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

Name of the Course : **Algebra I**

Course Code : **PM2011**

No. of hours per week	Credits	Total No. of hours	Marks
6	5	90	100

Objectives: 1. To study abstract Algebraic systems.

2. To know the richness of higher Mathematics in advanced application systems.

Course Outcome

CO No.	Course Outcomes 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

Total contact hours: 90 (Including lectures, assignments and tests)

Unit	Section	Topics	Lecture hours	Learning Outcomes	Pedagogy	Assessment/ evaluation
I	**Automorphisms and conjugate elements**					
	1.	Automorphism: Definition& Examples,	3	To understand the concept of automorphism and find	Lecture	Test

		Automorhism of a finite cyclic group, an infinite cyclic group		automorphisms of finite and infinite cyclic groups		
	2.	Theorems based on automorphism, Inner automorphism	4	To understand the concept of inner automorphism	Lecture	Test
	3.	Problems based on automorphism,Cayley's Theorem	3	To understand the Cayley's Theorem	Group Discussion	Quiz
	4.	Conjucacy, Cauchy's theorem , Conjugate Classes	3	To understand the concepts and give illustrations	Seminar	Formative Assessment Test I
II	**Sylow's theorems and Direct products**					
	1.	Sylow's first theorem(Second Proof)	3	To understand the concept and give illustrations	Lecture	Test
	2.	*p*-Sylow subgroups	3	To understand Sylow'ssubgroups	Lecture	Test
	3.	Second Part of Sylow's theorem, Third Part of Sylow's theorem	3	To develop proofs for theorems based on Sylow P- subgroups	Lecture	Formative Assessment Test I, II
	4.	Direct products: Definition, Examples and Theorems	4	To understand the concept and give illustrations	Seminar	Test
	5.	Theorems based on finite abelian groups	4	To understand the concept and give illustrations	Lecture	Test
III	**Rings**					
	1.	Rings: Definition , Examples and Theorems, Some	3	To understand the concept and practice theorems	Lecture With PPT	Test

		special classes of Rings				
	2.	Characteristic of a Ring,Homomorphisms: Definition, Examples, Theorems	3	To understand the concept and develop theorems	Group Discussion	Test
	3.	Ideals and Quotient Rings: Definition, Examples, Theorems	4	To understand the concept and analyze the theorems	Lecture	Test
	4.	More Ideals and Quotient Rings: Definition, Examples, Theorems	5	To understand the concept Quotient Rings and demonstrate examples.	Lecture	Formative Assessment Test II
IV	**Embedding of Rings**					
	1.	The field of Quotients of an integral domain: Definition , Examples and Theorems	3	To understand the concept the field of Quotients of an integral domain and give illustrations	Lecture with illustration	Test
	2.	Embedding of rings: Ring into a Ring with unity, Ring into a Ring with endomorphisms, Integral domain embedded into a field and related theorems	4	To develop the way of embedding of rings and design proofs for theorems related to rings	Lecture	Test
	3.	Euclidean Rings, Unique Factorization theorem	4	To understand the concept and practice theorems related to the concepts.	Group Discussion	Test

	4.	A particular Euclidean Ring, Fermat's Theorem	4	To learn and interpret the concept and theorem	Seminar	Formative Assessment Test III
V	**Polynomial Rings**					
	1.	Polynomial Rings: Definition , Examples and Theorems The Division Algorithm	5	To understand the concept and practice theorems related to the concepts	Lecture	Test
	2.	Polynomials over the Rational Field: Definition , Examples and Theorems	4	To understand the concept and practice theorems related to the concepts	Lecture	Formative Assessment Test III
	3.	Gauss' lemma, The Eisenstein Criterion	3	To learn and understand the theorems	Seminar	Assignment
	4.	PolynomialRings over Commutative Rings, Unique Factorization Domains	3	To practice theorems based on this concept	Lecture	Assignment

Course Instructor(Aided): Dr.J. Befija Minnie HOD(Aided): Dr. V. M. Arul Flower Mary

Course Instructor(SF): Ms.G.Arockia Amala Sherly HOD(SF): Mrs. J. Anne Mary Leema

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

Name of the Course : **Analysis I**

Course Code : **PM2012**

No. of hours per week	Credits	Total No. of hours	Marks
6	4	90	100

Objectives:

