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KIRIRI WOMEN'S UNIVERSITY OF SCIENCE AND TECHNOLOGY
UNIVERSITY EXAMINATION, 2024/2025 ACADEMIC YEAR
FIRST YEAR, FIRST SEMESTER EXAMINATION
FOR THE DIPLOMA IN INFORMATION & COMMUNICATION TECHNOLOGY
DIT 1003 – COMPUTATIONAL MATHEMATICS

Date: 4TH December 2024
Time: 8:30AM – 10:30AM

INSTRUCTIONS TO CANDIDATES
ANSWER QUESTION ONE (COMPULSORY) AND ANY OTHER TWO QUESTIONS
QUESTION ONE (30 MARKS)

a) Express the number 747_8 in:

i) Binary (1 Mark)
ii) Denary (2 Marks)
iii) Hexadecimal (2 Marks)

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 that the chance that the three selected consist of 1 girl and 2 boys is $\frac{13}{32}$ (3 Marks)

c) Solve the following quadratic equation $6x^2 = 10x + 7 = 0$. (2 Marks)

d) Find a matrix X such that $\begin{pmatrix} 1 & -4 \\ 3 & -2 \end{pmatrix} X = \begin{pmatrix} -16 & -6 \\ 7 & 2 \end{pmatrix}$ (3 Marks)

e) From the following table below, find

Class Intervals	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40
Frequency	17	30	35	49	45	33	26	15

i) Median (2 Marks)
ii) Q_1 (2 Marks)
iii) Q_3 (2 Marks)
iv) D_6 (2 Marks)

f) The following data shows the Marks of students obtained in a given exam. Calculate

Marks	0-10	10-20	20-30	30-40	40-50
Number of students	7	6	15	12	10

i) Standard deviation (3 Marks)
ii) Coefficient of variation (1 Mark)

g) Use the substitution method to solve the simultaneous equations

$$2x + y = 6$$
$$4x - 2y = 4$$

(2 Marks)

h) Given that $y = \frac{x^2}{2-x}$, show that $\frac{dy}{dx} = \frac{(4-x)x}{(2-x)^2}$ (3 Marks)

QUESTION TWO (20 MARKS)

a) Given the matrices A=$\begin{bmatrix} 4 & 5 & 3 \\ 6 & -3 & 7 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 3 & 2 \\ 3 & 0 & -1 \end{bmatrix}$ and C= $\begin{bmatrix} 5 & 3 \\ 1 & 6 \\ -5 & 9 \end{bmatrix}$

Find $(2X + Y)Z$ (3 Marks)

b) Compute the Harmonic mean from the data (3 Marks)

Size	10-20	20-30	30-40	40-50	50-60
Frequency	5	7	13	3	2

c) Calculate the from the data given below

Daily wages Shs	40-45	45-50	50-55	55-60	60-65	65-70
No of workers	5	8	10	6	3	2

i) Arithmetic mean (2 Marks)

ii) Median (3 Marks)

iii) Mode (3 Marks)

d) Solve the following equations

$$5x - 3y = 6$$
$$4x + 4y = 8$$

i) Elimination method (3 Marks)

ii) Substitution method (3 Marks)

QUESTION THREE (20 MARKS)

a) Solve by Matrix method

$$7x - 3y = 8$$
$$5x + 2y = 14$$ (4 Marks)

b) Solve the equation $5x^2 - 9x + 8 = 0$

i) By formula (3 Marks)

ii) By factorization (3 Marks)

c) A bag contains 4 white and 3 blue balls. The balls are identical in all aspects except the color. Three balls were picked at random one at a time. Determine the probability that the 3 balls picked were blue. (4 Marks)

d) From the following grouped frequency distribution.

Class interval	0.0-8.0	8.0-16.0	16.0-24.0	24.0-32.0	32.0-40.0	40.0-48.0
Frequency	8	7	16	24	15	7

Calculate

i) Mean (2 Marks)

ii) Semi-interquartile range (4 Marks)

QUESTION FOUR (20 MARKS)

a) The number of telephone calls received daily in the Marketing department of a company for 62 days are given below;

Age group	30-39	40-49	50-59	60-69	70-79	80-89	90-99
No of persons	8	11	13	7	10	9	4

Calculate the;

i) Mean (3 Marks)

ii) Median (3 Marks)

iii) Mode (2 Marks)

b) Convert each of the following number systems to their respective equivalents

i) 111010010_2 to hexadecimal (3 Marks)

ii) $15A_{16}$ to decimal (3 Marks)

iii) 1017_8 to Binary (3 Marks)

iv) 167_{10} to Binary (3 Marks)

QUESTION FIVE (20 MARKS)

a) The data below shows the Marks students obtained on a given test.

Marks	0-10	10-20	20-30	30-40	40-50
No of student	3	8	11	6	9

Calculate the following

i) Mean (2 Marks)

ii) Median (3 Marks)

iii) Mode (3 Marks)

b) Differentiate the following function $y = 5x^4 - 2x^{-3} + 5$ with respect to x (2 Marks)

c) Given two matrices A and B

A=$\begin{bmatrix} -1 & 5 \\ 0 & 3 \\ 6 & 8 \end{bmatrix}$ B=$\begin{bmatrix} -4 & 3 & 0 \\ 0 & 3 & 2 \end{bmatrix}$

Determine the following;

i) Transpose of A (1 Mark)

ii) $A^T B^T$ (3 Marks)

iii) B^T+A (2 Marks)