CHAPTER – 5
INTRODUCTION TO EUCLID'S GEOMETRY

1 Euclid's Definitions, Axioms and Postulates

2 Equivalent Versions of Euclid's Fifth Postulate

The Greeks developed geometry is a systematic manner which Euclid (300 B.C.) a Greek mathematician, father of geometry introduced the method of proving mathematical results by using deductive logical reasoning and the previously proved result. The Geometry of plane figure is known as "Euclidean Geometry".

Axioms:

The basic facts which are taken for granted without proof are called axioms. Some Euclid's axioms are

(i) Things which are equal to the same thing are equal to one another. i.e.

$$a = b,\ b = c \Rightarrow a = c$$

(ii) If equals are added to equals, the wholes are equal i.e.

$$a = b \Rightarrow a + c = b + c$$

(iii) If equals are subtracted from equals, the remainders are equal i.e.

$$a = b \Rightarrow a - c = b - c$$

(iv) Things which coincide with one another are equal to one another.

(v) The whole is greater than the part.

Postulates:

Axioms are the general statements; postulates are the axioms relating to a particular field.

Euclid's five postulates are.

(i) A straight line may be drawn from any one point to any other point.

(ii) A terminated line can be produced indefinitely.

(iii) A circle can be drawn with any centre and any radius.

(iv) All right angles are equal to one another.

(v) If a straight line falling on two straight lines makes the interior angles on the same side of it taken together less than two right angles, then the two straight lines, if produced indefinitely meet on that side on which the angles are less than two right angles.

Statements: A sentence which is either true or false but not both, is called a statement.

e.g. (i) 4+9=6 If is a false sentence, so it is a statement.

(ii) Sanjay is tall. This is not a statement because he may be tall for certain persons and may not be taller for others.

Theorems: A statement that requires a proof is called a theorem.

eg. (i) The sum of the angles of triangle is 180°

(ii) The angles opposite to equal sides of triangles are equal. Corollary -

Result deduced from a theorem is called its corollary.