M.Sc. Mathematics

Programme Outcomes (PO)

PO No.	Upon completion of M.Sc. Degree programme, the graduates will be able to:
PO-1	Understand the basic concepts, theorems, fundamental principles and the scientific theories related to various scientific phenomena and their relevancies in the day-to-day life.
PO-2	Acquire the knowledge with facts related to various subjects in pure sciences such as Mathematics, Physics, Chemistry, Botany, Zoology etc.
PO-3	Apply the knowledge of Mathematics, in all the fields of learning including higher research and its extensions.
PO-4	Innovate, invent and solve complex mathematical problems using the knowledge of pure and applied mathematics.
PO-5	Explain the knowledge of contemporary issues in the field of Mathematics and applied sciences.
PO-6	Crack lectureship and fellowship exams approved by UGC like CSIR – NET and SET.

Programme Specific Outcomes (PSO)

PSO No.	Upon completion of M.Sc. Mathematics Degree programme, the graduates will be able to:	Mapping
PSO-1	Understand the basic concepts, fundamental properties and application of theorem in-depth on the subject.	PO-1
PSO-2	Apply their knowledge in various concepts involved in algebra, differential equations and graph theory.	PO-2, PO-6
PSO-3	Demonstrate their talent in writing mathematical proofs.	PO-4, PO-5
PSO-4	Create and analyze mathematical models by applying the theorem statement for the real life situation.	PO-4
PSO-5	Solve problems in competitive exams in order to brighten their future and academic carrier.	PO-4, PO-6
PSO-6	Analyze the statistical survey data and interpret the conclusion using statistical techniques	PO-3
PSO-7	Choose excellent career opportunities in Research, Teaching and Technical Institutions.	PO-3, PO-6
PSO-8	Apply their knowledge in computer programming.	PO-3
PSO-9	Pursue higher degree courses M.Phil., Ph.D in pure and applied mathematics.	PO-3
PSO-10	Interpret their knowledge to qualify CSIR-NET, GATE and SET exams.	PO-6

CBCS SYLLABUS FOR M.Sc., MATHEMATICS

I SEMESTER			
DSC 1	**GROUPS, RINGS & FIELDS**		**18PCMA11**
Hrs / Week : 6	**Hrs / Sem : 6 x 15 = 90**	**Hrs / Unit :18**	**Credit : 4**

Course Outcomes (CO)

CO No.	Upon completion of this Course, students will be able to:	PSO addressed	Blooms taxonomy classification
CO-1	Understand the concepts of Sylow's theorem, Class equations and finite Abelian groups.	1	Understanding
CO-2	Explain the fundamental concepts of algebra.	1,2	Understanding
CO-3	Apply the Galois theory for finding the roots of the polynomial.	2,3	Applying
CO-4	Determine the properties of roots of the polynomial.	10	Evaluating
CO-5	Recall the importance of extension fields and its use.	2,4	Remembering

I SEMESTER			
DSC 2	**REAL ANALYSIS I**		**18PCMA12**
Hrs / Week : 6	**Hrs / Sem : 6 x 15 = 90**	**Hrs / Unit :18**	**Credit : 4**

Course Outcomes (CO)

CO No.	Upon completion of this Course, students will be able to:	PSO addressed	Blooms taxonomy classification
CO-1	Understand the real and complex number systems, point set topology and metric spaces.	1	Understanding
CO-2	Analyze the various types of sequences and series and differentiate them with their practical knowledge.	2,7	Analyzing
CO-3	Distinguish continuous functions and differentiable functions and also find relations between the functions.	2	Analyzing
CO-4	Estimate the higher order derivatives using Taylor's theorem and writing solution in good manner.	10	Creating
CO-5	Utilize skills in mathematical analysis through the disciplinary.	2,9	Applying

I SEMESTER			
DSC 3	**MATHEMATICAL STATISTICS**		**18PCMA13**
Hrs / Week : 6	**Hrs / Sem : 6 x 15 = 90**	**Hrs / Unit : 18**	**Credit : 4**

