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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 BUSINESS & INFORMATION TECHNOLOGY
DIT 1003 – COMPUTATIONAL MATHEMATICS

Date: 12TH April 2024
Time: 8:30AM – 10:30AM

INSTRUCTIONS TO CANDIDATES

ANSWER QUESTION ONE (COMPULSORY) AND ANY OTHER TWO QUESTIONS

QUESTION ONE (30 MARKS)

- a) Find the mean, median, and mode of the following data. (3 Marks)
8, 12, 10, 11, 13, 12, 15, 9, 11, 16.
- b) Convert the following number system (3 Marks)
i) 11101_2 to Decimal (3 Marks)
ii) 672_8 to Hexadecimal (3 Marks)
- c) A bag contains 3 red balls, 5 black balls. Two balls are drawn at random from the bag without replacement. What is the probability that one is black and the other is red? (3 Marks)
- d) Solving $2x^2 + 5x + 3 = 0$ by the Quadratic Formula (3 Marks)
- e) Solve the system of linear equations using the elimination method: (3 Marks)
$$2x + 3y = 6$$
$$-2x + 5y = 10$$
- f) Differentiate the following function $y = (2x^2 + 5x - 1)(x - 3)$ (3 Marks)
- g) Calculate the variance and the standard deviation of the following continuous frequency distribution

Class interval	30–40	40–50	50–60	60–70	70–80	80–90	90–100
Frequency	3	7	12	15	8	3	2

- h) Given the matrices $A = \begin{bmatrix} 3 & -8 \\ 2 & 4 \end{bmatrix}$, $B = \begin{bmatrix} 3 & 5 \\ -2 & 6 \end{bmatrix}$ (4 Marks)
Determine
i) B^T (1 Mark)
ii) $A^T + B$ (2 Marks)
iii) AB (2 Marks)

QUESTION TWO (20MKS)

- a) Solve the following simultaneous equations using (3 Marks)
$$2x + 7y = 10$$
$$3x + y = 6$$

i) Elimination method (3 Marks)
ii) Substitution method (3 Marks)
- b) Solve the equation $2x^2 - 7x + 3 = 0$
i) By formula method (3 Marks)
ii) By completing the squares method (3 Marks)

- c) Find the inverse of the matrix $\begin{pmatrix} 4 & -5 \\ 2 & 15 \end{pmatrix}$. Hence solve the simultaneous equations;

$$4x - 5y = -6$$

$$2x + 15y = 11$$

(5 Marks)

- d) A bag contains 4 white and 3 red balls. Two draws of one ball each at a time are made without replacement. What is the probability that both the balls are red? (3 Marks)

QUESTION THREE (20MKS)

- a) The table below shows the consumption of electricity by 100 households in a particular week

Consumption (kwh)	0-9	10-19	20-29	30-39	40-49	50-59	60-69	70-79
Number of households	5	11	18	29	16	10	8	3

Determine the,

- i) Mean (2 Marks)
 ii) Mode (3 Marks)
 iii) 69th percentile (3 Marks)
 iv) 7th decile (3 Marks)
- b) Differentiate $y = (2x + 1)^3 (x - 8)^7$ with respect to x. (3 Marks)
- c) Evaluate

$$\int_1^3 (3x^3 + 2x + 3) dx \quad (3 \text{ Marks})$$

- d) Solve the following simultaneous equations using substitution method

$$x + 2y = 4$$

$$3x - 5y = 1$$

(3 Marks)

QUESTION FOUR (20MKS)

- a) Convert each of the following number system to their respective equivalents

i) 13479_{10} to binary (3 Marks)

ii) $4FB2_{16}$ to decimal (3 Marks)

iii) 24_8 to decimal (3 Marks)

iv) 111011101_2 to hexadecimal (3 Marks)

- b) For a given 10-day period, the police reported the following number of car thefts; 9,6,10,8,10,8,4,8,3,8

Calculate the

i) Harmonic mean (2 Marks)

ii) Geometric mean (3 Marks)

iii) Mean deviation. (3 Marks)

QUESTION FIVE (20MKS)

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

Determine the following;

i) Transpose of C (1 Mark)

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

iii) B^{-1} (2 Marks)

- b) Solve the equation $4x^2 - 7x + 3 = 0$ using factorization method (3 Marks)

- c) Given the determinant of the matrix $M = \begin{pmatrix} x+1 & 1 \\ x & 4 \end{pmatrix}$, is 13, determine the value of x. (4 Marks)

- d) Integrate with respect to x: $\int 6x(4x^5 + 6x^3 - 7) dx$ (3 Marks)

- e) A two-digit number is such that the product of its digits is 12. When the number is reversed, the number formed exceeds the original number by 9. Find the original number. (4 Marks)