PEOs for the Institution-PG

PEO1: The graduates use scientific and computational technology to solve social issues and pursue research.

PEO2:. Our graduates will continue to learn and advance their careers in industry both in public and private sectors, government and academia.

PEOs for the PG Departments

Mathematics

PEO3:Our graduates will have the ability to apply analytical and theoretical skills to model and solve mathematical problems and to work as efficient professionals .

M.Sc. Mathematics (PO)

PO No.	Upon completion of M.Sc. Degree Programme, the graduates will be able to :
PO - 1	prepare successful professionals in industry, government, academia, research, entrepreneurial pursuits and consulting firms.
PO - 2	face and succeed in high level competitive examinations like NET, GATE and TOFEL.
PO - 3	carry out internship programmes and research projects to develop scientific skills and innovative ideas.
PO - 4	utilize the obtained scientific knowledge to create eco-friendly environment.

M.Sc. Mathematics (PSO)

PSO No.	Upon completion of the M.Sc. DegreeProgramme, the graduates will be able to:	PO addressed
PSO - 1	utilize the knowledge gained for entrepreneurial pursuits.	PO 1
PSO - 2	sharpen their analytical thinking, logical deductions and rigour in reasoning.	PO 2
PSO - 3	use the techniques, skills and modern technology necessary to communicate effectively with professional and ethical responsibilities.	PO 3
PSO - 4	understand the applications of mathematics in a global economic environmental and societal context.	PO 4

Course Outcomes

Semester **: I** **Major Core I**

Name of the Course **: Algebra I**

Subject code **: PM2011**

CO No.	Upon completion of this course, students will be able to	**PSOs addressed**	**CL**
CO -1	understand the fundamental concepts of abstract algebra and give illustrations.	PSO- 1	U
CO -2	analyze and demonstrate examples of various Sylow p-subgroups, automorphisms, conjugate classes, finite abelian groups, characteristic subgroups, rings, ideals, Euclidean domain, Factorization domain.	PSO- 2	An
CO -3	develop proofs for Sylow's theorems, finite abelian groups, direct products, Cauchy's theorem, Cayley's Theorem, automorphisms for groups.	PSO- 2	C
CO -4	develop the way of embedding of rings and design proofs for theorems related to rings, polynomial rings, Division Algorithm, Gauss' lemma and Eisenstein Criterion	PSO- 2	C
CO -5	apply the concepts of Cayley's theorem, Counting principles, Sylow's theorems, Rings and Ideals in the structure of certain groups of small order.	PSO-4	Ap

Semester **: I** **Major Core II**

Name of the Course **: Analysis I**

Subject code **: PM2012**

CO	**Upon completion of this course the students will be able to :**	**PSO addressed**	**CL**
CO -1	explain the fundamental concepts of analysis and their role in modern mathematics.	PSO-3	U, Ap
CO -2	deal with various examples of metric space, compact sets and completeness in Euclidean space.	PSO- 2	An
CO -3	utilize the techniques for testing the convergence of sequence and series	PSO-1	Ap
CO -4	understand the important theorems such as Intermediate valued theorem, Mean value theorem, Roll's theorem, Taylor and L'Hospital theorem	PSO-3	U
CO -5	apply the concepts of differentiation in problems.	PSO- 4	Ap

Semester : **I** **Major Core III**

Name of the Course : **Probability and Statistics**

Subject code : **PM2013**

CO	Upon completion of this course the students will be able to :	PSO addressed	CL
CO- 1	recall the basic probability axioms,conditional probability, random variables and related concepts	PSO-2	R
CO- 2	compute marginal and conditional distributions and check the stochastic independence	PSO-2	U, Ap
CO- 3	recall Binomial, Poisson and normal distributionsand learn new distributions such as multinomial, Chi square and Bivariate normal distribution	PSO-4	R,U
CO- 4	learn the transformation technique for finding the p.d.f of functions of random variables and use these techniques to solve related problems	PSO-1,3	U, Ap
CO -5	employ the relevant concepts of analysis to determine limiting distributions of random variables	PSO-5	Ap