Course Outcomes (CO)

CO No.	Upon completion of this Course, students will be able to :	PSO addressed	Blooms taxonomy classification
CO-1	Understand mathematical expectations and Chebyshev inequality.	1	Understanding
CO-2	Recall t and F distributions and their applications.	4,6	Remembering
CO-3	List out the MGF technique and derive Central Limit theorem.	3,4	Remembering, Creating
CO-4	Apply Poisson distribution, Gamma distribution and Chi-square distribution to solve problems.	2,6	Applying
CO-5	Outline the concepts of marginal and Conditional distributions, correlation coefficient and stochastic independence.	1,10	Understanding

I SEMESTER			
DSC 4	**ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS**		**18PCMA14**
Hrs / Week : 6	**Hrs / Sem : 6 x 15 = 90**	**Hrs / Unit : 18**	**Credit : 4**

Course Outcomes (CO)

CO No.	Upon completion of this Course, students will be able to:	PSO addressed	Blooms taxonomy classification
CO-1	Evaluate the general solutions of first-order, second-order, and higher-order homogeneous and nonhomogeneous differential equations by manual and technology-based methods.	3,5	Evaluating
CO-2	Understand the basic concepts of Partial Differential Equations and its applications.	1,2	Understanding
CO-3	Discuss the properties of the Legendre polynomial and Bessel functions.	9	Creating
CO-4	Analyze the origin of first order partial differential equations and solving them using Charpit's method.	2,10	Analyzing
CO-5	Determine the solutions of the Homogenous equation with constant co-efficient and analytic co-efficient.	10	Evaluating

I SEMESTER			
DSE 1(A)	**CLASSICAL MECHANICS**		**18PEMA1A**
Hrs / Week : 6	**Hrs / Sem : 6 x 15 = 90**	**Hrs / Unit : 18**	**Credit : 4**

Course Outcomes (CO)

CO No.	Upon completion of this Course, students will be able to :	PSO addressed	Blooms taxonomy classification
CO-1	State and prove Linear, Angular and Energy conservation theorem for a particle and a system of particles.	2,3	Evaluating
CO-2	Derive the Lagrangian equation using Hamilton's principle.	2,4	Creating
CO-3	Apply their skills in Hamilton's principle for various coordinate systems.	2	Applying
CO-4	Determine central force field in real life problems.	2,7	Evaluating
CO-5	Solve the Maxwell equations for simple configuration.	2,10	Applying, Creating

I SEMESTER			
DSE 1(B)	**DISCRETE MATHEMATICS.**		**18PEMA1B**
Hrs / Week : 6	**Hrs / Sem : 6 x 15 = 90**	**Hrs / Unit : 18**	**Credit : 4**

Course Outcomes (CO)

CO No.	Upon completion of this Course, students will be able to :	PSO addressed	Blooms taxonomy classification
CO-1	Understand the basic principles of Boolean algebra, Logic and Set theory.	1	Understanding
CO-2	Examine logical arguments and logical constructs.	2	Analyzing
CO-3	Apply their skills to describe computer programs in a formal Mathematical manner.	2,8	Applying
CO-4	Find out the logic statements using truth tables.	1,2	Remembering
CO-5	Solve discrete mathematics problems which involve permutations and combinations of a set.	2,5	Applying, Creating

II SEMESTER			
DSC 5	**LINEAR ALGEBRA**		**18PCMA21**
Hrs / Week : 6	**Hrs / Sem : 6 x 15 =90**	**Hrs / Unit :18**	**Credit :4**

Course Outcomes (CO)

CO No.	Upon completion of this Course, students will be able to:	PSO addressed	Blooms taxonomy classification
CO-1	Understand the concepts of vector space and its geometric representation.	1	Understanding
CO-2	Determine the angle between vectors by using inner product.	5	Evaluating
CO-3	Prove there is a one to one correspondence between operators and matrices.	2,3	Evaluating
CO-4	Formulate the triangular form of a transformation.	2,10	Creating
CO-5	Solve linear equations using matrix.	2,9,10	Applying, Creating

