

Kasarani Campus Off Thika Road Tel. 2042692 / 3 P. O. Box 49274, 00100 NAIROBI Westlands Campus Pamstech House Woodvale Grove Tel. 4442212 Fax: 4444175

KIRIRI WOMEN'S UNIVERSITY OF SCIENCE AND TECHNOLOGY UNIVERSITY EXAMINATION, 2024/2025 ACADEMIC YEAR FIRST YEAR, FIRST SEMESTER EXAMINATION FOR THE DIPLOMA IN BUSINESS & INFORMATION TECHNOLOGY <u>DIT 1003 COMPUTATIONAL MATHEMATICS</u>

Date: 8TH AUGUST 2024 Time: 8:30AM – 10:30AM

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

a) Convert the following numbers into their decimal quivalent;

(i)	(657.321) ₈	(2 Marks)
(ii)	(2D63.B92) ₁₆	(2 Marks)
(iii)	$(1101101.110010)_2$	(2 Marks)

b) Use matrix method to solve

$$x + y = 7$$

 $2x + 5y = 23$ (3 Marks)

- c) Solve for t given that $4(t-2) = \frac{2}{3}(t+7) + 1$ (2 Marks)
- d) Given the data below, determine standard deviation
 - 3, 5, 7, 7, 9, 10, 19, 24 (4 Marks)
- e) Find the first derivative of the following function:

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

- f) Use completing square method to solve for x in $2x^2 + 3x 7 = 0$ (2 Marks)
- g) A piece of equipment will function only when all the three components A, B and C are working. The probability of A failing during one year is 0.15, that of B failing is 0.09 and that of C failing is 0.10.
 - i) Draw a probability tree for the above problem. (1 Mark)
 - ii) What is the probability that the equipment will fail before the end of the year? (2 Marks)
- h) Evaluate the following integrals;

$$\int (2x^4 - x^2 + 5x^3 + 2x - 1)dx$$
 (2 Marks)

i) 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 students	6	10	4	7	6	7

Calculate the following

	i. Median mark ii. Mean mark	(3 Marks) (3 Marks)
<u>QU</u>	ESTION TWO (20 MARKS)	
a) b)	Convert the following numbers into their denary equivalent; i) (65347.3251) ₈ ii) (2863.412) ₁₂ iii) (BEEF) ₁₆ iv) ((110110.111011) ₂) Convert the following numbers to the stated number system	(3 Marks) (3 Marks) (2 Marks) (2 Marks)
,	i) $(4932.731)_{10}$ to octal form ii) $(7624.356)_{10}$ to hexadecimal form	(2 Marks) (2 Marks)
c)	Solve the simultaneous equation below using elimination method $11x + 3y = 67$ 5x + 7y = 46	(2 Marks)
d)	Given the matrices $P = \begin{bmatrix} 4 & 5 & -3 \\ 6 & -7 & 2 \end{bmatrix}$, $Q = \begin{bmatrix} 5 & 3 \\ -1 & 6 \\ 5 & 9 \end{bmatrix}$ Determine	

i. $\boldsymbol{P}^T + \boldsymbol{Q}$ (2 Marks)ii. $(\boldsymbol{P}\boldsymbol{Q})^{-1}$ (2 Marks)

QUESTION THREE (20 MARKS)

a) A bag contains 3 red balls, 5 blue ball and 2 white balls. Two balls are picked at random with replacement. Calculate the probability that.

i)	Both balls are the same colour.	(3 Marks)
ii)	No red ball is picked.	(3 Marks)

b)	The frequenc	y distribution	below	shows	annual	exp	penditure	on	food
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Expenditure: (ksh '00)	0 - 19	20 – 39	40 - 59	60 – 79	80 - 99
No. of families	14	22	27	12	15

(i)	Find the upper quartile (Q_3) of the expenditure.	(3 Marks)
(ii)	Median expenditure	(3 Marks)
(iii)	Find the D_3 and P_{67} of the expenditure	(4 Marks)

c) Solve the following quadratic equations using the stated method; i. $-7x^2 + 2x + 7 = 0$ quadratic formula (2 Marks) ii. $4x^2 - 7x + 3 = 0$ Factorization (2 Marks)

QUESTION FOUR (20 MARKS)

- a) Integrate the following functions
 - i) $\int_{0}^{2} (3x^{2} + 2x + 2) dx$ (2 Marks)

(2 Marks)

(4 Marks)

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

b) Determine the area bounded by the curves y = x and $y = x^2$ for $0 \le x \le 2$.

c) The table below shows the masses of 50 pupils in a class.

	Mass (kg)	20 - 25	25 - 30	30 - 35	35 - 40	40 - 45	
	Frequency	6	12	17	10	5	
i	Calculate: - . The Me . Semi-ir	an Mass nterquartile rat	nge				(2 Mark (4 Marks

d) Determine the derivative of each of the following polynomial functions with respect to x (i) $y = x(5x - 2) + 3(x + 2)^2$. (3 Marks)

(ii)
$$y = \frac{6x^3 + 14x^2 - 12x}{3x - 2}$$
 (3 Marks)

QUESTION FIVE (20 MARKS)

The data below represent the wages (in thousands) of 60 employees in a certain company

Wages	130-140	140-150	150-160	160-170	170-180	180-190
No of employees	8	13	15	12	7	5

a)	Mean	(3 Marks)
b)	Mode	(3 Marks)
c)	Median	(3 Marks)
d)	Standard deviation	(4 Marks)
e)	Coefficient of variation	(3 Marks)
f)	The quartile deviation	(4 Marks)