KISII UNIVERSITY

UNIVERSITY EXAMINATIONS

FIRST YEAR EXAMINATION FOR THE AWARD OF CERTIFICATE IN INFORMATION TECHNOLOGY

FIRST SEMESTER, 2023/2024

(AUGUST-DECEMBER, 2023)

CIT 01010: QUANTITATIVE SKILLS II

STREAM: Y1 S1 **TIME: 2 HOURS**

DAY: THURSDAY,09.00 – 11.00 AM **DATE: 30.11.2023**

INSTRUCTIONS

1. ***Do not write anything on this question paper.***
2. ***Answer Question ONE [Compulsory] and any other TWO Questions***

QUESTION ONE

1." Convert each of the decimal numbers to an 8-bit two's complement binary number:

(i) 4710; (2 marks)

(ii) -7210. (3 marks)

b) Differentiate between BCD and EBCDIC computer coding systems. (4 marks)

c) Describe each of the following types of statistical data:

(i) discrete data;

(ii) Continuous data. (4 marks)

iii) Use the binomial theorem to expand the expression $(5x + 2b)^3$ in the descending powers of x. (3 marks)

iv) Given that matrix $W = \begin{matrix} 3 & -4 \\ -2 & 5 \end{matrix}$, determine (2W)-l . (4 marks)

d)

i) Use the matrix method to solve the following pair of simultaneous equations:

$x + 2y = -1$

$3x-5y= 19$ (4 marks)

ii) Outline three methods of collecting statistical data. (6marks)

QUESTION TWO

a) Describe each of the following types of matrices:

(i) Column matrix;

(ii) Scalar matrix. (4 marks)

b) Given the following matrices, $X=\begin{bmatrix} 2 & -1 \\ 3 & 0 \\ -5 & 2 \end{bmatrix}$, $Y=\begin{bmatrix} 4 & 4 & -3 \\ 0 & -1 & -2 \end{bmatrix}$ and $Z=\begin{bmatrix} 1 & 6 \\ 1 & -2 \\ 0 & -3 \end{bmatrix}$

Determine each of the following matrix operations:

i (XY)Z; (3 marks)

ii x^Tz. (3 marks)

c) Convert each of the following numbers to their equivalent number systems indicated:

(i) 631508 to binary;

(ii) 1538 to hexadecimal. (10 marks)

QUESTION THREE

(a) Table 1 shows the probability of selling a specified number of cars by a certain car dealer in a certain month. Use it to answer the question that follows.

Table 1

Number of cars	8	9	10	11	12	13	14	15
Probability x	0.10	0.15	0.15	0.25	0.20	0.10	0.0	0.05

Determine the number of cars the car dealer expects to sell during the period. (2 marks)

b) Use the substitution method to solve the following pair of simultaneous equations:

$3x-y= 11$

$3x — 2y = 4$ (4 marks)

(c). Using graphical method, solve the following pair of simultaneous equations:

(Use the range $x\leq 3$)

$Y = 2x^2 +x-5$

$y = 2x + 1$ (6 marks)

(d) A team comprising of 7 men and 6 women and a committee of 5 persons is to be formed from a group. Determine the number of ways in which a committee of 3 men and 2 women could be formed. (3 marks)

i. Outline three properties of a binomial probability distribution. (3 marks)

ii. Using Pascal's triangle, expand the expression $(x — 3y)^4$ in ascending powers of y. (2 marks)

QUESTION FOUR

(a) Table 2 shows distribution of overtime hours worked by 100 employees of a company. Use it to answer the questions that follow.

Table 2

Overtime hours	10 - 15	15 -20	20-25	25 - 30	30 -35	35 -40
Number of em 10 ees	11	20	35	20	8	6

Calculate each of the following measures about the overtime hours:

(i) the median;

(ii) the standard deviation. (6 marks)

b) The Principal of Stargat College is required to choose the environmental committee of 4 members from a staff comprising 3 women and 4 men.

Determine the number of ways of choosing the committee if

i)2 men and 2 women should be chosen; (2 marks)

(ii) The probability that the committee consists of 2 men and 2 women. (3 marks)

c) Given the sets U = 14,15 16, 19}, X = 14} and Y = {1 14,12, use Venn diagram to represent each of the following set operations:

(i). XuY' ;

i. XAU;

ii. X - Y. (7 marks)

$$\begin{bmatrix} 3 & - \end{bmatrix} \quad 1 \quad 28/63 \quad - \quad = \begin{bmatrix} 13/63 & 1/9 \end{bmatrix}.$$

d) Given that matrix L = -3 1 5, show that L-l-1/3 1/3

O 3 71/7 1/7 0

2 marks

QUESTION FIVE

a) State the meaning of each of the following set properties:

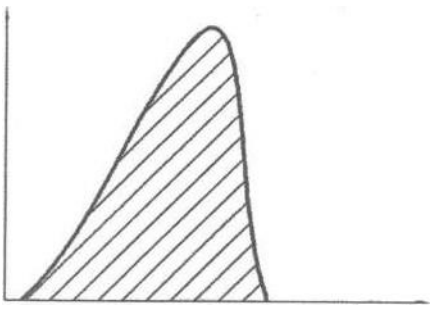
(i) $A \subset$

(ii) $\varnothing;$

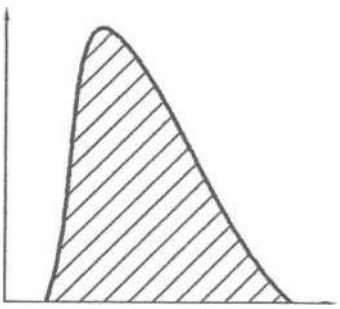
(iii) x E T;

(6 marks)

(b) State two differences between data sets that were used to draw the graphs labelled (i) and (ii) with respect to skewness: (4 marks)



(ii)



(c) A box R contains 2 green and 8 white similar balls. A box S contains 4 green and 8 white similar balls. A ball is drawn at random from box R and placed in box S. Then a ball is drawn at random from box S.

(i) Represent this information using a probability tree diagram.(6marks)

(ii) Determine the probability of each of the following events:

I. drawing a green ball from box R and a white ball from box S; (2 marks)

Il. drawing a green ball from box S. (2marks)