1. To understand the basic concepts of analysis.

2. To formulate a strong foundation for future studies.

Course Outcome

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

Total contact hours: 90 (Including lectures, assignments and tests)

Unit	Section	Topics	Lecture hours	Learning Outcomes	Pedagogy	Assessment/ evaluation
I	**Basic Topology**					
	1	Definitions and examples of metric spaces, Theorems based on metric spaces.	5	To explain the fundamental concepts of analysis and also todeal with various examples of metric space.	Lecture	Test
	2	Definitions of compact spaces and related theorems, Theorems based on compact sets	5	To understand the definition of compact spaceswith examples and theorems	Lecture	Test

	3	Weierstrass theorem, Perfect Sets, The Cantor set	3	To understand the concepts of Perfect Sets and The Cantor set	Lecture	Test
	4	Connected Sets and related problems	2	To understand the definitionof Connected Setsandpractice various problems.	Lecture	Formative Assessment Test I
II	**Convergent Sequences**					
	1	Definitions andtheorems of convergent sequences, Theorems based on convergent sequences	5	To Learn some techniques for testing the convergence of sequence.	Lecture	Test
	2	Theorems based on Subsequence s	2	To understand the concept of Subsequences with theorems	Lecture	Formative Assessment Test I
	3	Definition and theorems based on Cauchy sequences, Upper and lower limits	5	To Understand the definition and theorems based on Cauchy sequences	Lecture	Test
	4	Some special sequences, Problems related to convergent sequences	3	To Understand the problems related to convergent sequences	Lecture	Test

III	**Series**					
	1	Series, Theorems based on series	3	To Learn some techniques for testing the convergence series and confidence in applying them	Lecture	Test
	2	Series ofnon-negative terms, The number e	4	To find the number e	Lecture	Assignment
	3	The ratio and root tests – example and theorems, Power series	3	To Understand the ratio and root tests	Lecture with PPT	Quiz
	4	Summation of parts, Absolute convergence	2	To apply the techniques for testing the absolute convergence of series	Lecture	Test
	5	Addition and multiplication of series, Rearrangements	3	To find theAddition and multiplication of series	Lecture with group disscussion	Formative Assessment Test II
IV	**Continuity**					
	1	Definitions and Theorems based on Limits of functions, Continuous functions	4	To explain the fundamental concepts of analysis and their role in modern mathematics	Lecture with PPT	Test

	2	Theorem related to Continuous functions, Continuity and Compactness	3	To Understand the theorem related to Continuous functions	Lecture	Quiz
	3	Corollary, Theorems based on Continuity and Compactness, Examples and Remarks related to compactness	3	To Understand the concepts of Continuity and Compactness	Seminar	Formative Assessment II
	4	Continuity and connectedness, Discontinuities	2	To Understand the definition of Continuity and connectedness	Lecture	Assignment
	5	Monotonic functions, Infinite limits and limits at infinity	3	To Understand the definition of Monotonic functions, Infinite limits and limits at infinity	Lecture	Test
V	**Differentiation**					
	1	The derivative of a real functions - Theorems, Examples	3	To Apply the concepts of differentiation	Lecture	Assignment
	2	Mean value theorems	3	To Understand the important	Lecture	Test

				Mean value theorem		
	3	The continuity of derivatives, L'Hospital rule, Derivatives of higher order, Taylor's Theorem	4	To Understand the important theorems such as Taylor and L'Hospital theorem	Lecture with group discussion	Quiz
	4	Differentiation of vector valued functions	3	To Understand the concepts of differentiation	Lecture	Formative Assessment
	5	Problems related to differentiation	2	To Apply the concepts of differentiation in problems.	Lecture	Assignment

Course Instructor(Aided): Dr. M.K. Angel Jebitha HOD(Aided): Dr. V. M. Arul Flower Mary

Course Instructor(SF): Ms. V.G. Michael Florance HOD(SF): Ms. J. Anne Mary Leema

Semester : I Major Core III

Name of the Course : Probability and Statistics

Course Code : PM2013

Course Outcome

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

Total contact hours: 90 (Including lectures, assignments and tests)