Semester : **I** **Major Core IV**

Name of the Course : **Ordinary differential equations**

Subject code : **PM2014**

CO	Upon completion of this course the students will be able to :	PSO addressed	CL
CO - 1	recall the definitions of degree and order of differential equations and determine whether a system of functions is linearly independent using the Wronskian definition.	PSO - 2	R,U
CO - 2	solve linear ordinary differential equations with constant coefficients by using power series expansion.	PSO - 3	Ap
CO - 3	determine the solutions for a linear system of first order equations.	PSO - 2	U
CO - 4	learnproperties of Legendre polynomials and Properties of Bessel Functions.	PSO - 4	U
CO - 5	analyze the concepts of existence and uniqueness of solutions of the ordinary differential equations.	PSO - 2	An
CO - 6	create differential equations for a large number of real world problems.	PSO - 1	C

Semester : I

Name of the Course : Numerical Analysis **Elective I**

Course Code : PM2015

CO	Upon completion of this course the students will be able to :	PSO addressed	CL
CO - 1	recall the methods of finding the roots of the algebraic and transcendental equations.	PSO - 2	R
CO - 2	understand the significance of the finite, forward, backward and central differences and their properties.	PSO - 3	U
CO - 3	learn the procedures of fitting straight lines and curves.	PSO - 2	U
CO - 4	compute the solutions of a system of equations by using appropriate numerical methods.	PSO - 1	Ap
CO - 5	solve the problems in ODE by using Taylor's series method, Euler's method etc.	PSO - 4	Ap

Semester : II **Major Core V**

Name of the course : Modules and Vector Spaces

Course code : PM2021

CO	Upon completion of this course the students will be able to :	PSOs addressed	CL
CO - 1	recall the definitions and properties of Vector Spaces and Subspaces	PSO - 2	R
CO - 2	analyze the concepts Linear Independence, Dependence and Basis	PSO - 2	An
CO - 3	apply the definition and properties of Linear transformation and Matrices of Linear transformation	PSO - 3	Ap
CO - 4	gain knowledge about characteristic polynomial, eigen vectors, eigen values and eigen spaces as well as the geometric and the algebraic multiplicities of an eigen value	PSO - 1	U
CO - 5	learn and apply Jordan form and triangular form for computations	PSO - 4	U

Semester **: II** **Major Core VI**

Name of the Course **: Analysis II**

Subject code **: PM2022**

CO	**Upon completion of this course the students will be able to :**	**POs/PSOs addressed**	**CL**
CO -1	recall the definition of continuity, boundedness and some results on uniform convergence	PSO-1	R
CO -2	recognise the difference between pointwise and uniform convergence of a sequence of functions and Riemann Stieltjes integrals.	PSO-2	An
CO -3	understand the close relation between equicontinuity and uniform convergence of sequence of continuous function and rectifiable curves	PSO-3	U
CO -4	learnParseval's theorem, Stone Weierstrass theorem and know about its physical significance in terms of the power of the Fourier components.	PSO-4	U
CO -5	utilize the definition of differentiation and partial derivative of function of several variables to solve problems	PSO-3	Ap

Semester **: II** **Major Core VII**

Name of the Course **: Partial Differential Equations**

Subject code **: PM2023**

CO	**Upon completion of this course the student will be able to:**	**PSOs addressed**	**CL**
CO-1	recall the definitions of complete integral, particular integral and singular integrals.	PSO-2	R
CO-2	learn some methods to solve the problems of non- linear first order partial differential equations. homogeneous and non homogeneous linear partial differential equations with constant coefficients and solve related problems.	PSO-1	U
CO-3	analyze the classification of partial differential equations in three independent variables – cauchy's problem for a second order partial differential equations.	PSO-3	An
CO-4	solve the boundary value problem for the heat equations and the wave equation.	PSO-4	Ap

CO-5	apply the concepts and methods in physical processes like heat transfer and electrostatics.	PSO-5	Ap

