OUTLINES OF TESTS,
SYLLABI AND COURSES OF READING

for

M.Sc. Chemistry Part I
(Semester I)

Academic Sessions
2025–26 and 2026–27

NEP-TEMPLATE FOR MULTIDISCIPLINARY UG PROGRAMME

POST GRADUATE DEPARTMENT OF MATHEMATICS
GURU NANAK COLLEGE BUDHLADA
AN AUTONOMOUS COLLEGE
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SCHEME OF THE COURSE

M.Sc. CHEMISTRY I SEMESTER I & II

Semester I							
Type of Course	**Course Code**	**Course Title**	**Internal**	**External**	**Practical**	**Total**	**Credit**
Elective	BAMJMAT1103T	Mathematics for Chemist	30	70	-	100	04

SEMESTER I
BAMJMAT1103T: MATHEMATICS FOR CHEMIST
(Elective)

Credits: 04(L)   External Exam Marks: 70
Time Allowed: 3 Hrs.   Internal Assessment: 30
Pass percentage: 35%   Total Marks: 100

COURSE OBJECTIVE: The course aims to develop a strong foundation in vector analysis, matrix algebra, coordinate geometry, and trigonometry. It enhances analytical and problem-solving skills through differential and integral calculus, differential equations, and series solutions. Students will also gain basic knowledge of permutations, probability, and their applications in physical sciences.

COURSE OUTCOMES:
1. Apply vector operations and calculus tools (gradient, divergence, curl) to solve physical and mathematical problems.
2. Solve systems of linear equations using matrix algebra, including eigenvalue problems and the Cayley-Hamilton theorem.
3. Analyze geometric relationships using coordinate geometry and trigonometric identities.
4. Use differential and integral calculus for solving problems involving rates of change, area, and optimization.
5. Solve basic differential equations and apply them to physical models such as chemical kinetics and harmonic oscillators.
6. Apply concepts of permutations, combinations, and probability to analyze and interpret scientific data.

INSTRUCTIONS FOR THE PAPER-SETTER

The question paper will consist of three Sections: A, B and C. Section A will have four questions (from the respective section of syllabus) carrying 12 marks each, Section B will have also four questions (from the respective section of syllabus) carrying 12 marks each. Section C will consist of 11 short answer questions that will cover the entire syllabus and will be of two marks each.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt five questions selecting two questions from each of Section A & B and entire Section C.

SECTION-A

Matrix Algebra : Addition and multiplication, determinants (up to 3 order) inverse, adjoint and transpose of matrices, special matrices (Symmetric, skew-symmetric, Hermitian; skew-Hermitian, unit, diagonal, unitary etc.) and their properties.

Coordinate Geometry: Cartesian system of co-ordinates in the plane, slope of a line, parallel and perpendicular lines, intercepts of a line on the co-ordinate axes, Various forms of equations of a line-parallel to axis, slope intercept form, the point slope form, two point form, intercept form, normal form and general forms.

Trigonometry: Degree and radian measure of positive and negative angles, relation between degree and radian, definition of trigonometric functions with the help of unit circle, Periodic functions, Concept of periodicity of trigonometric functions, values of trigonometric functions for different angles, trigonometric functions of sum and differences of angles, addition and subtraction formulae.

SECTION-B

Differential Calculus: Functions, continuity and differentiability, rules for differentiation, applications of differential calculus including maxima and minima. Functions of several variables, partial differentiation, Euler's theorem co-ordinate transformations (e.g. cartesian to spherical polar).

Integral calculus: Basic rules for integration, integration by parts, partial fraction and substitution definite integrals.

Elementary Differential Equations: Variables separable and exact, first order differential equations. Homogeneous, exact and linear equations. Applications to chemical kinetics, secular equilibria, quantum chemistry etc.

RECOMMENDED BOOKS:
1. The Chemistry Mathematics Book, E. Steiner, Oxford University Press.
2. Mathematics for Chemistry, Doggett and Sucliffe, Longman.
3. Mathematical Preparation for Physical Chemistry, F. Daniels, McGraw Hill.
4. Chemical Mathematics, D.M. Hirst, Longman.
5. Applied Mathematics for Physical Chemistry, J.R. Barrante, Prentice Hall.
6. Basic Mathematics for Chemists, Tebbutt Wiley.

SUPPLEMENTARY READING

1. Higher Engineering Mathematics, B. S. Grewal (Khanna Pub.)
2. Jain. R.K., Iyengar, S.R. and Iyengar, S.R., 2007. Advanced engineering mathematics. Alpha Sci.