

Enrolment No. /Seat No.: _____

GUJARAT TECHNOLOGICAL UNIVERSITY

BCA/MCA INTEGRATED – SEMESTER I- EXAMINATION –WINTER-2024

Subject Code: BC01001051

Date: 03/01/2025

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) Define the following	07
1. Power set	
2. Cartesian Product	
3. Unit Matrix	
4. Transpose of a matrix	
5. Domain	
6. De- Morgan's laws	
7. Infinite Set	
(b) 1) Explain domain, Co-domain, and range with example. (3 MARKS)	07
2) If $A = \begin{bmatrix} 2 & 1 & 5 \\ 3 & 0 & -5 \end{bmatrix}$, $B = \begin{bmatrix} 2 & 2 \\ 8 & 3 \\ 1 & 1 \end{bmatrix}$ Find AB	
if it is exist. (4 MARKS)	
Q.2 (a) Let $U = \{1,2,3,4,5,6,7,8,9,10,11,12,13\}$ $A = \{1, 3, 5, 7\}$ $B = \{5, 7, 9, 11\}$ and $C = \{1, 3, 5, 7, 9, 11, 13\}$ prove that:	07
1. $(A \cap B) \cup (A \cap C) = A \cap (B \cup C)$	
2. $(A \cup B)' = A' \cap B'$	
(b) If $A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 1 \\ 1 & 0 & 0 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 1 & 1 \\ 0 & 0 & 1 \\ 1 & 0 & 1 \end{bmatrix}$, Find : (a) $A \vee B$, (b) $A \wedge B$, (c) $A \odot B$.	07
OR	
(b) Let $U = \{1,2,3,4,5,6,7,8,9,10\}$ $X = \{1,2,4,5,6\}$ $Y = \{2,4,5,7,8\}$ $Z = \{2,7,9,10\}$ Compute using Venn diagram. $X \cap Z \cap Y$, $Y' \cap X'$, $X - (Y \cup Z)$.	07
Q.3 (a) Simplify Exponential function: a) $2^x - 2^{x+1}$	07
b) $(4)^3 \times (4)^{x+5} = (4)^{2x+12}$	
(b) If $\begin{bmatrix} a+4 & 3b \\ 8 & -6 \end{bmatrix} = \begin{bmatrix} 2a+2 & b+2 \\ 8 & a-8b \end{bmatrix}$ then find the value of (a-2b).	07
OR	
Q.3 (a) Define Rank of matrix .Find rank of following matrix.	07
$A = \begin{bmatrix} 1 & 3 & 5 \\ 4 & 5 & 7 \\ 2 & 6 & 10 \end{bmatrix}$	
(b) A line passing through the point(1,2) with a slope of 4. Write equation.	07
Q.4 (a) Find the inverse of function. (i) $f(x) = x + 1/x$ (ii) $f(x) = 5x - 7$	07
(b) Find x and y if $2x - 3y = 15$ and $x + 5y = -18$ using Cramer's rule.	07

OR

- Q.4 (a)** By using the section formula, find out the coordinates of the points C that divide the line segment joining the points A(8, -3) and B(16, 5) in the internal ratio 3:1. **07**
- (b)** Find the distance between the points A(-1, 2) and B(2, 3). **07**
- Q.5 (a)** Simplify $\log_5(1/5)$ using logarithmic property. **07**
- (b)** Show that the points P(-1, 6, 6), Q(0, 7, 10) and R(-4, 9, 6) form an isosceles right triangle. **07**

OR

- Q.5 (a)** Find the area of the triangle in coordinate geometry by determinant method, whose vertices are: A(1,-2), B(-3,4), C(2,3) **07**
- (b)** If P(-2, 1), Q(2, 3) and R(-2, -4) are three points, find the angle between the straight lines PQ and QR. **07**
