



MAASAI MARA UNIVERSITY

**REGULAR UNIVERSITY EXAMINATIONS
2023/2024 ACADEMIC YEAR
THIRD YEAR FIRST SEMESTER**

**SCHOOL OF PURE APPLIED AND HEALTH
SCIENCES
BSC INFORMATION SCIENCES
PROGRAMME**

COURSE CODE: INS 3203

**COURSE TITLE: QUANTITATIVE
TECHNIQUES FOR INFORMATION
SCIENTISTS**

DATE: 6th June 2024

TIME: 11:00am-1:00pm

INSTRUCTIONS TO CANDIDATES

Answer Question ONE and any other TWO questions

QUESTION ONE

- a. Differentiate between dependent and independent events **(2 marks)**
- b. Give three advantages of arithmetic mean **(3 marks)**
- c. Give three axioms of probability **(3 marks)**
- d. The following set of data refers to the amount of money in shillings taken by a news vender for 6 days. Determine the mean and median of the data {27.90, 34.70, 54.40, 18.92, 47.60, 39.68} **(4 marks)**
- e. Use the remainder theorem to determine the remainder when $3x^3 - 2x^2 + x - 5$ is divided by $x - 2$ **(3 marks)**
- f. Solve the equation; $\log(x-1) + \log(x+1) = 2 \log(x+2)$ **(4 marks)**
- g. What is the chance of getting two sixes in rolling of a single die? **(2 marks)**
- h. Simplify giving the answer with positive indices **(5 marks)**

$$\frac{\left(\frac{4}{3}\right)^3 x \left(\frac{3}{5}\right)^{-2}}{\left(\frac{2}{5}\right)^{-3}}$$

- i. Given that $j^2 = -1$, find the determinant of the matrix **(4 marks)**

$$\begin{pmatrix} 1+j & j^2 \\ -j^3 & 1-j^4 \end{pmatrix}$$

QUESTION TWO

- a. Determine the remainder when $(x^3 - 2x^2 - 5x + 6)$ is divided by;
- i. $X-1$ **(3 marks)**
- ii. $X+2$ **(3 marks)**
- iii. Hence, factorize the cubic function **(4 marks)**

- b. Solve the equation $2^{x+1} = 3^{2x+5}$ correct to 2 decimal places **(4 marks)**
- c. The probability of a component failing in one year due to excessive temperature is $1/20$, due to excessive vibration is $1/25$ and due to excessive humidity is $1/50$.
Determine the probability that during one year period a component;
- Fail due to excessive temperature and excessive vibration **(2marks)**
 - Fail due to excessive vibration or excessive humidity **(2 marks)**
 - Will not fail because of both excessive temperature and excessive humidity **(2 marks)**

QUESTION THREE

- a. Define a unit matrix **(2 marks)**
- b. Given matrices A and B as follows

$$A = \begin{pmatrix} 1 & 0 & 3 \\ 2 & 1 & 2 \\ 1 & 3 & 1 \end{pmatrix}$$

$$B = \begin{pmatrix} 2 & 2 & 0 \\ 1 & 3 & 2 \\ 3 & 2 & 0 \end{pmatrix}$$

Find;

- Matrix $C = A - B$ **(2 marks)**
 - Matrix $D = AxB$ **(3 marks)**
 - Determinant of matrix D **(4 marks)**
 - Inverse of matrix D **(6 marks)**
- c. Give the laws of logarithm **(3 marks)**

QUESTION FOUR

a. Give the data in the following table. Calculate;

- i. Mean grade **(2 marks)**
- ii. Modal grade **(3 marks)**
- iii. Median grade **(3 marks)**
- iv. Variance and standard deviation of the grade **(4 marks)**

Grade	50 - 59	60 - 69	70 - 79	80 - 89	90 - 99	100 - 109	110 - 119
Frequency	7	81	192	312	218	82	18

- b. Three groups of children contain respectively 3 girls and 1 boy, 2 girls and 2 boys, 1 girl and 3 boys. One child is selected at random from each group. Show the chance that the 3 selected consist of 1 girl and 2 boys is $\frac{13}{32}$ **(8 marks)**