Semester : II Major Core VIII

Name of the Course : Graph Theory

Course Code : PM2024

CO	Upon completion of this course the students will be able to :	PSO addressed	CL
CO - 1	identify cut vertices and understand various versions of connectedness of a graph.	PSO-1	An
CO - 2	understand the concept of Digraphs and characterize Eulerian Digraphs.	PSO-4	U,C
CO - 3	recall the definitions of Matchings and design proof for characterization of graphs containing a 1-factor.	PSO-1	R
CO - 4	solve problems involving coloring and learn necessary conditions for planar graphs.	PSO-2,3	Ap
CO - 5	learn the basic definitions of domination and review the concept of distance in a graph.	PSO-4	U

Semester : II Elective II

Name of the Course : Classical Dynamics

Course code : PM2025

CO	Uponcompletion ofthiscoursethestudents Willbeableto:	PSO addressed	CL
CO–1	recall the concepts of Newton's laws of motion, momentum, acceleration, motion of a particle.	PSO-4	R
CO–2	understanding the generalized co-ordinates of the Mechanical system.	PSO-1	U
CO–3	apply D'Alembert's Principle to solve the problems involving System of particles.	PSO-2	Ap
CO-4	Solve the Newton's equations for simple configuration using Various methods.	PSO-1	C

CO-5	transforming the Lagrangian equations to Hamiltonian equations.	PSO-2	U
CO-6	define the canonical transformations and Lagrange and Poisson brackets.	PSO-4	R

Semester : III

Name of the course : Field Theory and Lattices **Major Core IX**

Course code : PM2031

CO	Upon completion of this course the students will be able to :	PSO addressed	CL
CO - 1	recall the definitions and basic concepts of field theory and lattice theory	PSO - 2	U
CO - 2	express the fundamental concepts of field theory, Galois theory	PSO - 2	U
CO - 3	demonstrate the use of Galois theory to construct Galois group over the rationals and modules	PSO - 3	E
CO - 4	distinguish between field theory and Galois theory	PSO - 3	Ap
CO - 5	interpret distributivity and modularity and apply these concepts in Boolean Algebra	PSO - 4	Ap

Semester : III **Major Core X**

Name of the Course : Topology

Course code : PM2032

CO	Upon completion of this course the students will be able to :	PSO addressed	CL
CO - 1	understand the definitions of topological space, closed sets, limit points, continuity, connectedness, compactness, separation axioms and countability axioms.	PSO - 3	U
CO - 2	construct a topology on a set so as to make it into a topological space	PSO - 4	C
CO - 3	distinguish the various topologies such as product and box topologies and topological spaces such as normal and regular spaces.	PSO - 3	U, An
CO - 4	compare the concepts of components and path components, connectedness and local connectedness and countability axioms.	PSO - 2	E, An
CO - 5	apply the various theorems related to regular space, normal space, Hausdorff space, compact space to other branches of mathematics.	PSO - 1	Ap
CO - 6	construct continuous functions, homeomorphisms and projection mappings.	PSO - 4	C

Semester : III

Name of the Course : Measure Theory and Integration Major Core XI

Subject Code :PM2033

CO	Upon completion of this course thestudents will be able to :	PSOs addressed	CL
CO - 1	define the concept of measures and Vitali covering and recall some properties of convergence offunctions,	PSO - 1	R
CO - 2	cite examples of measurable sets , measurable functions, Riemann integrals, Lebesgue integrals.	PSO - 3	U
CO - 3	apply measures and Lebesgue integrals to various measurable sets and measurable functions	PSO - 2	Ap
CO - 4	apply outer measure, differentiation and integration to intervals , functions and sets.	PSO - 2	Ap
CO - 5	compare the different types of measures and Signed measures	PSO - 3	An

