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KIRIRI WOMEN'S UNIVERSITY OF SCIENCE AND TECHNOLOGY
UNIVERSITY EXAMINATION, 2023/2024 ACADEMIC YEAR
FIRST YEAR, FIRST SEMESTER EXAMINATION
FOR THE DIPLOMA IN INFORMATION COMMUNICATION TECHNOLOGY
DIT 1003 – COMPUTATIONAL MATHEMATICS

Date: 14TH APRIL 2022
Time: 8:30AM – 10:30AM

INSTRUCTIONS TO CANDIDATES

ANSWER QUESTION ONE (COMPULSORY) AND ANY OTHER TWO QUESTIONS

QUESTION ONE (30 MARKS)

- a) Solve the following simultaneous linear equations using matrix method
- $$\begin{aligned} 5x + 2y &= 14 \\ 3x - 4y &= 24 \end{aligned}$$
- (3 Marks)
- b) Integrate the following function with respect to x $\int (x^3 + 4x^2 + 3)dx$ (2 Marks)
- c) Two balls are drawn in turn with replacement from a bag containing 8 red, 15 white, 24 blacks and 17 orange balls. Determine the probabilities of having
- Two red balls (2 Marks)
 - A red and a white ball (2 Marks)
- d) Convert the following numbers into their denary equivalent;
- $(657.321)_8$ (3 Marks)
 - $(2B863.492)_{16}$ (3 Marks)
 - $(11110110.111011)_2$ (3 Marks)
- e) Find the first derivatives of the following function:
- $f(x) = x^{-2} + 5x + 1$ (2 Marks)
 - $y = (x^3 + 1)(x^2 + 2x - 3)$ (3 Marks)
- f) Given the matrices $A = \begin{bmatrix} 3 & 8 \\ 5 & 2 \end{bmatrix}$, $C = \begin{bmatrix} 6 & 1 \\ -1 & 2 \end{bmatrix}$
- Determine
- $A+C$ (2 Marks)
 - $C^T A$ (2 Marks)
- g) Given the data below, determine standard deviation
33, 35, 37, 37, 39, 39, 41, 41, 41, 42, 44 (3 Marks)

QUESTION TWO (20 MARKS)

- a) Convert the following numbers into their denary equivalent;
- $(6347.3251)_8$ (3 Marks)
 - $(1110101.100111)_2$ (3 Marks)
 - $(B57)_{16}$ (2 Marks)
- b) Convert the following numbers to the stated number system

- i) $(0.32975)_{10}$ to octal (3 Marks)
- ii) $(4962.7831)_{10}$ to octal form (3 Marks)
- iii) $(389.4576)_{10}$ to hexadecimal form (3 Marks)
- iv) $(964.356)_{10}$ to binary form (3 Marks)

QUESTION THREE (20 MARKS)

- a) Solve by Elimination method
 - i) $3x+2y=3$
 - ii) $5x+3y=15$ (5 Marks)
- b) Solve by Substitution method
 - i) $y-2x=2$
 - ii) $3y+x=20$ (5 Marks)
- c) Integrate the following functions
 - $\int (3x^2 + 2x + 2)dx$ (2 Marks)
 - $\int (x^2 + 1)(2x + 4)dx$ (3 Marks)
- d) Find the first derivatives of the following function:
 - i) $f(x) = x^4 + 5x + 1$ (2 Marks)
 - ii) $y = (x^2 + 1)(2x - 3)$ (3 Marks)

QUESTION FOUR (20 MARKS)

- a) A bag contains 5 green balls and 7 red balls, 2 balls are drawn at random. What is the probability that one is green and the other is red? (4 Marks)
- b) Solve by completing the square method the quadratic equation $3x^2 - 4x - 4 = 0$ (3 Marks)
- c) Solve the following equation $4x^2 - x - 3 = 0$ using
 - i) Factorization method (2 Marks)
 - ii) Quadratic formula (3 Marks)
- d) From the matrix

$$A = \begin{bmatrix} 5 & 9 \\ 6 & -2 \end{bmatrix}$$

- i) Determine the inverse A (3 Marks)
- ii) Determine the transposing of A (2 Marks)
- iii) Hence solve the following simultaneous equation
 - $5x+9y = -30$
 - $6x-2y = 28$ (3 Marks)

QUESTION FIVE (20 MARKS)

The following frequency distribution table gives the class interval of results for computational Mathematics at Kiriri Women's university of science and technology.

Class	20 - 29	30 - 39	40 - 49	50 - 59	60 - 69	70 - 79	80 - 89	90 - 99
Frequency	5	26	15	33	35	20	19	25

Calculate:

- i) Mean (4 Marks)
- ii) Median (4 Marks)
- iii) Mode (4 Marks)
- iv) Semi-Interquartile range (4 Marks)
- v) Standard deviation (4 Marks)