



SAGE University Indore
Institute of Computer Application
Mid-Semester Test I
BCA semester I: Oct -2023

Institute Name: Computer Application	Subject: Theory of Mathematics
Program Name: BCA	Branch: BCA
Semester: I	Section: A, B, C, D
Subject Code: CAPDCTOM001T	Session: July Dec 2023-24
Unit Test No: 1, 2	Date of Test: 12/10/23
Max. Marks: 20	Allotted Time: (90 min duration max)

Course Outcome (CO) No.1: To apply the concept of set, relation and functions
Course Outcome (CO) No.2: To know and define the use of basic concepts of Matrices.

Note: All Questions carry equal marks, Attempt any five questions.

Q. No.	Questions	Marks	CO	BL
Q.1	Let $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$, $A = \{2, 4, 6, 8\}$, $B = \{2, 3, 5, 7\}$ and $C = \{3, 5, 6, 7, 9\}$. Find (i) $A \times (B \cap C)$ (ii) prove that $(A \cap B)' = A' \cup B'$ (iii) $A - (B \cup C)$ (iv) $(A - C)'$	4	CO1	K5
Q.2	Show that the relation R on the set A of all the books in a library of a college given by $R = \{(x, y): x \text{ and } y \text{ have the same number of pages}\}$, is an Equivalence relation.	4	CO1	K4
Q.3	In a group of 90 people, 41 like jogging, 30 like swimming and 8 like jogging and swimming both. Find: (a) how many like jogging only? (b) how many like swimming only?	4	CO1	K5
Q.4	Find $\lim_{x \rightarrow \infty} \frac{4x^3 - 3x^2 - 4x + 6}{7x^3 + 5x^2 + x - 3}$	4	CO1	K5
Q.5	Find the value of x, y if $2 \begin{bmatrix} x & 5 \\ 7 & y-4 \end{bmatrix} + \begin{bmatrix} 3 & 4 \\ 1 & -4 \end{bmatrix} = \begin{bmatrix} 5 & 14 \\ 1 & -4 \end{bmatrix}$	4	CO2	K3, K5
Q.6	2) If $A = \begin{bmatrix} 2 & 5 & 7 \\ 2 & -1 & 0 \\ 3 & 4 & 8 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 4 & 9 \\ 3 & -2 & 4 \\ -5 & 6 & 8 \end{bmatrix}$ verify that $(A + B)^T = A^T + B^T$.	4	CO2	K3, K4, K5
Q.7	$A = \begin{bmatrix} 2 & 3 \\ 1 & -4 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & -2 \\ -1 & 3 \end{bmatrix}$, then verify that $(AB)^{-1} = B^{-1}A^{-1}$	4	CO2	K4, K5
Q.8	Show that the function $f(x) = \frac{x+1}{x^2+1}$ is continuous at $x=2$.	4	CO1	K3, K4