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KIRIRI WOMENS' UNIVERSITY OF SCIENCE AND TECHNOLOGY
UNIVERSITY EXAMINATION, 2024/2025 ACADEMIC YEAR
FIRST YEAR, FIRST SEMESTER EXAMINATION
FOR THE CERTIFICATE IN INFORMATION TECHNOLOGY
CIT 1003 COMPUTATIONAL MATHEMATICS

Date: 13$^{\text{TH}}$ AUGUST 2024
Time: 11:30AM – 1:30PM

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

a) From the following data, 756,726, 710,568, 564,440, 440. Calculate the mean (2 Marks)

b) Differentiate the following functions;
    i) $7x^5 + 4x^{-8} - 9x^3 + 10x^2 + 2$ (2 Marks)
    ii) $(x^4)(2x^5 + 6)$ (3 Marks)

c) Use substitution method to solve the simultaneous equations; (3 Marks)
$$4x + 3y = 7$$
$$3x - 2y = 9$$

d) The following relates to the number of successful sales made by the salesmen employed by a large microcomputer firm in a particular quarter.

No of sales	50-60	60-70	70-80	80-90	90-100	100-110	110-120
No of sales men	7	1	12	31	21	8	10

Required
Calculate the median sales. (4 Marks)

e) Convert 364_8 to decimal. (3 Marks)
f) Convert $4C6F_{16}$ to decimal. (3 Marks)
g) The following data shows the weight of students in a class, 45,48,50,55,65,75. Find the variance. (4 Marks)

h) Given the matrices A=$\begin{bmatrix} 4 & 5 \\ 6 & -3 \end{bmatrix}$, B=$\begin{bmatrix} 8 & 4 \\ 2 & 7 \end{bmatrix}$
    Determine;
    i) $A^T B$ (3 Marks)
    ii) A^{-1} (3 Marks)

QUESTION TWO (20 MARKS)

a) The number of telephone calls received daily in a marketing department of a company for 35 days are given below;

No of calls	0-10	10-20	20-30	30-40	40-50	50-60
Frequency	2	7	3	10	5	8

Compute;
i)   Median   (3 Marks)
ii) Q_4 (3 Marks)
iii)   Mode   (3 Marks)
iv) P_{30} (4 Marks)
v)   Standard deviation.   (4 Marks)
vi)   Co-efficient of variation   (3 Marks)

QUESTION THREE (20 MARKS)

a)   Calculate the variance from the following data;   12,23,36,38,42,45,50.   (4 Marks)

b)   Solve the following equation using the quadratic formula; $2x^2 - 5x + 2 = 0$ (4 Marks)

c)   Find the derivatives of the following functions
   i) $y = 5x^9 + 6x^5 - 3x^{-3}$ (3 Marks)
   ii) $y = 7x^2(4x^3 + 2x^2)$ (3 Marks)

d)   Integrate the following functions with respect to x;
   i) $f(x) = 10x^9 + 6x^8 - 3x^{-2} + 1$ (3 Marks)
   ii) $f(x) = 12x^5 - 6x^7 + 8x^4 - 5$ (3 Marks)

QUESTION FOUR (20 MARKS)

a)   Given two matrices A and B

$$A = \begin{bmatrix} 5 & 4 \\ 1 & 3 \\ 8 & 2 \end{bmatrix} \quad B = \begin{bmatrix} -4 & 7 & 5 \\ 1 & 2 & 6 \end{bmatrix}$$

Determine the following;
   i)   Transpose of A   (1 Mark)
   ii)   AB   (3 Marks)
   iii) $B^T + A$ (3 Marks)
   iv) $(BA)^{-1}$ (4 Marks)

b)   Solve the following simultaneous equation by Elimination method;
$$4x + 3y = 7$$
$$3x - 2y = 9$$ (4 Marks)

c)   Solve the following simultaneous equation by Matrix method;   (5 Marks)
$$4p + q = 6$$
$$2p - q = -3$$

QUESTION FIVE (20 MARKS)
Convert the following number system into its equivalent;

   i) 127_{10} to binary   (3 Marks)

   ii) 329_{10} to binary   (2 Marks)

   iii) 546_{10} to octal   (3 Marks)

   iv) 6325_{10} to hexadecimal   (3 Marks)

   v) 11011010_2 to decimal   (3 Marks)

   vi) 75412_8 to decimal   (3 Marks)

   vii) $45A2F3_{16}$ to decimal   (3 Marks)