

**5<sup>th</sup> SEMESTER**  
**DISCIPLINE SPECIFIC ELECTIVES (DSEs)**

**OPTION-I**

**MM516DA: MATHEMATICS – PLANE AND SOLID GEOMETRY**

**CREDITS: 6**

**Unit-I**

Parabola, tangents and normals, pole and polar, parametric equations of a parabola, ellipse, tangents and normals, pole and polar, parametric equations of ellipse, diameters, conjugate diameters and their properties. Hyperbola, tangents and normals, equation of hyperbola referred to asymptotes as axes, rectangular and conjugate diameters and their properties, tracing of conics (Cartesian co-ordinates only), general second degree equation in x and y, conditions under which a general second degree equation represents a conic and determination of equation of the corresponding conic.

**Unit-II**

Sphere, radical plane, coaxial system, 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, cylinder, equation of the cylinder whose generators intersect a given conic and are parallel to given line, enveloping cylinder of a sphere.

**Unit-III**

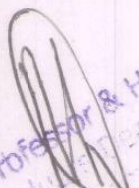
Types of conicoids, central conicoids, tangent and tangent planes, director sphere, normals to a surface, polar and polar planes, enveloping and enveloping cylinder, the paraboloids, conjugate diameters and conjugate planes, plane sections of a conicoid, circular sections of conicoids, umbilics.

**Unit-IV**

Generating lines- ruled surfaces, real ruled surfaces, generating lines for hyperbolic paraboloid of one sheet, perpendicular generators, generating lines for hyperbolic paraboloid, conicoids through three given lines, hyperboloid whose two generators are coordinate axes, properties of a generating line

**Text Books Recommended**

1. P. Balasubrahmanyam, K.G. Subramanian and G.R.Venkataraman, Coordinate Geometry of two and three Dimensions.
2. S.Pirzada and T.A.Chishti, Analytical Solid Geometry, Universities Press, Orient Blackswan, 2007.
3. Shanti Narayan, Analytical Solid Geometry.

  
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**5<sup>th</sup> SEMESTER**  
**DISCIPLINE SPECIFIC ELECTIVES (DSEs)**  
**OPTION-II**

**MM516DB: MATHEMATICS – NUMERICAL ANALYSIS**

**CREDITS: 6**

**Unit-I**

Preliminaries of Computing; Basic concepts: round-off errors; Errors in Numerical calculations; Absolute, relative and percentage errors, General error formula; Error in a series approximation; Taylor and Maclaurin's series approximations; Convergence of a numerical solution; The Bisection method; fixed-point iteration; the iteration method; Acceleration of convergence (Aitken's  $\Delta^2$  - process).

**Unit II**


Newton- Raphson method; Computing roots of algebraic and transcendental equations. Interpolation and Polynomial Approximation; Finite differences: Forward, Backward and Central differences; Symbolic relations and separation of symbols; Lagrange's Interpolation formula.

**Unit-III**

Numerical differentiation; Errors in numerical differentiation; Newton's forward difference method; The cubic spline method; Numerical Integration; General quadrature formula; Trapezoidal rule; Simpson 1/3 and 3/8 methods.


**Unit-IV**

Solution of systems of linear algebraic equations using Gauss elimination and Gauss-Seidel methods; Numerical factorizations; Eigenvalue problems; IVP problems for ODE; Euler's, Taylor's and Runge-Kutta methods; Picard's iterative method; Approximation theory; Least square approximation.

  
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**Suggested Books**

1. S.C. Chapra, and P.C. Raymond, Numerical Methods for Engineers, Tata McGraw Hill, New Delhi (2000) □
2. R.L. Burden, and J. Douglas Faires, Numerical Analysis, P.W.S. Kent Publishing Company, Boston (1989), Fourth edition. □
3. S.S. Sastry, Introductory methods of Numerical analysis, Prentice- Hall of India, New Delhi (1998). □
4. M.K. Jain, S.R.K. Iyengar and R.K. Jain, Numerical methods for scientific and Engineering computation, Wiley Eastern (1993) □

  
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