Unit	**Section**	**Topics**	**Lecture hours**	**Learning outcomes**	**Pedagogy**	**Assessment/ evaluation**
I	**Conditional probability and Stochastic independence**					
	1	Definitionof Conditional probability and multiplication theorem Problems on Conditional probability Bayre'stheorem	4	Explain the primary concepts of Conditional probability	Lecture through Google meet.	Evaluation through appreciative inquiry
	2	Definition and calculation of marginal distributions Definition and calculation of conditional distributions Conditional expectations	4	To distinguish between marginal distributions and conditional distributions	Lecture through Google meet	Evaluation through online quiz and discussions.
	3	The correlation coefficient Derivation of linear conditional mean Moment Generating function of joint distribution Stochastic independence of randomVariables and related problems	4	To understandthe theorems based onStochastic independence of random variables	Lecture through Google meet	online Test and Assignment
	4	Necessary conditions for stochastic independence. Necessary andsufficient conditions for stochastic independence, Pairwise and mutual stochastic independence, Bernstein's example.	3	To understandthe necessary and sufficient conditions for stochastic independence	Discussion through Google meet	Online Quiz and Test
II	**Some special distributions**					

	1	Derivation of Binomial distribution M.G.F and problems related to Binomial distribution Law of large numbers Negative binomial distribution	4	To understand Law of large numbers Negative binomial distribution	Lecture with Examples	Evaluation through online discussions.
	2	Trinomial and multinomial distributions Derivation of Poisson distribution using Poisson postulates M.G.F and problems related to Poisson distribution Derivation of Gamma distribution using Poisson postulates	4	To know aboutDerivation of Poisson distribution using Poisson postulates	Lecture through Google meet	Evaluation through appreciative inquiry thro google meet
	3	Chi-Square distribution and its M.G.F Problems on Gamma and Chi-Square distributions The Normal distribution	4	To identify Chi-Square distribution and its M.G.F Problems on Gamma and Chi-Square distributions The Normal distribution	Lecture through Google meet	Formative Assessment Online Test
	4	Derivation of standard Normal distribution M.G.F and problems on Normal distribution The Bivariate Normal distribution Necessary and sufficient condition for stochastic independence of variables having Bivariate Normal distribution	4	Relate the Normal distribution and stochastic independence of variables having Bivariate Normal distribution	Discussion Through Google meet	Slip Test through online
III	**Distributions of functions of random variables**					
	1	Sampling theory Sample statistics and related problems Transformations of single variables of discrete typeand related problems	4	Explain the primary concepts of Sampling theory Sample statistics	Lecture through Google meet	Evaluation through discussions.
	2	Transformations of single variables of continuous typeand related problems	4	To understand Transformations of single variables and Transformations of two or more variables	Lecture through Google meet	Evaluation through appreciative inquiry

		Transformations of two or more variables of discrete typeand related problems				
	3	Transformations of two or more variables of continuous typeand related problems Derivation of Beta -distribution	3	Explain the derivation of Beta distribution	Lecture through Google meet	Formative Assessment Test online
	4	Derivation of t- distribution Problems based on t -distribution Derivation of F-distribution Problems based on F -distribution	4	To identify the t -distribution and F -distribution	Discussion Through Google meet	Slip Test through online
IV	**Limiting distributions**					
	1	Behavior of distributionsfor large values of n Limiting distribution of n^{th} order statistic Limiting distribution of sample mean from a normal distribution	3	Explain the behavior of distributionsfor large values ofn	Lecture through Google meet	Evaluation through discussions.
	2	Stochastic convergence and convergence in probability Necessary and sufficient condition for Stochastic convergence Limiting moment generating function	4	To understand necessary and sufficient condition for Stochastic convergence Limiting moment generating function	Lecture through Google meet	Evaluation through Assignment online
	3	Computation of approximate probability The Central limit theorem	3	To understand The Central limit theorem	Lecture through Google meet	Formative Assessment Test online
	4	Problems based on theCentral limit theorem Theorems on limiting distributions Problems on limiting distributions	4	To calculate Problems based on theCentral limit theorem and Problems on limiting distributions	Lecture through Google meet	Slip Testonline
V	**Estimation**					
	1	Estimation, Point Estimation	3	Explain the primary concepts of Estimation, Point Estimation	Lecture through Google meet	Evaluation through discussions.

