MATHEMATICS

CLASS XI

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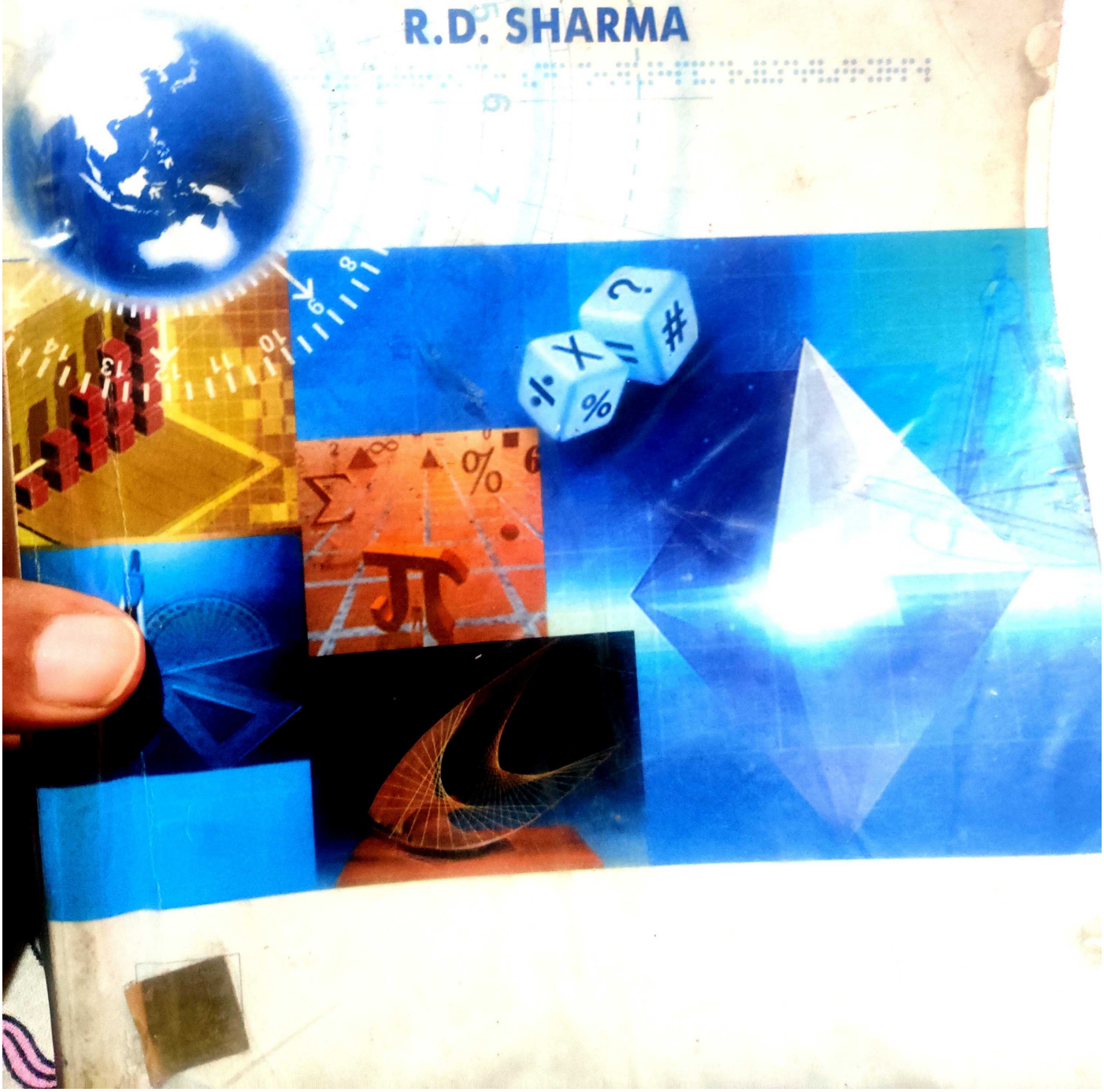

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SETS

1.1 SETS

It is a well known fact that any attempt to define a set has always led mathematicians to unsurmountable difficulties. For example, suppose one defines the term set as *"a well defined collection of objects"*. One may then ask what is meant by a collection. If one answers that a collection is an aggregate of objects or things. What is then an aggregate? Perhaps then one may define that an aggregate is a class of things. What is then a class? Now one may define a class as a collection. In this manner question after question, since our language is finite, we find that after some time we will have to use some words which have already been questioned. The definition thus becomes circular and worthless. Thus mathematicians realized that there must be some undefined (or primitive) terms. In this chapter we start with two undefined (or primitive) terms – "element" and "set". We assume that the word "set" is synonymous with the words "collection", "aggregate", "class" and is comprised of elements. The words "element", "object", "member" are synonymous.

If a is an element of a set A, then we write $a \in A$ and say a belongs to A or a is in A or a is a member of A. If a does not belong to A, the we write $a \notin A$. It is assumed here that if A is any set and a is any element, then either $a \in A$ or $a \notin A$ and the two possibilities are mutually exclusive. Thus one cannot say "consider the set A of some positive integers", because it is not sure whether $3 \in A$ or $3 \notin A$.

Throughout this chapter we shall denote sets by capital alphabets e.g. A, B, C, X, Y, Z etc. and the elements by the small alphabets e.g. a, b, c, x, y, z etc.

The following are some illustrations of sets:

ILLUSTRATION 1 *The collection of vowels in English alphabets. This set contains five elements, namely, a, e, i, o, u.*

ILLUSTRATION 2 *The collection of first five prime natural numbers is a set containing the elements 2, 3, 5, 7, 11.*

ILLUSTRATION 3 *The collection of all states in the Indian union is a set.*

ILLUSTRATION 4 *The collection of past presidents of the Indian union is a set.*

ILLUSTRATION 5 *The collection of cricketers in the world who were out for 99 runs in a test match is a set.*

ILLUSTRATION 6 *The collection of good cricket players of India is not a set, since the term "good player is vague and it is not well defined".*

Similarly, collection of good teachers in a school is not a set. However, the collection of all teachers in a school is a set.

In this chapter we will have frequent interaction with some sets, so we reserve some letters for these sets as listed below:

N : for the set of natural numbers.