Enrollment No./Seat No.:

GUJARAT TECHNOLOGICAL UNIVERSITY

BCA/MCA INTEGRATED - SEMESTER - I EXAMINATION - WINTER 2025

Subject Code: BC01001051 **Date: 12-12-2025**

Subject Name: Mathematics-1

Time: 10:30 AM TO 01:00 PM **Total Marks: 70**

Instructions

1. Attempt all questions.

2. Make suitable assumptions wherever necessary.

3. Figures to the right indicate full marks.

4. Use of simple calculators and non-programmable scientific calculators are permitted.

			Marks
Q.1	**(a)**	(a) Define the following terms (i) Set with example, Function, Cartesian product of sets. (ii) Coordinate Geometry, Scalar Matrix, Cardinality of Sets. (iii) De-Morgan's laws.	**07**
	(b)	Define bijective function. If $f : R \to R, f(x) = x + 2$, show that f is bijective function.	**07**
Q.2	**(a)**	If A={a,b,c,d}, B={b,c,d,g,h}, C={a,g,x,y,z} and D={b,d,x,z} then verify that $(A \times B) \cap (C \times D) = (A \cap C) \times (B \cap D)$	**07**
	(b)	In a group of 1000 people, there are 750 who can speak Hindi and 400 who can speak Bengali. How many can speak Hindi only? How many can speak Bengali? How many can speak both Hindi and Bengali?	**07**
		OR	
	(b)	Let A={1,2,3,5,6,7}, B={2,5,8,9} and C={1,4,6,10,11} then verify and represent a Venn diagram of $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$	**07**
Q.3	**(a)**	(i) is of 04 marks and (ii) is of 03 marks (i) Let $f(x) = x^3$ and $g(x) = 2x + 3$, then find $(f + g)(x), (f - g)(x), (f.g)(x) and (f/g)(x)$ (ii) If $g(x) = 5x + 2$ and $g(x) = 17$, then find the value of x?	**07**
	(b)	(i) is of 03 marks and (ii) is of 04 marks (i) If $f(x) = x^2(x-1)^2, x \in R,$ prove that $f(x+1) - f(x) = 4x^3$ (ii) Define followings (a) Even and odd functions with examples (b) One-one and onto functions with examples	**07**
		OR	

(a) (i) is of 03 marks and (ii) is of 04 marks. **07**

(i) If the cost function of a commodity is $C(x) = 1200 - 45x + 2x^2$, find the total cost for producing 25 units.

(ii) If the function $f : R \to R$ be given by $f(x) = x^2 + x$ and $g : R \to R$ is given by

$g(x) = \dfrac{x}{x+1}$. Find fog and gof.

(b) **07**

If $log(\dfrac{a+b}{2}) = \dfrac{1}{2}(loga + logb)$, then show that a=b.

Q.4 **(a)** **07**

If $A = \begin{bmatrix} 1 & 3 \\ 2 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} -2 & 3 \\ 1 & 1 \end{bmatrix}$. then prove that $(AB)^T = B^T A^T$.

(b) Find the inverse of the matrix **07**

$$\begin{bmatrix} 4 & 3 & 8 \\ 6 & 2 & 5 \\ 1 & 5 & 9 \end{bmatrix}$$

OR

(a) Use Cramer's rule to solve the equations **07**

$3x + 4y = -14$

$-2x - 3y = 11$

(b) Define Rank of a matrix. Find the rank of the matrix **07**

$$\begin{bmatrix} 1 & 2 & 3 \\ 2 & 3 & 4 \\ 3 & 5 & 7 \end{bmatrix}$$ using determinant method.

Q.5 **(a)** Prove that (-1,0), (0,3),(3,2) and (2,-1) are the vertices of square by using distance formula. **07**

(b) Find the angle between the lines $2x + y - 3 = 0$ and $x + 3y + 2 = 0$. **07**

OR

(a) Find the coordinates of the point which divides the points A(8, -3) and (16,5) in the internal ratio 3:1 and externally in the ratio 4:3. **07**

(b) Find equation of the line passing from (7,-4) and (2,4). Find slope and intercepts. **07**

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