	2	Measures of quality of Estimators, Confidence Intervals for Means	4	Finding the 95% confidence interval for μ	Lecture through Google meet	Formative Assessment test
	3	Confidence intervals for difference of Means	4	Explain about the maximum likelihood estimators and functions	Lecture through Google meet	Slip Test online
	4	Confidence intervals for Variances	4	To understand the variance of unbiased estimators	Lecture through Google meet	online Assignment

Course Instructor(Aided): Ms. J.C. Mahizha HOD(Aided):: Dr. V. M. Arul Flower Mary

Course Instructor(SF): Dr. S.Kavitha HOD(SF): Ms. J. Anne Mary Leema

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

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

Course Code **: PM2014**

No. of hours per week	Credits	Total no. of hours	Marks
6	4	90	100

Objectives:

1. To study mathematical methods for solving differential equations

2. Solve dynamical problems of practical interest.

Course Outcome

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

Total contact hours: 90 (Including lectures, assignments and tests)

Unit	**Section**	**Topics**	**Lecture hours**	**Learning outcomes**	**Pedagogy**	**Assessment/ evaluation**
I	**Second Order linear Equations**					
	1	Second order Linear Equations - Introduction	4	Understand the concepts of existence and uniqueness behavior of solutions of the ordinary differential equations	Lectures, Assignments	Test
	2	The general solution of a homogeneous equation	4	To understand the theorems and identify whether a system of functions is linearly independent using the Wronskian	Lectures, Assignments	Test
	3	The use of a known solution to find another	4	To determine the solutions for the Second order Linear Equations	Lectures, Assignments	Test
	4	The method of variation of parameters	4	To determine the solutions using the method of variation of parameters	Lectures, Seminars	Test
II	**Power series solutions**					
	1	Review of power series, Series solutions of first order equations	4	To learn about Power Series method	Lectures, Assignments	Test

	2	Power Series solutions for Second order linear equations – Ordinary Points	3	To determine series solutionsforsecond order equations	Lectures, Seminars	Test
	3	Singular points	3	To understand the concepts of regular singular points and irregular singular points	Lectures, Group Discussion	Quiz
	4	Power Series solutions for Second order linear equations -Regular singular points	5	To solve ordinary linear differential equations with constant coefficients by using Frobenius method	Group Discussion	Test
III	**System of Equations**					
	1	Linear systems-theorems	4	To understand the theorems in Systems of Equations	Lectures, Online Assignments	Test
	2	Linear systems-problems	3	To determine the solutions for a linear system of first order equations	Online Assignments	Test
	3	Homogeneous linear systems with constant coefficients	4	To understand the theorems Homogeneous linear systems with constant coefficients	Seminars	Test
	4	Homogeneous linear systems with constant coefficients–problems	4	To determine the solutions for Homogeneous linear systems with constant coefficients	Group Discussions, Online Assignments	Test
IV	**Some Special Functions of Mathematical Physics**					
	1	Legendre Polynomials	3	To derive Rodrigues' formula	Lectures, Online Assignments	Test

	2	Properties of Legendre Polynomials	4	To understand Orthogonal property and other properties of Legendre Polynomials	Online Assignments Seminars	Test
	3	Bessel Functions. The Gamma Function	4	To derive Bessel function of the first kind $J_P(x)$, To understand the gamma function and to determine the general solution of Bessel's equation	Online Assignments Seminars	Test
	4	Properties of Bessel Functions	4	To understand properties of Bessel functions and to derive orthogonal property of Bessel Functions	Online Assignments Seminars	Test
V	**Picard's method of Successive approximations**					
	1	The method of Successive approximations	4	To solve the problems using the method of Successive approximations	Lectures, Assignments	Test
	2	Picard's theorem	3	To understand Picard's theorem	Lectures	Test
	3	Lipchitz condition	5	To solve problems using Lipchitz condition	Lectures, Group discussion	Quiz
	4	Systems-The second order linear equations	2	To solve the problems in Systems of second order linear equations	Assignments	Assignment

Course InstructorAided): Dr.L.Jesmalar HOD(Aided): Dr. V. M. Arul Flower Mary

Course Instructor(SF): Ms. J. Anne Mary Leema HOD(SF): Ms. J. Anne Mary Leem

Semester I

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

Course Code : PM2015

No. of hours per week	Credits	Total No. of hours	Marks
6	4	90	100

Objectives:

1. To study the various behaviour pattern of numbers.

2. To study the various techniques of solving applied scientific problems.

Course Outcome

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

Total contact hours: 90 (Including lectures, assignments and tests)

