# Postgraduate Department of Mathematics 

B.Sc. Mathematics

## Programme Outcomes

| PO1 | Acquire the sense of Mathematical, Logical and Analytical thinking |
| :--- | :--- |
| PO2 | Understand the basics of Mathematical concepts and area of applications. |
| PO3 | Generate interest for higher education and academic contribution |
| PO4 | Develop soft skills for Research, Employment and Entrepreneurship. |
| PO5 | Ignite scientific temper and be aware of possible contributions. |
| PO6 | Create awareness on environmental issues and human rights |
| PO7 | Become intellectually competent and to become a human being committed to <br> development of society |

## Programme Specific Outcomes

| PSO1 | Apply the basic concepts and techniques of logic, set theory and calculus in <br> other areas of Mathematics. |
| :--- | :--- |
| PSO2 | Apply Mathematics in real life situations and solve the problems logically. |
| PSO3 | Analyze abstract structures which are relevant in other disciplines of Mathematics, <br> Theory of Equations, Geometry, Number Theory and Logic. |
| PSO4 | Develop analytic brain, logical thinking and problem solving skills through <br> Mathematical Analysis. |
| PSO5 | Understand Mathematics of nature and create a positive attitude about the <br> environment. Awareness of the basic ideas of Human Rights. |
| PSO6 | Create aptitude in higher studies and research. |

## Course Outcomes

## Core Courses for B.Sc. Mathematics

| $\begin{aligned} & \text { Sl. } \\ & \text { No } \end{aligned}$ | Course Code | Course Title |  | Course Outcomes |
| :---: | :---: | :---: | :---: | :---: |
| SEMESTER 1 |  |  |  |  |
| 1 | MM1CRT01 | Foundations of Mathematics | CO1 | Analyze and evaluate real world arguments and problems using propositional logic |
|  |  |  | CO 2 | Create new sets and perform set operations to model and solve practical problems. |
|  |  |  | CO 3 | Apply knowledge of equivalence relations to solve problems involving equivalence classes and partitions. |
|  |  |  | CO 4 | Apply relations connecting roots and coefficients to solve equations and derive useful information about their properties. |
| SEMESTER 2 |  |  |  |  |
| 2 | MM2CRT01 | Analytic Geometry, Trigonometry and Differential Calculus | CO1 | Evaluate the properties of conic sections |
|  |  |  | CO 2 | Understand polar equations of conic sections |
|  |  |  | CO3 | Apply the concept of separation into real and imaginary parts for circular and hyperbolic functions of a complex variable |
|  |  |  | CO 4 | Evaluate higher order derivatives of the product of two functions and limits of indeterminate forms |
| SEMESTER 3 |  |  |  |  |
|  |  |  | CO1 | Apply the concepts of differentiation. |
|  |  |  | CO 2 | Apply the concepts of partial derivatives . |


| 3 | MM3CRT01 |  |  | Apply integrals to find the volumes of solids, the <br> length of an arc and the area of surfaces of <br> revolution. |
| :--- | :--- | :--- | :--- | :--- |
|  | Calculus | CO3 |  |  |

## SEMESTER 4

| MM4CRT01 | Vector <br> Calculus, Theory of Numbers and Laplace Transform | CO1 | Analyze differentiable vector valued functions and properties |
| :---: | :---: | :---: | :---: |
|  |  | CO2 | Evaluate line integrals and surface integrals and apply related theorems |
|  |  | CO3 | Apply the properties of congruence relation and understand Phi-function |
|  |  | CO 4 | Apply Laplace transforms for solving differential equations |

