

School of Advanced Sciences

Fall Semester 2023-2024

Continuous Assessment Test – I

Programme Name & Branch : B.Tech & (CSE and Business Systems)

Course Name & code: Discrete Mathematics

Class Number (s): VL2023240106391

Faculty Name : Dr. H. Niranjana

Exam Duration: 90 Min.

Maximum Marks: 50

General instruction(s): Answer **ALL** the following questions.

Q.No.	Question	Max Marks
1.	If A, B, C are sets, then prove that $(B \cup C) - A = (B - A) \cup (C - A)$ by both analytical and graphical method.	10
2.	Let f be a function $f: N \rightarrow N$ be defined by $f(x) = 3x + 2, x \in N$ (i) Find the images of 1, 2, 3 (ii) Find the pre-images of 29, 53 (iii) Identify the type of function.	10
3.	If R is the relation on the set $\{1, 2, 3, 4, 5\}$ defined by $(a, b) \in R$ if $a + b \leq 6$, (i) list the elements of R, R^{-1} and $\bar{R}$ (ii) the domain and range of R and R^{-1} (iii) the domain and range of $\bar{R}$. (iv) Determine whether the relation R on the set is reflexive, symmetric, antisymmetric and/or transitive.	10
4.	a) Let Q, be the set of all rational number other than 1 defined by $a * b = a + b - ab$ for all $a, b \in Q$. Prove that $(Q, *)$ is an abelian group. b) Show that the set N of natural members is a semi-group under the operation $x * y = \max \{x, y\}$. Is it a monoid?	10
5.	a) Define Lagrange's theorem. b) $(R, +, \cdot)$ is commutative ring with unity. R is an integral domain if and only if for all $a, b, c \in R, ab = ac$ implies $b = c$ ($a \neq 0$) c) Define the followings (i) Ring and types of Rings, (ii) Integral Domain (iii) Field with suitable example.	10