# Shyama Prasad Mukherji College Teaching Plan

**Course and Year: B.A (Prog.) - II yr. (July to Dec – 2022) Semester: III**

**Taught individually or shared: Shared**

**Core Paper: Analytic Geometry and Applied Algebra Faculty: Ms. Monika and Ms. Alka Goel**

**Workload: 5 Lectures, 1 Tutorial (per week)**

**Total Marks:** 100 (Theory: 75 + Internal Assessment: 25)

**Duration:** 14 Weeks (70 Hrs.),**Examination:** 3 Hrs.

**Course Objective:** The course aims at identify curves and applying mathematical models in daily life problems studying geometric properties of different conic sections. The purpose of this course is to strengthen the mathematical skill along with the algebraic skills and concepts to assure success in the Algebra.

**Course Learning Outcomes:**The course will enable the students to: i)Identify and sketch curves.

1. Use three-dimensional geometry using vectors.
2. Understand mathematical models to relate mathematics with daily life problems.

**Teaching Plan**

**Name of the Paper Units**

**Numerical Methods : Unit-I: (i) Methods for solving Transcendental equations**

**(With Practicals)** Bisection Method, Regula False Method, Secant Method, Newton Raphson Method and Fixed point method, Convergence analysis.

**(ii) Methods for solving Linear Algebraic System of Equations**

LU-Decomposition Method, Gauss Jacobi Method, Gauss-Siede Method and SOR Method.

**Unit-1I: Interpolations and Operators**

Linear and Lagrange’s Interpolation, Higher Order Interpolation and Finite Difference Operators.

**Unit-III : Numerical Differentiation and Integration**

Forward difference, Backward difference and Central difference methods. Trapezoidal rule, Simpson’s rule, Euler’s method..

**Readings : [1] Bradie B(2007), A Friendly Introduction to Numerical Analysis, Pearson Education, India** .

**[2] Jain M.K., Iyengar S.R.K. and Jain R.K.(2007), Numerical Methods for Scientific and Engineering Computation, New age International Publisher, India, 5th edition.**

**[3] Gerald C.F. and Wheatley P.O.(2008), App;ied Numerical Analysis, Pearson Education, India,7th edition.**

**Teaching Plan (Unit)**

**Name of the Paper:Analytic Geometry and Applied Algebra**

**Unit-I: Geometry**

Techniques for sketching parabola, ellipse and hyperbola. Reflection properties of parabola, ellipse and hyperbola and their applications to signals, classification of quadratic equation representing lines, parabola, ellipse and hyperbola.

**Unit-II:3-Dimensional Geometry and Vectors**

Rectangular coordinates in 3-space; spheres, cylindrical surfaces cones. Vectors viewed geometrically, vectors in coordinate system, vectors determine by length and angle, dot product, cross product and their geometrical properties. Parametric equations of lines in plane, planes in 3-space.

**Unit-III:Applied Algebra**

Latin Squares, Table for a finite group as a Latin Square, Latin squares as in Design of experiments, Mathematical models for Matching jobs, Spelling Checker, Network Reliability, Street surveillance, Scheduling Meetings, Interval Graph Modelling and Influence Model, Picher Pouring Puzzle.

**Reference:**1.Anton, Howard, Bivens, Irl, & Davis, Stephen (2013). Calculus (10th ed.). Wiley India Pvt. Ltd. New Delhi. International Student Version. Indian Reprint 2016.

**Suggested Readings : [1] Frank R.G., William P.F. and Steven B.H. (2014), A first course in Mathematical Modelling, Cenage Learning, India.**

**[2] Richard L.B. and FairesJ.D.(2005), Numerical Analysis, Thompson Book,USA.**

**Additional readings :** i. Ghorpade, Sudhir R. & Limaye, B. V. (2006). A Course in Calculus and Real Analysis. Undergraduate Texts in Mathematics, Springer (SIE). First Indian reprint. ii. Mattuck, Arthur. (1999). Introduction to Analysis, Prentice Hall. iii. Ross, Kenneth A. (2013). Elementary Analysis: The Theory of Calculus (2nd ed.). Undergraduate Texts in Mathematics, Springer. Indian Reprint.**. and Steven B.H.**

ii).Mattuck, Arthur. (1999). Introduction to Analysis, Prentice Hall.

iii). Ross, Kenneth A. (2013). Elementary Analysis: The Theory of Calculus (2nd ed.). Undergraduate

1. Tucker, Alan (2012). Applied Combinatorics (6th ed.). John Wiley & Sons, Inc.

**Additional Readings:**

## Strauss, Monty J., Bradley, Gerald L., & Smith, Karl J. (2007). *Calculus* (3rd ed.). Dorling Kindersley (India) Pvt. Ltd. (Pearson Education). Delhi. Indian Reprint 2011.

* 1. Thomas, Jr. George B., Weir, Maurice D., & Hass, Joel (2014). *Thomas*’ *Calculus* (13th ed.). Pearson Education, Delhi. Indian Reprint 2017.

## . 3. Jeffrey R. Chasnov. Vector Calculus for Engineers. Hong Kong University of Science and Technology.

1. Charles F. Laywine, Gary L. Mullen (1998). Discrete Mathematics Using Latin Squares. John Wiley & Sons.

## Fred S Roberts, Barry Tesman (2009). Applied Combinatorics, Second Edition. CRC Press;Chapman and Hall/CRC

**e-references [1] Mathematical Science - VLE , University of Delhi.**

1. **Paul’s Online Math’s Notes**
2. **NPTEL Video Lectures**
3. **web link :** mathfaculty.fullerton.edu/mathews/n2003/Web

**Tentative date of assessments/ assignments (time frame): Test -1 in the mid of sept. Test-2 and Assignment-1 in mid of Oct.**

**Test -3 and Assignment-2 in mid of Nov.**

**Criteria of Assessment: Written Tests/Assignments/Presentations/Mock Tests/Viva Voice Examinations/Performance in Inter-College academic activities.**

**Teaching Plan (Weekly)**

**Weeks 1 to 3:**Techniques for sketching parabola, Ellipse and hyperbola with problem solvable.

[1] Chapter 11 (Section 11.4)

**Weeks 4 and 5:**Reflection properties of parabola, Ellipse and Hyperbola, Classification of quadratic equation representing lines, Parabola, Ellipse and Hyperbola, Rotation of axis second degree equations

[1] Chapter 11 (Sections 11.4, and 11.5)

**Weeks 6 and 7:**Rectangular coordinates in 3-space with problems, Spheres, Cylindrical surfaces cones.

[1] Chapter 12 (Section 12.1)

**Weeks 8 and 9:**Vectors in coordinate system, Vectors viewed geometrically, Vectors determined by length and angle, Dot product, Cross product and their geometrical properties.

[1] Chapter 12 (Sections 12.3, and 12.4)

**Weeks 10 and 11:**Parametric equations of lines in plane, Planes in 3-space.

1. Chapter 12 (Sections 12.4, 12.5)

**Weeks 12 to 14:**Latin squares, Table for a finite group as a Latin square, Latin squares as in design of experiments, Mathematical models for matching jobs, Spelling checker, Network reliability, Street surveillance, Scheduling meetings. Interval graph modelling and Influence model, Pitcher pouring puzzle.

1. Chapter 1 (Section 1.1, Examples 1 to 6), and Chapter 3 (Section 3.2, Example 3, page 106)