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

Date: 20TH APRIL, 2023
Time: 2:30PM- 4:30PM

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

a) Use elimination method to solve

$$2x + 3y = 8$$
$$5x - y + 2 = 0$$ (2 Marks)

b) Using completing the square method, solve $(6t + 1)^2 + 3 = 0$ (3 Marks)

c) Given the data below, determine variance
33, 35, 37, 37, 39, 39, 41, 41, 41, 42, 44 (3 Marks)

a. Find the first derivatives of the following function:
   i. $f\ (x) = x^{-3} + 5x^4 + 1$ (2 Marks)
   ii. $y = (x^3 + 1)(x^2 + 2x - 3)$ (3 Marks)

d) A fair die is rolled. Find the probability of getting
   i. A two or a six (2 Marks)
   ii. An odd number (2 Marks)

e) Two times a number plus ten times a second number is 20. Thirty times the second number plus three times the first number is 45. Find the two numbers using substitution method. (3 Marks)

f) Convert the following numbers into their denary equivalent;
   (i) $(657.321)_8$ (2 Marks)
   (ii) $(2X863.492)_{12}$ (3 Marks)

g) Evaluate the following integrals;

   i. $\int(x^3 + 2x - 1)dx$ (2 Marks)
   ii. $\int_{-1}^{2}(2x^4 - x^2 + 5)dx$ (3 Marks)

QUESTION TWO (20 MARKS)

a) Convert the following numbers into their denary equivalent;

i) $(654347.3251)_8$ (3 Marks)

ii) $(2X63.4192)_{12}$ (3 Marks)

iii) $(\text{BECEF})_{16}$ (2 Marks)

b) Convert the following numbers to the stated number system

i) $(0.32975)_{10}$ to duodecimal (3 Marks)

ii) $(49362.7831)_{10}$ to octal form (3 Marks)

iii) $(3894.4576)_{10}$ to hexadecimal form (3 Marks)

iv) $(97624.356)_{10}$ to binary form (3 Marks)

QUESTION THREE (20 MARKS)

a) Solve the following system of linear equations by first getting its inverse.

$$4x - 2y + 3z = 1$$
$$x + 3y - 4z = -7$$
$$3x + y + 2z = 5$$

(5 Marks)

b) Solve the following series of simultaneous equations using the specified method;

i. $5x + 3y = 9$, $2x - 3y = 12$ [Elimination method] (2 Marks)

ii. $x + 3y = 4$, $2x + 5y = 7$ [Substitution method] (2 Marks)

c) The income from advertisements and sales for a college magazine amounted in a year to £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 £12.50.Find the original income from advertisements and sales using matrix method. (3 Marks)

d) Integrate the following functions

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

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

(2 Marks)

e) Find the area in the first quadrant bounded by$f(x) = 4x - x^2$ and the x-axis. (3 Marks)

QUESTION FOUR (20 MARKS)

a) A researcher studied the connection between x (the age in years of a licensed driver) and y (the percentage of fatal accidents for drivers of that age which are caused by speeding). The collected data is shown below.

X	17	27	37	47	57	67	77
y	36	25	20	12	10	7	5

Using this data to:

i. Calculate the coefficients of correlation (3 Marks)

ii. Find regression equation that adequately represents the data. (4 Marks)

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

Class Interval	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 (3 Marks)

ii) Median (3 Marks)

iii) Mode (3 Marks)

iv) Semi-Interquartile range (4 Marks)