II SEMESTER			
DSC 6	**REAL ANALYSIS II**		**18PCMA22**
Hrs / Week : 5	**Hrs / Sem : 5x 15 =75**	**Hrs / Unit : 15**	**Credit : 4**

Course Outcomes (CO)

CO No.	Upon completion of this Course, students will be able to :	PSO addressed	Blooms taxonomy classification
CO-1	Understand Riemann-Stieltjes integral concepts and their properties with examples.	1	Understanding
CO-2	Examine uniform convergence in sequence and series of functions.	2,3	Analyzing
CO-3	Understand the concepts of continuity, integration and differentiation in functions.	1,7	Understanding
CO-4	Apply and state the inverse function theorem.	2,3	Applying
CO-5	Explain the implicit function theorem and solve problems efficiently.	1,10	Evaluating

II SEMESTER			
DSC 7	**LATEX AND MATLAB**		**18PCMA23**
Hrs / Week : 6	**Hrs / Sem : 6 x 15 = 90**	**Hrs / Unit : 18**	**Credit : 4**

Course Outcomes (CO)

CO No.	Upon completion of this Course, students will be able to :	PSO addressed	Blooms taxonomy classification
CO-1	Summarize techniques in Latex for the preparation of printable document in an enhanced manner.	1	Understanding
CO-2	Apply their skills to type their project and thesis with Latex software.	2,8	Applying
CO-3	Develop skills to prepare paper in Journal format.	7,8	Applying
CO-4	Solve Mathematical equations using MATLAB software.	7,8	Applying, Creating
CO-5	Analyze the statistical survey using MATLAB.	6,8	Analyzing

II SEMESTER			
DSCP	**LATEX AND MATLAB**		**18PCMA2P1**
Hrs / Week : 6	**Hrs / Sem : 6 x 15 = 90**	**Hrs / Unit : 18**	**Credit : 4**

Course Outcomes (CO)

CO No.	Upon completion of this Course, students will be able to:	PSO addressed	Blooms taxonomy classification
CO-1	Understand the image of mathematical function using MATLAB.	1,8	Understanding
CO-2	Create mathematical documents and reports using LaTex.	8	Creating
CO-3	Solve engineering problems using MATLAB.	2,8	Applying, Creating
CO-4	Solve differential equation using MATLAB.	2,8	Applying, Creating
CO-5	Create the beamer presentation using LaTex software.	7,8	Creating

II SEMESTER			
DSE 2(A)	**CALCULUS OF VARIATIONS AND INTEGRAL EQUATIONS**		**18PEMA2A**
Hrs / Week : 4	**Hrs / Sem : 4 x 15 =60**	**Hrs / Unit :12**	**Credit : 4**

Course Outcomes (CO)

CO No.	Upon completion of this Course, students will be able to:	PSO addressed	Blooms taxonomy classification
CO-1	Understand the concepts of maxima and minima in calculus of variations.	1	Understanding
CO-2	Discuss the relation between differential and integral equations.	2,7	Creating
CO-3	Apply the principles of calculus of variations in derivation of some classical differential equations.	2,10	Applying
CO-4	Solve isoperimetric problems of standard types and integral equations of several types for eligibility exams.	2,5	Applying, Creating
CO-5	Develop the problem-solving and analytical skills.	2,10	Applying

II SEMESTER			
DSE 2(B)	**NUMERICAL ANALYSIS**		**18PEMA2 B**
Hrs / Week : 4	**Hrs / Sem : 4 x 15 =60**	**Hrs / Unit :12**	**Credit : 4**

Course Outcomes (CO)

CO No.	Upon completion of this Course, students will be able to :	PSO addressed	Blooms taxonomy classification
CO-1	Find out the solution of transcendental and polynomial equation.	1	Remembering
CO-2	Solve system of equations using direct and iterative method.	2,10	Applying, Creating
CO-3	Apply Hermite and Spline interpolation.	2,9	Applying
CO-4	Classify the concepts of Green's function.	10	Analyzing
CO-5	Solve the problems using various interpolation formulae.	2,10	Applying, Creating