Semester : III Elective III

Name of the Course: Algebraic Number Theory and Cryptography

Course code : PM2034

CO	Upon completion of this course the students will be able to :	PSO addressed	CL
CO - 1	Recall the basic results of field theory	PSO - 1	R
CO - 2	Understand quadratic and power series forms and Jacobi symbol	PSO - 2	U
CO - 3	Apply binary quadratic forms for the decomposition of a number into sum of sequences	PSO - 3	Ap
CO - 4	Determine solutions using Arithmetic Functions	PSO - 3	Ap

CO - 5	Calculate the possible partitions of a given number and draw Ferrer's graph	PSO - 2	An
CO - 6	Identify the public key using Cryptography	PSO - 4	An

Semester : IV Major Core XII

Name of the Course : Complex Analysis

Subject code : PM2041

CO	Upon completion of this course the students will be able to :	PSO addressed	CL
CO - 1	understand the fundamental concepts of complex variable theory	PSO - 1	U
CO - 2	effectively locate and use the information needed to prove theorems and establish mathematical results	PSO - 3	R
CO - 3	demonstrate the ability to integrate knowledge and ideas of complex differentiation and complex integration	PSO - 4	U
CO - 4	use appropriate techniques for solving related problems and for establishing theoretical results	PSO - 3	Ap
CO - 5	evaluate complicated real integrals through residue theorem	PSO – 2,4	E

Semester : IV Major Core XIII

Name of the Course : Functional Analysis

Course Code : PM2042

CO	Upon completion of this course the students will be able to :	PSOs addressed	CL
CO – 1	learn and understand the definition of linear space , normed linear space, Banach Space and their examples	PSO - 1	R
CO – 2	explain the concept of different properties of Banach Spaces, Hahn Banach theorem	PSO -2	U
CO – 3	compare different types of operators and their properties, Natural imbedding	PSO - 2	Ap
CO – 4	explain the ideas needed for open mapping theorem , Open Mapping theorem	PSO - 1	C

CO – 5	construct the idea of projections , the spectrum of an operator and develop problem solving skills , Matrices, Determinants	PSO - 1	Ap

Semester : **IV** **Major Core XIV**

Name of the course : **Operations Research**

Course code : **PM2043**

CO	Upon completion of this course the students will be able to :	PSO addressed	CL
CO - 1	explain the fundamental concept of DP model , Inventory model and Queuing model	PSO - 2	U
CO - 2	relate the concepts of Arrow (Network)diagram representations, in critical path calculations and construction of the Time chart	PSO - 3	U
CO - 3	distinguish deterministic model and single item	PSO - 3	E
CO - 4	interpret Poisson and Exponential distributions and apply these concepts in Queuing models	PSO - 4	Ap
CO - 5	solve life oriented decision making problems by optimizing the objective function	PSO - 1	C

Semester : **IV** **Major Core XV**

Name of the course : **Algorithmic Graph Theory**

Course code : **PM2044**

CO	Upon completion of this course the students will be able to :	PSO addressed	CL
CO - 1	understand basic algorithms and write algorithms for simple computing	PSO - 1	U E

CO - 2	analyze the efficiency of the algorithm	PSO - 2	An
CO - 3	understand and analyze algorithmic techniques to study basic parameters and properties of graphs	PSO - 2	R An
CO - 4	use effectively techniques from graph theory, to solve practical problems in networking and communication	PSO - 3	Ap

Semester : IV **Elective IV (a)**

Name of the Course : Combinatorics

Course Code : PM2045

CO	Upon completion of this course the students will be able to :	PSO addressed	CL
CO - 1	discuss the basic concepts in permutation and combination, Recurrence Relations, Generating functions, The Principle of Inclusion and Exclusion	PSO - 1	U
CO - 2	distinguish between permutation and combination, distribution of distinct and non-distinct objects	PSO - 2	An
CO - 3	correlate recurrence relation and generating function	PSO - 2	An
CO -4	solve problems by the technique of generating functions, combinations, recurrence relations, the principle of inclusion and exclusion	PSO - 3	Ap
CO - 5	interpret the principles of inclusion and exclusion, equivalence classes and functions	PSO - 4	An E