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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 BUSINESS INFORMATION TECHNOLOGY
## DIT 1003 – COMPUTATIONAL MATHEMATICS

Date: 07TH December 2023
Time: 8:30AM – 10:30AM

**INSTRUCTIONS TO CANDIDATES**

**ANSWER QUESTION ONE (COMPULSORY) AND ANY OTHER TWO QUESTIONS**

**QUESTION ONE (30 MARKS)**

a) Find out the value of mean from the data given below
42,15,22,15,58,35,28,12 (2 Marks)

b) Convert the following numbers to the stated number system
i) $25.125_{10}$ *to* Binary (3 Marks)
ii) $111010.0011_2$ *to* Denary (3 Marks)
iii) $6893_{10}$ *to* Hexadecimal (3 Marks)

c) A bag contains 5 white balls and 4 red balls, 2 balls are drawn at random with replacement. What is the probability that a white ball followed by a red ball is drawn? (2 Marks)

d) Solve the following quadratic equation $4x^2 - 10x + 6 = 0$. (2 Marks)

e) Use matrix method to solve the following simultaneous equations
$$2x + y = 6$$
$$4x - 2y = 4$$ (3 Marks)

f) The following relates to the Marks obtained by the number of student at KWUST.

| Marks | 0-10 | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 |
|---|---|---|---|---|---|---|
| No.of student | 6 | 10 | 5 | 8 | 1 | 7 |

Calculate the following
i) Median mark (3 Marks)
ii) Mean mark (2 Marks)

g) Differentiate the following function $y = (x^4 - 2x^2)(5x)$ (2 Marks)

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

Determine
i) $B^T$ (1 Marks)
ii) $A^T + B$ (2 Marks)
iii) AB (2 Marks)

**QUESTION TWO (20MARKS)**

a) Solve the following equations using elimination method

$$3x - 5y = 6$$
$$4x + 4y = 8$$ (4 Marks)

b) Use matrix method to solve the following simultaneous equations

$$5x + 2y = 14$$
$$3x - 4y = 24$$ (4 Marks)

c) Solve the following quadratic equations using the stated method

i) $3x^2 - x - 4 = 0$ (factorization method) (4 Marks)

ii) $4x^2 - 7x + 3 = 0$ (Completing the square method) (4 Marks)

d) A bag contains 5 white and 4 blue balls. The balls are identical in all aspect except the color. Three balls were picked at random one at a time without replacement. Determine the probability that the balls picked were blue. (4 Marks)

**QUESTION THREE (20MARKS)**

a) The number of customer received daily in a marketing department of a company for a month are given below;

| Age group | 0-20 | 20-40 | 40-60 | 60-80 | 80-100 | 100-120 | 120-140 |
|---|---|---|---|---|---|---|---|
| No. of persons | 8 | 11 | 13 | 7 | 10 | 9 | 4 |

*Calculate the;*

i) Mean age (3 Marks)

ii) Median age (3 Marks)

iii) Mode (2 Marks)

iv) Standard variation (4 Marks)

v) Co-efficient of variation (3 Marks)

b) Find the first derivatives of the following function:

i) $f\ (x) = x^{-2} + 5x + 1$ (2 Marks)

ii) $y = (x^3 + 1)(x^2 + 2x - 3)$ (3 Marks)

**QUESTION FOUR (20 MARKS)**

a) Convert the following numbers into their decimal equivalent;

i) $(647.325)_8$ (3 Marks)

ii) $(1110101.1011)_2$ (3 Marks)

iii) $(B57.AD5)_{16}$ (2 Marks)

b) Convert the following numbers to the stated number system

i) $(32.975)_{10}$ to binary form (3 Marks)

ii) $(4962.7831)_{10}$ to octal form (3 Marks)

iii) $(389.4576)_{10}$ to hexadecimal form (3 Marks)

iv) $(9564.356)_{10}$ to duodecimal form (3 Marks)

**QUESTION FIVE (20 MARKS)**

a) Integrate the following functions

i) $\int(3x^2 + 2x + 2)dx$ (2 Marks)

ii) $\int(x^2 + 1)(2x + 4)dx$ (3 Marks)

b) 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)

c) The following frequency distribution table gives the class interval for computational Mathematics Marks 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 |

Obtain the following from the given data:

i) Semi-interquartile range (4 Marks)

ii) $D_3$ (2 Marks)

iii) $P_{45}$ (2 Marks)

iv) Mode (2 Marks)