II SEMESTER			
IDC-1	**ADVANCED DISCRETE MATHEMATICS**		**18PIMA21**
Hrs / Week : 3	**Hrs / Sem : 3x 15 = 45**	**Hrs / Unit : 9**	**Credit : 3**

Course Outcomes (CO)

CO No.	Upon completion of this Course, students will be able to :	PSO addressed	Blooms taxonomy classification
CO-1	Understand the basic principle of logic and set theory.	1	Understanding
CO-2	Recall the concepts of functions and relations in set theory.	2	Remembering
CO-3	Construct simple mathematical proof.	2,3	Applying
CO-4	Understand the basic concepts of Graph theory.	1	Understanding
CO-5	Apply the Baye's theorem to find the conditional probability.	2,5	Applying

III SEMESTER			
DSC 8	**GRAPH THEORY**		**18PCMA31**
Hrs / Week : 6	**Hrs / Sem : 6 x 15 = 90**	**Hrs / Unit : 18**	**Credit : 4**

Course Outcomes (CO)

CO No.	Upon completion of this Course, students will be able to :	PSO addressed	Blooms taxonomy classification
CO-1	Understand the basic principles and concepts of graph theory.	1	Understanding
CO-2	Recall the properties of graph theory which has diverse application in the area of Computer Science, Chemistry, Physics and Engineering.	2,4	Remembering
CO-3	Analyze the fundamental results describing the behavior of graph properties.	4	Analyzing
CO-4	Understand the concepts of planarity and colourability of graphs.	1,4	Understanding
CO-5	Evaluate the Ramsey number of various graphs.	10	Evaluating

III SEMESTER			
DSC 9	**COMPLEX ANALYSIS**		**18PCMA32**
Hrs / Week : 6	**Hrs / Sem : 6 x 15 = 90**	**Hrs / Unit : 18**	**Credit : 4**

Course Outcomes (CO)

CO No.	Upon completion of this Course, students will be able to :	PSO addressed	Blooms taxonomy classification
CO-1	Understand the notion of Riemann integration and Cantor integration.	1	Understanding
CO-2	Explain the geometric idea about conformal mappings.	1,2	Understanding
CO-3	Differentiate an analyticity and differentiability of a function.	2,9	Analyzing
CO-4	Solve the problems using power series expression of an analytic function.	2,10	Applying, Creating
CO-5	Calculate definite integrals using the mean value property and Poisson formula.	2,10	Applying

III SEMESTER			
DSC 10	**MEASURE THEORY AND INTEGRATION**		**18PCMA33**
Hrs / Week : 6	**Hrs / Sem : 6 x 15 = 90**	**Hrs / Unit : 18**	**Credit : 4**

Course Outcomes (CO)

CO No.	Upon completion of this Course, students will be able to:	PSO addressed	Blooms taxonomy classification
CO-1	Understand the concept of Lebesgue measure and measurable functions.	1	Understanding
CO-2	Differentiate between the Lebesgue and Riemann Integral.	7,10	Analyzing
CO-3	Summarize the functions of bounded variations.	1,2	Understanding
CO-4	Prove the Radon-Nikodym theorem and general convergence theorem.	2,3	Evaluating
CO-5	Apply extension theorems in problem solving.	2,10	Applying

III SEMESTER			
DSC 11	**OPERATIONS RESEARCH**		**18PCMA34**
Hrs /Week : 5	**Hrs / Sem : 5 x 15 = 75**	**Hrs / Unit : 15**	**Credit : 4**

Course Outcomes (CO)