## SEMESTER 5

| 5 |  |  | Understand the algebraic and order properties of Real <br> numbers, the absolute value of a real number and the <br> Completeness Property of R |
| :--- | :--- | :--- | :--- | :--- |


|  |  |  |  | curves. |
| :---: | :---: | :---: | :---: | :---: |
|  |  |  | CO4 | Apply various methods of solutions of Differential Equations $d x / P=d y / Q=d z / R$ |
| 7 | MM5CRT03 | Abstract Algebra | CO1 | Understand different algebraic structures. |
|  |  |  | CO2 | Construct new algebraic structures and substructures. |
|  |  |  | CO 3 | Analyze concepts of Homomorphism, Isomorphism and automorphism. |
|  |  |  | CO 4 | Apply theorems related to algebraic structures. |
| 8 | MM5CRT04 | Human Rights <br> and <br> Mathematics for <br> Environmental Studies | CO1 | Analyze the use and over-exploitation of natural resources. |
|  |  |  | CO2 | Analyze the role of individuals in preventing Environmental Pollution and Social Issues. |
|  |  |  | CO3 | Analyze types of Fibonacci and Lucas numbers in nature. |
|  |  |  | CO 4 | Understand the concept of golden ratio, the mean proportional and its geometric interpretation. |
|  |  |  | CO5 | Evaluate the importance of human rights awareness in education. |
| SEMESTER 6 |  |  |  |  |
| 9 | MM6CRT01 | Real Analysis | CO1 | Analyze the behavior of continuous functions, andd identifying points of continuity and discontinuity. |
|  |  |  | CO 2 | Analyze functions and intervals where the Mean Value Theorem is applicable and apply L' Hospital's rules. |
|  |  |  | CO3 | Understand the Riemann Integral and Riemann Integrable Functions |


|  |  |  | CO 4 | Understand the concept of sequence and series of functions. |
| :---: | :---: | :---: | :---: | :---: |
| 10 | MM6CRT02 | Graph Theory and Metric Spaces | CO1 | Apply concepts graph theory and matrix representation of graphs. |
|  |  |  | CO 2 | Analyze the properties of trees, Euler graphs, and Hamiltonian graphs. |
|  |  |  | CO 3 | Analyze convergence in metric spaces |
|  |  |  | CO 4 | Understand the completeness concept and evaluate continuity of functions in metric spaces. |
| 11 | MM6CRT03 | Complex <br> Analysis | CO1 | Evaluate analytic and harmonic functions. |
|  |  |  | CO 2 | Apply the theory and techniques of complex integration. |
|  |  |  | CO3 | Apply power series expansion of analytic functions. |
|  |  |  | CO 4 | Apply the theory of residues in complex integration and evaluation of definite integrals. |
| 12 | MM6CRT04 | Linear <br> Algebra | CO1 | Apply concepts of matrices to solve linear equations. |
|  |  |  | CO2 | Evaluate properties of vector spaces |
|  |  |  | CO 3 | Apply concepts of Linear transformations and Linear isomorphism. |
|  |  |  | CO4 | Analyze concepts of algebraic and geometric multiplicity. |

## Choice Based Core Course (Semester 6)

| 1 |  |  | CO 1 | Evaluate real-life problems using various linear <br> programming methods. |
| :--- | :--- | :--- | :--- | :--- |
|  |  |  | CO 2 | Analyze the concept of duality in LPP. |


|  |  |  |  | of two person zero sum game. |
| :--- | :--- | :--- | :--- | :--- |

## Open Course (Semester 5)

| 1 |  |  | CO 1 | Apply the formulas on interest computing, time and <br> work, work and wages, time and distance. |
| :--- | :--- | :--- | :--- | :--- |
|  | MM5GET02 | Applicable <br> Mathematics | CO 2 | Apply the basic concepts of trigonometry, <br> exponential and logarithmic series |
|  |  | CO 3 | Apply elementary mensuration of solids and <br> elementary concepts of algebra |  |
|  |  | CO 4 | Understand the basic concepts of differential calculus <br> and basic formulas |  |

