given: **(7 Marks)**

$$C = 3q^3 - 400q - 4q^2 + 1000$$

g) Giving examples in each case, explain any two rules of probability   **(2 Marks)**

QUESTION TWO

a) The following data shows the prices and quantities of weekly consumption pattern of a certain community for years 2016 and 2017.

Items	2016		2017	
	Price (Sh)	Quantity (Kg)	Price (Sh)	Quantity (Kg)
Bread	40	1	200	4
Sugar	200	2	300	3
Eggs	320	2	400	2
Blue band	400	4	500	5

Required to calculate:

Fishers Price Index Number   **(12 Marks)**

b) Explain any three applications of index numbers   **(3 marks)**

QUESTION THREE

a) Giving examples in each case, explain any three types of a matrix   **(6 Marks)**

b) Solve the following system of equation using matrix algebra   **(9 Marks)**

$4x + 3y + z = 22$

$y - 2x + z = 18$

$3x - y + 4z = 30$

QUESTION FOUR

a) In a city, three daily newspapers are published and sold. 36% of the people in the city read citizen (C), 66% read nation (N), 25% read star (S), 16% read citizen and nation, 18% read nation and star, 13% read citizen and star and 8% read all the three papers. If the population in the city is 10 million persons, use Venn diagram to find the number of people who do not read all the three papers. **(9 Marks)**

b) Using a Venn diagram, shade the regions shown below:

    i) $(C \cup N) \cap S^I$ **(3 Marks)**

    ii) $(C \cap N)^I \cup S$ **(3 Marks)**

QUESTION FIVE

The following table indicates the marks obtained by potential employees in their final text.

Marks	Number of Students
0 – 20	5
20 – 40	7
40 – 60	12
60 – 80	10
80 – 100	6

Determine:

    a) The median **(4 Marks)**

    b) The standard Deviation **(9 Marks)**

    c) Coefficient of Skewness **(2 Marks)**

QUESTION SIX

a) Solve for x, given **(5 Marks)**

$$\int_{-1}^{2}(7x^2 + 6x + 100)\, dx$$

b) How long will it take for a given sum of money to double itself at 10% per annum compound interest. **(5 Marks)**

c) List any five application of statistics in business **(5 Marks)**

FORMULAS

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

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

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

$$\text{Mode} = L + \frac{F1}{F1 + F2} \times i \quad \text{or} \quad \text{Mode} = L + \left(\frac{D_1}{D_1 + D_2}\right).c$$

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

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

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

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

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

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

$$S = P(1 + rn)$$

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

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

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

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

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

$$F_P = \sqrt{L_P x P_P}$$

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

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

$$P = A \times \frac{1 - (1 + r)^{-n}}{r}$$