

Title of The Paper: SOLID GEOMETRY

LEARNING OBJECTIVES

The aim of this course is to learn the description, comparison of three dimensional solids.

LEARNING OUTCOMES

- Understand the concept of three dimensional geometry
- To measure the volumes of various solid shapes
- Finding numerical solutions in the fields of construction, defence .etc.

UNIT – I (12 hrs) : The Plane :

Equation of plane in terms of its intercepts on the axis, Equations of the plane through the given points, Length of the perpendicular from a given point to a given plane, Bisectors of angles between two planes, Combined equation of two planes, Orthogonal projection on a plane.

UNIT – II (12 hrs) : The Line :

Equation of a line; Angle between a line and a plane; The condition that a given line may lie in a given plane; The condition that two given lines are coplanar; Number of arbitrary constants in the equations of straight line; Sets of conditions which determine a line; The shortest distance between two lines; The length and equations of the line of shortest distance between two straight lines; Length of the perpendicular from a given point to a given line;

UNIT – III (12 hrs) : Sphere :

Definition and equation of the sphere; Equation of the sphere through four given points; Plane sections of a sphere; Intersection of two spheres; Equation of a circle; Sphere through a given circle; Intersection of a sphere and a line; Tangent plane.

UNIT – IV (12 hrs) : Sphere & Cones :

Angle of intersection of two spheres; Conditions for two spheres to be orthogonal; Radical plane; Coaxial system of spheres, limiting points of coaxial system of spheres.

Definitions of a cone; vertex; guiding curve; generators; Equation of the cone with a given vertex and guiding curve; Enveloping cone of a sphere; Equations of cones with vertex at origin are homogenous; Condition that the general equation of the second degree should represent a cone; Condition that a cone may have three mutually perpendicular generators;

UNIT – V (12 hrs): Cones & Cylinders :

Intersection of a line and a quadric cone; Tangent lines and tangent plane at a point; Condition that a plane may touch a cone; Reciprocal cones; Intersection of two cones with a common vertex; Right circular cone; Equation of the right circular cone with a given vertex; axis and semi-vertical angle.

Definition of a cylinder; Equation to the cylinder whose generators intersect a given conic and are parallel to a given line; Enveloping cylinder of a sphere; The right circular cylinder; Equation of the right circular cylinder with a given axis and radius.

Reference Books :

1. A text book of Mathematics for BA/B.Sc Vol 1, by V Krishna Murthy & Others, Published by S. Chand & Company, New Delhi.
2. A text Book of Analytical Geometry of Three Dimensions, by P.K. Jain and Khaleel Ahmed, Published by Wiley Eastern Ltd., 1999.