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Subject:-	Discrete Mathematics													
Roll No:-														

TECNIA INSTITUTE OF ADVANCED STUDIES
BCA
Internal Exam (2025-26)

Sem: IIIrd

Set-1

Date:

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Time: -1:30 Hours

Max. Marks: 30

General Instructions:

- All Questions are compulsory. Answers should be brief and to the point.
- It comprises three sections, A, B, and C. you are to attempt all the sections.
- **Section A** – Question No -1 is Very Short Answers type carrying 2 marks each. You are required to answer ALL.
- **Section B**- Question No-3 is Short Answers type question carrying 5 marks each. You are required to attempt any TWO out of THREE questions given.
- **Section C**- Question No -4 is Long Answer type question carrying 10 marks each. You need to attempt anyone.
- Students are instructed to cross the blank sheets before handing over the answer sheet to the invigilator.
- No sheet should be left blank. Any written material after a blank sheet will not be evaluated /checked.

		CO	BT	M
SECTION –A				(10)
1.	Attempt All of the following.			(5*2=10)
a.	Define cardinality of a set. What is the cardinality of power set of {a,b,c}?	CO1	L1	
b.	Let $\mathbb{N}=\{1,2,3,\dots\}$ denote the set of all positive integers and $A=\{x: x \in \mathbb{N}, 3 < x < 12\}$, $B=\{x: x \in \mathbb{N}, x \text{ is even}, x < 15\}$. Find $A \cup B$, $A \cap B$, A^c and B^c .	CO1	L2	
c.	Let $A = \{1,2,3,4\}$ and define the relation $R = \{(x, y): y=x+1\}$ on A. Represent R using a matrix and a digraph.	CO1	L3	
d.	Define Tautology and Contradiction.	CO2	L1	
e.	Let p: Earth revolves around Sun and q: $2 > 5$. What will be the truth value of $p \wedge q$ and $p \vee q$.	CO2	L2	
SECTION –B				
2.	Answer any Two of the following.			(2*5=10)
a.	Let $A=\{a,b,c\}$, $B=\{1,2,3,4\}$, and $f:A \rightarrow B$ be defined as $f(a)=1$, $f(b)=2$, $f(c)=3$. Define a new function $g:B \rightarrow B$ by $g(x) = x^2$. Find $(g \circ f)(a)$, $(g \circ f)(b)$, and $(g \circ f)(c)$. Is $g \circ f$ one-one?	CO1	L3	
b.	Determine whether the following are propositions. If they are, write their truth values. I. $2 + 5 = 7$	CO2	L4	

		II. $x > 10$ III. Read the instructions carefully. IV. The Earth revolves around the Sun. V. What time is it?			
	c.	Express each of the following statements using predicates and quantifiers: I. All students are intelligent. II. There exists a student who loves mathematics. III. No humans can fly. IV. Some animals are not mammals. V. Some cars are electric.	CO2	L3	
SECTION –C					
3.	Answer any <u>One</u> of the following.				(1*10=10)
	a.	Consider the set $S = \{1,2,4,6\}$ with the relation $R = \{(a,b) a \text{ divides } b\}$. Show that (S,R) is a partially ordered set and draw its Hasse diagram. Identify all maximal and minimal elements.	CO1	L5	
	b.	Prove that I. $p \rightarrow (q \wedge r) \equiv (p \rightarrow q) \wedge (p \rightarrow r)$. II. $p \rightarrow q \equiv \sim q \rightarrow \sim p$	CO2	L6	