Unit	Section	Topics	Lecture hours	Learning outcomes	Pedagogy	Assessment/ evaluation
I	**Solution of Algebraic and Transcendental Equations**					
	1	Bisection Method - Examples and graphical representation, Problems based on Bisection Method	3	Recall about finding the roots of the algebraic and transcendental equations using algebraic methods.	Lecture with Illustration	Evaluation through test
	2	Method of False Position – Examples and graphical representation, Problems based on Method of False Position.	3	Draw the graphical representation of each numerical method.	Lecture with Illustration	Evaluation through test
	3	Ramanujan's Method & Problems based onRamanujan's Method,	3	To solve algebraic and transcendental equations using Ramanujan'sMethod.	Discussion with Illustration	Quiz and Test
	4	Secant Method - Problems based on Secant Method and	3	To understand the methods of Secant.	Lecture with Illustration	Test

		graphical representation.				
	5	Muller’s Method, Problems based on Muller’s Method	3	To understand the methods of Muller’s.	Lecture	Test
II	**Interpolation**					
	1	Forward Differences, Backward Differences and Central Differences, Problems related to Forward Differences, Backward Differences and Central Differences, Detection of Errors by use of difference tables	3	Understand the significance of the finite, forward, backward and central differences and their properties.	Lecture	Test
	2	Differences of a polynomial, Newton’s formulae for Interpolation, Problems based on Newton’s formulae for Interpolation	3	To practice various problems	Lecture	Test
	3	Central Difference Interpolation formulae - Gauss’s forward central difference formulae, Problems related to Gauss’s forward central difference formulae, Problems related to Gauss’s backward formula	3	To solve problems using Gauss’s forward central and Gauss’s backward formula	Lecture	Formative Assessment Test
	4	Stirling’s formulae, Problems related to Stirling’s formulae, Bessel’s formulae	4	To solve problems using Stirling’s formulae	Group Discussion	Test

	5	Problems related to Bessel’s formulae, Everett’s formulae, Problems related to Everett’s formulae	4	To solve problems using Bessel’s formulae and Everett’s formulae	Group Discussion	Test
III	**Least squares and Fourier Transforms**					
	1	Least squares Curve Fitting Procedure	2	To understand the Curve Fitting Procedure.	Lecture	Quiz
	2	Fitting a straight line. Problems related to fitting of straight line	3	To solve Problems related to fitting of straight line	Lecture	Test
	3	Multiple Linear Least squares	2	To solve Problems related to Multiple Linear Least squares.	Lecture	Test
	4	Linearization of Nonlinear Laws. Problems related to fitting of nonlinear equation.	4	To solve Problems related to fitting of nonlinear equation.	Group Discussion	Formative Assessment Test
	5	Curve fitting by Polynomials. Problems related to fitting of Polynomials	2	To solve Problems related to fitting of Polynomials.	Lecture	Test
IV	**Numerical Linear Algebra**					
	1	Triangular Matrices, LU Decomposition of a matrix	2	To evaluate the matrix using LU Decomposition method.	Lecture	Test
	2	Solution of Linear systems – Direct methods: Gauss elimination, Necessity for Pivoting, Problems related to Gauss elimination	3	To understand the Gauss elimination and practice problems based on it	Lecture with Illustration	Quiz
	3	Gauss-Jordan method, Problems based on Gauss-Jordan method, Modification of the Gauss method to compute the inverse	3	To understand Gauss-Jordan method	Lecture and group discussion	Test
	4	Examples to compute the inverse	3	To compute the inverse using different methods	Lecture with	Test

		using Modification of the Gauss method, LU Decomposition method and related problems, Solution of Linear systems - Iterative methods			Illustration	
	5	Gauss-Seidal method, Problems related to Gauss-Seidal method, Jacobi's method, Problems related to Jacobi's method	3	To understand the Gauss-Seidal method and Jacobi's method	Lecture with Illustration	Test
V	**Numerical Solution of Ordinary Differential Equations**					
	1	Solution by Taylor's series, Examples for solving Differential Equations using Taylor's series, Picard's method of successive approximations	4	To solve Differential Equations using different methods	Lecture with Illustration	Test
	2	Problems related to Picard's method, Euler's method, Error Estimates for the Euler Method, Problems related to Euler's method	4	To understand the methods Picard's and Euler's and practice problems related to it.	Lecture with Illustration	Formative Assessment test
	3	Modified Euler's method, Problems related toModified Euler's method, Runge - Kutta methods - II order and III order	4	To solve problems using Modified Euler's method	Lecture with Illustration	Assignment
	4	Problems related to Runge - Kutta II order and III order, Problems related to Fourth-order Runge - Kutta methods	4	To solve problems using Fourth-order Runge - Kutta methods	Lecture with Illustration	Assignment

