

## **Bachelors with Mathematics as Major**

### **4<sup>th</sup> Semester**

#### **MMT422J2: Mathematics/Applied Mathematics: Geometry**

**Credits: 4 THEORY + 2 TUTORIAL**

**Theory: 60 Hours & Tutorial: 30 Hours**

**Course Objectives:** (i) To provide idea about the basic applications of the analytical plane and solid geometry. To study the different sections of a cone (as conic section) and its properties. (ii) to familiarize the students with the illustrations of graphing standard quadric surfaces like cones, paraboloids, hyperboloids and ellipsoids.

**Course Outcomes:** After the completion of the paper, the student is expected to handle 2D and 3D geometrical concepts. (i) Understand the nature of Hyperbolic functions. (ii) Trace standard curves in Cartesian coordinates and polar coordinates.

#### **Theory: 4 Credits**

##### **Unit –I**

Parabola, 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, tangents and normal, pole and polar, parametric equations of ellipse, Diameters, conjugate diameters and their properties, General second-degree equation in  $x$  and  $y$ , Conditions under which a general second degree equation represents a conic, Determination of equation of the corresponding conic.

##### **Unit –III**

Sphere, radical plane, coaxial system, simplified form of the equation of two spheres, Cone, vertex, guiding curve, generator, equation of cone with vertex as origin or a given vertex and guiding curve, Condition that the general equation of the second degree should represent a cone, Necessary and sufficient conditions for a cone to have three mutually perpendicular generators.

##### **Unit –IV**

Cylinder, equation of the cylinder whose generators intersect a given conic and are parallel to given line, enveloping cylinder of a given sphere, types of conicoids, tangent and tangent planes, Director sphere, normal to a sphere, polar and polar planes, enveloping and enveloping cylinder. The paraboloids, conjugate diameters and conjugate planes

#### **Tutorial: 2 Credits**

##### **Unit –V**

Plane: equation of plane in intercept form, normal form, reduction of general form to normal form, equation of plane through three points, angle between two planes, perpendicular distance of a point from a plane, plane through the intersection of two planes.

##### **Unit –VI**

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

#### **Recommended Books:**

1. P. Balasubrahmanyam, K.G. Subramanian and G. R. Venkataraman, Coordinate Geometry of two and three Dimensions, Tata McGraw Hill, 1994.
2. Shanti Narayan, Analytical Solid Geometry, S. Chand and Company, 2007.
3. M. R. Puri, Co-ordinate Geometry of the Conics, New Academic Publishers, Jammu.
4. R.J.T. Bill, Elementary Treatise on Coordinate Geometry of Three Dimensions, McMillan India Ltd., 1994.
5. S.L. Loney, The Elements of Coordinate Geometry, McMillan and Company, London.
6. S.Pirzada and T.A.Chishti, Analytical Solid Geometry, Universities Press, Orient Blackswan, 2007.