## Complementary Courses (to B.Sc. Physics/Chemistry)

## SEMESTER 1

|  |  |  | CO 1 | Apply differentiation to functions of several <br> variables. |
| :--- | :--- | :--- | :--- | :--- |
| 1 | MM1CMT01 | Partial <br> Differentiation <br> Matrices, <br> Trigonometry <br> and Numerical <br> Methods | CO 2 | Apply matrix theory to find the solution of a system <br> of linear equations and spectrum of matrices. |
|  |  | Apply trigonometry for summation of infinite series <br> and separation of complex functions. |  |  |
|  |  | CO 4 | Apply numerical methods for solution of higher <br> order equations |  |


| SEMESTER 2 |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| 2 | MM2CMT01 | Integral Calculus and Differential Equations | CO1 | Apply tools of integration to find volume of solid of revolution , arc length and area of surface of revolution |
|  |  |  | CO 2 | Evaluate area of a bounded region in plane and volume of a closed bounded region in space. |
|  |  |  | CO 3 | Apply various methods to solve Ordinary Differential Equations. |
|  |  |  | CO 4 | Apply Lagrange's method to solve first order linear Partial Differential Equations. |

## SEMESTER 3

|  |  | CO 1 | Analyze differentiable vector valued functions and <br> properties |  |
| :--- | :--- | :--- | :--- | :--- |
|  |  | MM3CMT01 | Vector <br> Calculus, | CO 2 |
| Evaluate line integrals and surface integrals and <br> apply related theorems |  |  |  |  |
| Analytic <br> Geometry and <br> Abstract <br> Algebra | CO | CO 4 | Apply the concepts related to Conic sections | Understand Groups, Subgroups, Cyclic groups and <br> Homomorphism |

## SEMESTER 4

|  |  | CO 1 | Apply Fourier series and Legendre polynomials <br> in solving Mathematical problems. |
| :--- | :--- | :--- | :---: | :--- |
| 4 | Fourier <br> Series, <br> Laplace <br> MM4CMT01 <br> and Complex <br> Analysis | CO 2 | Apply Power series method and Laplace <br> transforms to solve differential equations |
|  |  | CO 3 | Analyze the concept of analytic and harmonic <br> functions. |
|  | CO 4 | Understanding the theory and techniques of <br> complex integration |  |

## ComplementaryCourses in Statistics (to B.Sc. Mathematics)

## SEMESTER 1

| 1 | ST1CMT01 | Descriptive Statistics | CO 1 | Analyze the concept of data |
| :---: | :---: | :---: | :---: | :---: |
|  |  |  | CO 2 | Understand the basic concepts of measures of central tendency and dispersion |
|  |  |  | CO 3 | Analyze different data sets based on their skewness and kurtosis |
|  |  |  | CO4 | Apply index numbers in various economic contexts for identifying economic fluctuations |
| SEMESTER 2 |  |  |  |  |
| 2 | ST2CMT01 | Probability <br> Theory | CO1 | Apply probability concepts for solving real world problems |
|  |  |  | CO 2 | Remember different types of random variables |
|  |  |  | CO 3 | Apply various measures associated with random variables |
|  |  |  | CO 4 | Analyze the relationship between two data sets using correlation and regression techniques |
| SEMESTER 3 |  |  |  |  |
| 3 | ST3CMT01 | Probability Distributions | CO1 | Apply the proficiency in using mathematical techniques related to Mathematical Expectations |
|  |  |  | CO 2 | Analyze different probability distributions |
|  |  |  | CO3 | Evaluate different implications of Law of Large <br> Numbers in statistical scenarios |
|  |  |  | CO4 | Remember various Sampling Distributions |
| SEMESTER 4 |  |  |  |  |
| 4 | ST4CMT01 | Statistical Inference | CO1 | Understand different methods of parameter estimation and their properties |
|  |  |  | CO 2 | Create confidence intervals for parameters |
|  |  |  | CO3 | Create hypotheses and conduct different tests |
|  |  |  | CO 4 | Apply the knowledge of statistical inference for drawing conclusions from real - world problems |