CO No.	Upon completion of this Course, students will be able to :	PSO addressed	Blooms taxonomy classification
CO-1	Understand how to translate a real-world problem into a mathematical formulation.	1	Understanding, Remembering
CO-2	Apply the mathematical tools to solve optimization problems.	2,5	Applying
CO-3	Create a report that describes the model and the solving technique to analyze the results.	6,7	Creating
CO-4	Solve the problems using special solution algorithms.	2,8	Applying, Creating
CO-5	Make use of CPM and PERT techniques, to plan, schedule, and control project activities in real life situation.	2,8	Applying

III SEMESTER		
DSE 3(A)	**DIFFERENTIAL GEOMETRY**	**18PEMA3A**
Hrs / Week : 4	**Hrs / Sem : 4 x 15 = 60** **Hrs / Unit : 12** **Credit : 4**	

Course Outcomes (CO)

CO No.	Upon completion of this Course, students will be able to :	PSO addressed	Blooms taxonomy classification
CO-1	Understanding the basic concepts in geometry of curves and surfaces in Euclidean space.	1	Understanding
CO-2	Solve typical problems associated with the theory of space curves.	2,10	Applying, Creating
CO-3	Define the concepts of Helicoids.	2	Remembering
CO-4	Utilize the idea of differential geometry for applications in theoretical physics.	2	Applying
CO-5	Summarize the properties of geodesics.	1	Understanding

III SEMESTER		
DSE 3(B)	**ANALYTICAL NUMBER THEORY**	**18PEMA3B**
Hrs / Week : 4	**Hrs / Sem : 4 x 15 = 60** **Hrs / Unit : 12** **Credit : 4**	

Course Outcomes (CO)

CO No.	Upon completion of this Course, students will be able to :	PSO addressed	Blooms taxonomy classification
CO-1	Explain mathematical terms relevant to prime numbers and fundamental theorem of Arithmetic.	1	Understanding
CO-2	State and prove fundamental theorems in analytical theory of numbers.	3	Evaluating
CO-3	Apply Arithmetical functions to find out values in Number Theory.	2,5	Applying
CO-4	Find out the average of Arithmetic functions like $\boldsymbol{\varphi(n)}$ $\boldsymbol{and}$ $\boldsymbol{\mu(n)}$ and its applications.	5	Remembering
CO-5	Discuss elementary theorems on distribution of prime numbers.	10	Creating

III SEMESTER			
IDC- 2	**NUMERICAL & STATISTICAL METHODS**		**18PIMA31**
Hrs / Week : 3	**Hrs / Sem : 3x 15 = 45**	**Hrs / Unit : 9**	**Credit : 3**

Course Outcomes (CO)

CO No.	Upon completion of this Course, students will be able to :	PSO addressed	Blooms taxonomy classification
CO-1	Solve algebraic and Transcendental equations.	1,2	Applying, Creating
CO-2	Solve the system of linear equation using iterative methods.	2,5	Applying, Creating
CO-3	Understand the various distributions like Binomial, Poisson and Normal distribution and discuss their applications.	1,2,6	Understanding, Applying
CO-4	Solve differential equations using various methods in numerical differentiation and integration.	2,10	Applying, Creating
CO-5	Determine the correlation coefficient and rank correlation for numerical data.	2,5	Evaluating

IV SEMESTER			
DSC 12	**TOPOLOGY**		**18PCMA41**
Hrs / Week : 6	**Hrs / Sem : 6 x 15 = 90**	**Hrs / Unit : 18**	**Credit :4**

Course Outcomes (CO)

CO No.	Upon completion of this Course, students will be able to :	PSO addressed	Blooms taxonomy classification
CO-1	Understand the concepts of topological spaces.	1	Understanding
CO-2	Define the different types of topology on any set.	2	Remembering
CO-3	Solve the problem by using the concepts of connectedness and compactness.	2,10	Applying, Creating
CO-4	Explain the concepts of countability and separation axioms in Topological spaces.	2	Remembering
CO-5	Analyze the different types of spaces like normal, regular, completely regular.	2,9	Analyzing

IV SEMESTER		
DSC 13	**FUNCTIONAL ANALYSIS**	**18PCMA42**
Hrs / Week : 6	**Hrs /Sem : 6 x 15 = 90 Hrs / Unit : 18**	**Credit: 4**

