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KIRIRI WOMENS' UNIVERSITY OF SCIENCE AND TECHNOLOGY
UNIVERSITY EXAMINATION, 2022/2023 ACADEMIC YEAR
FIRST YEAR, FIRST SEMESTER EXAMINATION
FOR THE DIPLOMA IN BUSINESS INFORMATION TECHNOLOGY
DIT 1003- COMPUTATIONAL MATHEMATICS

Date: 15TH DECEMBER 2022
Time: 11:30AM – 1:30PM

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

$5x + 2y = 14$

$3x - 4y = 24$ (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

i) Two red balls (2 Marks)

ii) A red and a white ball (2 Marks)

d) Convert the following numbers into their denary equivalent;

(i) $(657.321)_8$ (3 Marks)

(ii) $(2B863.492)_{16}$ (3 Marks)

(iii) $(11110110.111011)_2$ (3 Marks)

e) 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)

f) Given the matrices $A = \begin{bmatrix} 3 & 8 \\ 5 & 2 \end{bmatrix}$, $C = \begin{bmatrix} 6 & 1 \\ -1 & 2 \end{bmatrix}$

Determine

i) A+C (2 Marks)

ii) C^TA (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;
   i) $(6347.3251)_8$ (3 Marks)
   ii) $(1110101.100111)_2$ (3 Marks)
   iii) $(B57)_{16}$ (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) Use matrices to solve the simultaneous equations.

$$4x - 5y = 13$$
$$3x - 2y = 8$$

(5 Marks)

b) Solve by Elimination method

$$3x+2y=3$$
$$5x+3y=15$$

(5 Marks)

c) Solve by Substitution method

$$y-2x=2$$
$$3y+x=20$$

(5 Marks)

d) The income from advertisements and sales for a college magazine amounted in a year to ksh. 670. In the following year the income from advertisement was increased by $12\frac{1}{2}\%$ and the income from sales decreased by $16\frac{2}{3}\%$. The total income decreased by ksh 12.50. (5 Marks)

QUESTION FOUR (20 MARKS)

a) Solve the following equation $12x - x^2 - 20$ (3 Marks)
b) 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)
c) Solve by factorization the equation $3x^2 - 4x - 4 = 0$ (3 Marks)
d) Solve the following equation $4x^2$-x-3=0 using
   i) Factorization method (2 Marks)
   ii) Quadratic formula (3 Marks)
e) From the matrix

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

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

(5 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)