BENNETT UNIVERSITY
TIMES OF INDIA GROUP

Course Name:	**Discrete Mathematical Structure**	Course Code:	**CSET106**
Academic Year:	2023-24	Semester:	Even
Date:	January 14, 2024	Type:	3-1-0
Tutorial Sheet:	**1**		

CO-mapping: All the questions are mapped to CO-1.

Objectives: Students will be able to apply set theoretic notations and use them to derive logical inferences.

---

1. If $U = \{2, 4, 8, 9, 11, 13\}$ is a set, then which of the following are subsets of U?
   (a) $\{2, 4, \{8\}\}$ (b) $\{8, 9\}$
   (c) $\{\emptyset, 11, 13\}$, $\emptyset$ is the null set (d) $\{13, 11, 9, 8\}$

2. The set $\{x : x$ is an integer neither positive nor negative$\}$ is a
   (a) Empty set (b) Finite set (c) Non-empty set (d) (b) and (c) both

3. List the members of these sets.
   (a) $\{x|\ x$ is a real number such that $x^2 = 1\}$
   (b) $\{x|\ x$ is a positive integer less than $12\}$
   (c) $\{x|\ x$ is the square of an integer and $x < 100\}$
   (d) $\{x|\ x$ is an integer such that $x^2 = 2\}$

4. For each of these pairs of sets, determine whether the first is a subset of the second, the second is a subset of the first, or neither is a subset of the other.
   (a) the set of airline flights from New York to New Delhi, the set of nonstop airline flights from New York to New Delhi
   (b) the set of people who speak English, the set of people who speak Chinese
   (c) the set of flying squirrels, the set of living creatures that can fly

5. For each of the following sets, determine whether 2 is an element of that set.
   (a) $\{x \in \mathbb{R}|\ x$ is an integer greater than $1\}$ (b) $\{x \in \mathbb{R}|\ x$ is the square of an integer$\}$
   (c) $\{2, \{2\}\}$ (d) $\{\{2\}, \{\{2\}\}\}$ (e) $\{\{2\}, 2, \{2\}\}\}$ (f) $\{\{\{2\}\}\}$

6. Use a Venn diagram to illustrate the subset of odd integers in the set of all positive integers not exceeding 10.

7. Determine whether each of these pairs of sets are equal.
   (a) $\{1,3,3,3,5,5,5,5,5\}, \{5,3,1\}$ (b) $\{\{1\}\}, \{1,\{1\}\}$ (c) $\emptyset, \{\emptyset\}$

8. Determine whether each of these statements is true or false.
   (a) $x \in \{x\}$ (b) $\{x\} \subseteq \{x\}$ (c) $\{x\} \in \{x\}$
   (d) $\{x\} \in \{\{x\}\}$ (e) $\emptyset \subseteq \{x\}$ (f) $\emptyset \in \{x\}$

9. Find two sets A and B such that $A \in B$ and $A \subseteq B$.

10. Let $A = \{a, b, c, d\}$ and $B = \{y, z\}$. Find $A \times B$ and $B \times A$.

11. If the cardinality of a set A is $(2n + 1)$, then the number of subsets of A having more than 'n' elements are
    (a) $2n - 1$ (b) $2n + 1$ (c) $2n$ (d) 2^{2n}

12. If A and B have 10 elements in common, then how many numbers of elements are common in $A \times B$ and $B \times A$?

13. In a competition, a school awarded 36 medals in dance, 12 in arts, and 18 in sports. Total 45 got the medals, and only 4 persons got all three medals. How many students are there who got exactly two medals?

14. Each student in a class of 40 plays at least one indoor game chess, carrom, scrabble. 18 play chess, 20 play carrom, 27 play scrabble, 7 play chess and scrabble, 12 play scrabble and carrom, and 4 play all three. Find the number of students who play (i). chess and carom, and (ii). chess, carom, but not scrabble.

15. Find the number of positive integers not exceeding 100 that are either odd or the square of an integer.

"None can destroy iron, but its own rust can. Likewise, none can destroy a person but his own mindset can." — Ratan Tata