BACHELLOR OF ARTS / SCIENCE
5th SEMESTER
DISCIPLINE SPECIFIC ELECTIVE COURSES (DSEs)
OPTION-I

MM520DA: MATHEMATICS: PLANE AND SOLID GEOMETRY

CREDITS THEORY-4, TUTORIAL: 2

THEORY (4 CREDITS: 60 HOURS) **MAXIMUM MARKS: 60, MINIMUM MARKS: 24**

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.

UNIT-1 (15 HOURS)

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.

UNIT-2 (15 HOURS)

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-3 (15 HOURS)

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.

UNIT-4 (15 HOURS)

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.

TUTORIALS (2 CREDITS: 30 HOURS) **Maximum Marks: 30 Minimum Marks: 12**

13. Tutorials based on Unit I & II - **1 credit**
14. Tutorials based on Ruled Surfaces, Unit III & IV – **1 credit**.

Text Books Recommended

1. P. Balasubrahamanyam, 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.

BACHELLOR OF ARTS / SCIENCE
5th SEMESTER
DISCIPLINE SPECIFIC ELECTIVE COURSES (DSEs)
OPTION-II

MM520D: MATHEMATICS: NUMERICAL ANALYSIS

CREDITS THEORY-4, TUTORIAL: 2

THEORY (4 CREDITS: 60 HOURS) **MAXIMUM MARKS: 60, MINIMUM MARKS: 24**

Objectives: To learn the techniques and approximations to solve numerical problems arising in physical and engineering sciences.

UNIT-1 (15 HOURS)

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 Δ^2 - process)

UNIT-2 (15 HOURS)

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-3 (15 HOURS)

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-4 (15 HOURS)

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

TUTORIALS (2 CREDITS: 30 HOURS) **Maximum Marks: 30 Minimum Marks: 12**

15. Tutorials based on Unit I & II - **1 credit**
16. Tutorials based on Unit III & IV – **1 credit**.

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)