Course Outcomes (CO)

CO No.	Upon completion of this Course, students will be able to :	PSO addressed	Blooms taxonomy classification
CO-1	Understand the fundamental concepts of functional analysis.	1	Understanding
CO-2	State and prove Hahn-Banach theorem and its applications.	2,3	Applying, Creating
CO-3	Solve integral equations using spectral theorems.	2,10	Applying, Creating
CO-4	Demonstrate the properties of an various operator and find out its eigen values.	2,7	Remembering, Understanding
CO-5	Relate the properties of operator theory with matrix theory.	2	Understanding

IV SEMESTER			
DSE 4(A)	**Programming in C++ and Data Structures**		**18PEMA4A**
Hrs / Week : 4	**Hrs / Sem : 4 x 15 = 60**	**Hrs / Unit : 12**	**Credit : 4**

Course Outcomes (CO)

CO No.	Upon completion of this Course, students will be able to :	PSO addressed	Blooms taxonomy classification
CO-1	Relate and understand the purpose of basic computer components.	1,2	Remembering, Understanding
CO-2	Organize 'C++' program, data types and operators and console I/O function.	2,8	Applying
CO-3	Identify the basic concepts of tokens, expressions and control structures-functions in C++.	2,7	Applying
CO-4	Apply the basic concepts of classes and objects.	2	Applying
CO-5	Apply the concept of extending classes-pointers, virtual functions and polymorphism.	2,8	Applying

V SEMESTER		
DSEP-2(A)	**PROGRAMMING IN C++ and DATA STRUCTURES**	**18PCMA4PA**
Hrs/Week: 6	**Hrs / Sem : 6 x 15 = 90**	**Credit : 4**

Course Outcomes (CO)

CO No.	Upon completion of this Course, students will be able to :	PSO addressed	Blooms taxonomy classification
CO-1	Understand the structures of classes for performing the tasks.	1	Understanding
CO-2	Design and write a program for trigonometric functions.	8	Creating
CO-3	Define a class to represent a bank account.	2	Remembering
CO-4	Apply the constructors, and membership functions in program.	2,7,8	Applying
CO-5	Interpret the concept of extending classes in program.	1,8	Understanding

IV SEMESTER			
DSE 4(B)	**JAVA PROGRAMMING**		**18PEMA4B**
Hrs / Week : 4	**Hrs / Sem : 4 x 15 = 60**	**Hrs / Unit : 12**	**Credit : 4**

Course Outcomes (CO)

CO No.	Upon completion of this Course, students will be able to :	PSO addressed	Blooms taxonomy classification
CO-1	Understand the basic elements of a programming language and to write Java application programs using OOP principles and proper program structuring.	1	Understanding
CO-2	Identify classes, objects, members of a class and relationships among them needed for a specific problem.	2	Applying
CO-3	Demonstrate the concepts of polymorphism and inheritance.	2,8	Understanding
CO-4	Explain Java programs to implement error handling techniques using exception.	1,7	Understanding
CO-5	Apply the Applet Class and create, run and execute Applets.	2,7	Applying

IV SEMESTER			
DSEP-2(B)	**JAVA PROGRAMMING.**		**18PEMA4PB**
Hrs/Week : 6	**Hrs / Sem : 6 x 15 = 90**	**Hrs / Unit : 18**	**Credit : 4**

Course Outcomes (CO)

CO No.	Upon completion of this Course, students will be able to :	PSO addressed	Blooms taxonomy classification
CO-1	Develop an integrated environment to write, compile, run, and test simple object-oriented Java programs.	2,8	Applying
CO-2	Understand read and make elementary modifications to Java programs that solve real-world problems.	1,8	Understanding
CO-3	Identify and fix defects and common security issues in code.	2,7	Applying
CO-4	Evaluate input in a Java program.	7,8	Evaluating
CO-5	Apply and execute a Java program using Javadoc.	2,8	Applying