Course Instructor(Aided): Dr. K. Jeya Daisy HOD(Aided) :Dr. V. M. Arul Flower Mary

Course Instructor(S.F): Ms. V. Princy Kala HOD(S.F) :Ms. J. Anne Mary Leema

Semester : III

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

Course code : PM2031

Number of hours/ Week	Credits	Total number of hours	Marks
6	5	90	100

Objectives:

1. To learn in depth the concepts of Galois Theory, theory of modules and lattices.
2. To pursue research in pure Mathematics.

Course Outcome

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

Total contact hours: 90 (Including lectures, assignments and tests)

Unit	Section	Topics	Lecture hours	Learning outcome	Pedagogy	Assessment/ Evaluation
I	Extension fields					
	1	Extension field - Definition, Finite extension- Theorems on finite extension	4	Recall the definitions and basic concepts of field theory and lattice theory, Express the fundamental concepts of field theory, Galois theory	Lecture with illustration	Evaluation through: Short Test Formative assessment I
	2	Theorems and corollary on algebraic over Fields and understand about subfields of an extension	4	Express the fundamental concepts of field theory, Galois theory	Lecture with PPT illustration	
	3	To understand about adjunction of an element to a field, subfields, Theorems.	4	Recall the definitions and basic concepts of field theory and lattice theory, Express the fundamental concepts of field theory, Galois theory	Lecture with illustration	
	4	Algebraic extension- Theorems on algebraic extension- algebraic number- transcendental number	3	Express the fundamental concepts of field theory, Gain knowledge in algebraic extension in fields.	Lecture with illustration	
II	Roots of Polynomials					
	1	Definition- root, Remainder theorem, Definition- multiplicity	3	Recall the definitions and basic concepts of field theory and lattice theory, Express the fundamental concepts of field theory, Galois theory	Lecture with illustration	Short Test Formative assessment I, II

	2	Theorems based on roots of polynomials, Corollary and lemma based on roots of polynomials.	4	Recall the definitions and basic concepts of field theory and lattice theory, Express the fundamental concepts of field theory, Galois theory and theory of modules	Lecture with PPT illustration	
	3	Definition-splitting field. Theorems based on isomorphism of fields, Theorems based on splitting field of polynomials	4	Recall the definitions and basic concepts of field theory , Galois theory and lattice theory.	Lecture with PPT illustration	
	4	Definition-derivative, Lemmas on derivative of polynomials, Simple extension, Theorems on simple extension.	3	Understand the concept of Galois theory, irreducibility, splitting fields, derivative of polynomials	Lecture with illustration	
III	Galois Theory					
	1	Fixed Field - Definition, Theorems based on Fixed Field, Group of Automorphism	4	Recall the definitions and basic concepts of field theory and lattice theory, Express the fundamental concepts of field theory, Galois theory	Lecture with illustration	Short Test Formative assessment II Assignment on lemma based on Algebraic
	2	Theorems based on group of Automorphism, Finite Extension, Normal Extension	5	Express the fundamental concepts of field theory, Galois theory	Lecture with illustration	
	3	Theorems based on Normal Extension, Galois Group, Theorems based	4	Recall the definitions and basic concepts of field theory and lattice theory, Express the fundamental	Lecture with illustration	

		on Galois Group		concepts of field theory, Galois theory		
	4	Galois Group over the rationals, Theorems based on Galois Group over the rationals, Problems based on Galois Group over the rationals	4	Express the fundamental concepts of field theory, Galois theory, Demonstrate the use of Galois theory to compute Galois Group over the rationals	Lecture with PPT illustration	
IV	Finite fields					
	1	Finite Fields – Definition, Lemma-Finite Fields, Corollary-Finite Fields	4	Recall the definitions and basic concepts of field theory and lattice theory, Express the fundamental concepts of field theory, Galois theory	Lecture with PPT illustration	Short Test Formative assessment III
	2	Theorems based on Finite Fields, Wedderburn's Theorem on finite division ring	4	Recall the definitions and basic concepts of field theory and lattice theory, Express the fundamental concepts of field theory, Galois theory	Lecture with illustration	
	3	Wedderburn's Theorem, Wedderburn's Theorem-First Proof	4	Recall the definitions and basic concepts of field theory and lattice theory	Lecture with illustration	
	4	A Theorem of Frobenius-Definitions, Algeraic over a field, Lemma based on Algeraic over a field	3	Understand the theory of Frobenius Theorem, four square theorem and Integral Quaternions	Lecture with illustration	
V	Lattice Theory					
	1	Partially ordered set-Definitions, Theorems based on Partially ordered set	3	Recall the definitions and basic concepts of field theory and lattice theory	Lecture with illustration	Short Test Formative assessment III

