The Management University of Africa

MUA

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: 3RD DECEMBER 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) Find the time to invest Ksh. 15,000 given that the amount would be Ksh. 24,015 at the rate of 16% per annum compound interest.   **(3 Marks)**

b) Differentiate between mutually exclusive event and independent event as used in probability giving examples of each.   **(2 Marks)**

c) Find the nature of the turning point of the line: **(5 Marks)**

$$R = 2Q^3 + 3Q^2 - 6Q + 100$$

d) A bag contains 80 balls of which 20 are red, 25 are blue and 35 are white. A ball is picked at random what is the probability that the ball picked is:

    i. Red ball   **(2 Marks)**

    ii. Blue ball   **(2 Marks)**

    iii. Red or Blue ball.   **(2 Marks)**

e) For the past eight years, a certain college has graduate students from various programmes. The distribution of the number of graduands are as shown in the table below:

Year	2016	2017	2018	2019	2020	2021	2022	2023
Number of graduands	171	210	310	280	190	350	320	300

Calculate the Coefficient of Variance from the distribution of the graduands   **(5 Marks)**

f) Given: $3\begin{Bmatrix} a & b \\ d & c \end{Bmatrix} = \begin{Bmatrix} a & 10 \\ -4 & 2c \end{Bmatrix} + \begin{Bmatrix} 6 & a+b \\ d+c & 11 \end{Bmatrix}$

Find the values of the variables   **(4 Marks)**

QUESTION TWO

The price of the ordinary 25p shares of Manco PLC quoted on the stock exchange, at the close of the business on successive Fridays is tabulated below

126	120	122	105	129	119	131	138
125	127	113	112	130	122	134	136
128	126	117	114	120	123	127	140
124	127	114	111	116	131	128	137
127	122	106	121	116	135	142	130

Required:

a) Group the above date into eight classes.   **(4 Marks)**

b) Calculate the mean and median $\qquad$ (6 Marks)

c) Calculate the standard deviation of your frequency distribution. (5 Marks)

QUESTION THREE

a) Solve the following using matrix method

$$x_1 + x_2 - 3x_3 = 30$$
$$2x_1 - 4x_2 + 2x_3 = 45$$
$$4x_1 - 2x_2 + 5x_3 = 38 \qquad \text{(9 Marks)}$$

b) Distinguish between primary data and secondary data. Give two examples in each case (2 Marks)

c) How long will it take for a given sum of money to double itself at 15% per annum compound interest. (4 Marks)

QUESTION FOUR

a) A survey was conducted to 600 residence Jemmy Estate in Kitengela outcast to determine their media prints preference. The results indicated that: 190 of the students read Daily Nation; 180 of the students read Standard newspaper; 500 read Magazines; 130 read Daily Nation and Standard newspaper; 110 read the Standard Newspaper and Magazines; 130 read Daily Nation and Magazines; and 90 read all three.

Required: Use the above information to answer the following questions

   i. Illustrate the information in a Venn diagram (3 Marks)

   ii. How many individuals read none of the publication (3 Marks)

   iii. How many read magazines only (2 Marks)

   iv. How many read Daily Nation and the Standard newspaper, but not Magazine (2 Marks)

b) Mr. Denis invests Ksh. 150,000 in a scheme for 8 years at 6.5% compounded semi-annually. Find how much he gains at the end of 8 years (5 Marks)

QUESTION FIVE

a) Evaluate $\int_{1}^{5}(8x^2 + 3x^3 + 4x - 10)dx$ **(7 Marks)**

b) If $\begin{Bmatrix} 2x & 4 \\ 6 & 2 \end{Bmatrix}$ Is a singular matrix, then x is equal to   **(3 Marks)**

c) A car repair shops in Ngara has recorded the number of breakdowns of a machine during the month of January, 2024. The table below shows the distribution where x represents the number of breakdowns of the machine and $P(x)$ represents the probability value of x.

X	0	1	2	3	4
P(x)	0.10	0.22	0.23	0.30	0.15

Find:

   i. Probability of obtaining utmost two breakdown of machines   **(2 Marks)**

  ii. Probability of obtaining prime number of breakdown of machines

                                                   (3 Marks)

QUESTION SIX

a) A company manufacturing plastic chairs uses five components in its assembly. The quantities and prices of the components used to produce a unit of chair in 2022 and 2023 are tabulated as follows:

COMPONENT	2022		2023	
	Quantity	Prices	Quantity	Prices
A	10	3.12	12	3.17
B	6	11.49	7	11.58
C	5	1.40	8	1.35
D	9	2.15	9	2.14
E	30	0.32	33	0.32

Required:

Calculate Fisher price index   **(10 Marks)**

b) Solve for x in; $3(2x + 4) = (2x+1)7x + 11$ **(5 Marks)**

FORMULAS

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

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

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

$$\text{Mode} = L + \frac{F1}{F1_+ F2} \times I$$

or

$$\text{Mode} = L + \left(\frac{D_1}{D_1 + D_2}\right).c$$

$$\text{Median, } X_d = L + \frac{i}{F}(m - c)$$

or

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

$$\text{Variance} = \frac{\Sigma F(X - mean)^2}{\Sigma F}$$

or

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

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

or

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

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

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

$$S.\,I = \frac{PRT}{100}$$

$$C.\,I = P(1 + r)^n$$

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

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

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

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

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

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