

Under-Graduate Programme with MATHEMATICS; 4th Semester

MATHEMATICS

MAJOR COURSE

MMT426J2: Plane & Solid Geometry

Credits: 4 THEORY + 2 TUTORIAL

Theory: 4 Credits (60 Hours)

Tutorial: 2 Credits (30 Hours)

Course Objectives: (i) To study the different sections of a cone (as conic section) and properties. (ii) To extend the concepts of 2D to 3D analogues.

Course Outcomes: After the completion of the paper, the student is expected to handle 2D and 3D geometrical concepts.

Theory: 4 Credits

Unit –I

Parabola: definition and standard equation, tangents and normals, pole and polar, pair of tangents from a point, equation of a chord of a parabola in terms of its middle point, parametric equations of a parabola.

Unit –II

Ellipse: definition and standard equation, tangents and normal, pole and polar, parametric equations of ellipse, Diameters, conjugate diameters and their properties, General second-degree equation in x & y : conditions under which a general second degree equation represents a conic, Determination of equation of the corresponding conic.

Unit –III

Hyperbola: definition and standard equation, tangents and normal, equation of hyperbola referred to asymptotes as axes, rectangular and conjugate diameters and their properties, tracing of conics.
Sphere: Definition and standard equation.

Unit –IV

Director sphere, normal to a sphere, radical plane, coaxial system, simplified form of the equation of two spheres.
Cylinder: Definition of a cylinder, Equation of a cylinder with generators parallel to a coordinate axis, Equation of a right circular cylinder, Equation of a cylinder whose generators are parallel to a given line. Simple problems on cylinders.

Tutorial: 2 Credits

Unit –V

Problems on standard equations of parabola, Finding vertex, focus, directrix, and axis, Equation of tangent and normal at a point.
Finding major and minor axes, foci, and eccentricity, Parametric form problems, Tangent and normal at a point, Pole and polar problems.

Unit –VI

Basic problems on standard equation of hyperbola, Asymptotes and rectangular hyperbola, Tangent and normal at a point.
Finding centre and radius from the general equation, Equation of sphere through given points, Tangent plane to a sphere.
Problems on Equation of cylinder with generators parallel to axes, Equation of right circular cylinder, Cylinder with generators parallel to a given line.

Recommended Books:

1. P. Balasubrahmanyam, K.G. Subramanian and G. R. Venkataraman, Coordinate Geometry of two and three Dimensions.
2. Shanti Narayan, Analytical Solid Geometry.
3. M. R. Puri, Co-ordinate Geometry of the Conics, New Academic Publishers, Jammu.
4. R. J. T. Bell, A Text Book of Solid Geometry.
5. S.Pirzada and T.A.Chishti, Analytical Solid Geometry, Universities Press, Orient Blackswan, 2007.