	2	Totally ordered set, Lattice, Complete Lattice	4	Recall the definitions and basic concepts of field theory and lattice theory, Interpret distributivity and modularity and apply these concepts in Boolean Algebra, Develop the knowledge of lattice and establish new relationships in Boolean Algebra	Lecture with illustration	Seminar on Lattice
	3	Theorems based on Complete lattice, Distributive Lattice	3	Interpret distributivity and modularity and apply these concepts in Boolean Algebra, Develop the knowledge of lattice and establish new relationships in Boolean Algebra	Lecture with illustration	
	4	Modular Lattice, Boolean Algebra, Boolean Ring	4	Develop the knowledge of lattice and establish new relationships in Boolean Algebra	Lecture with PPT illustration	

Course Instructor(Aided): Dr. S. Sujitha HOD(Aided):Dr. V. M. Arul Flower Mary

Course Instructor(S.F): Dr. J. C. Eveline HOD(S.F): Ms. J. Anne Mary Leema

Semester : III Major Core X

Name of the Course : Topology

Course code : PM2032

No. of Hours per Week	Credit	Total No. of Hours	Marks
6	5	90	100

Objectives: 1. To distinguish spaces by means of simple topological invariants.

2. To lay the foundation for higher studies in Geometry and Algebraic Topology.

Course Outcome

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

Total contact hours: 90 (Including lectures, assignments and tests)

Unit	Section	Topics	Lecture hours	Learning outcomes	Pedagogy	Assessment/ evaluation
I	**Topological space and Continuous functions**					
	1	Definition of topology, discrete and indiscrete topology, finite complement	3	To understand the definitions of topological space and different types of topology	Lecture with PPT	Test

		topology, Basis for a topology and examples, Comparison of standard and lower limit topologies				
	2	Order topology: Definition & Examples, Product topology on XxY: Definition & Theorem	3	To compare different types of topology and Construct a topology on a set so as to make it into a topological space	Lecture	Test
	3	The Subspace Topology: Definition & Examples, Theorems	3	To understand the definition of subspace topology with examples and theorems	Lecture	Test
	4	Closed sets: Definition & Examples, Theorems, Limit points: Definition Examples & Theorems , Hausdorff Spaces: Definition & Theorems	5	To understand the definitions of closed sets and limit points with examples and theorems and identify Hausdorff spaces and practice various theorems	Lecture	Test
	5	Continuity of a function: Definition, Examples, Theorems, Homeomorphism: Definition & Examples, Rules for constructing continuous function, Pasting lemma &	3	To understand the definition of continuous functions and construct continuous functions	Lecture	Test

		Examples, Maps into products				
II	**The Product Topology, The Metric Topology & Connected Spaces**					
	1	The Product Topology: Definitions,Comparison of box and product topologies, Theorems related to product topologies, Continuous functions and examples	3	To understand the definition of homeomorphism and prove theorems and practice various Theorems related to Maps into products, Cartesian Product, Projection mapping and distinguish the various topologies such as product and box topologies and topological spaces	Lecture	Test
	2	The Metric Topology: Definitions and Examples, Theorems, Continuity of a function, The sequence lemma, Constructing continuous fuctions, Uniform limit theorem, Examples and Theorems	5	To understand the concept of metric topology and prove the theorems	Lecture	Class Test
	4	Connected Spaces: Definitions, Examples, Lemmas and Theorems, Connected Sub space of the real lines: Definitions and Examples, Theorems, Intermediate value	5	To understand the concepts of connected space open and closed sets and to practice the various theorems	Group discussion	Quiz

		theorem, connected space open and closed sets, lemma, examples, Theorems.				
	5	Components and Local Connectedness: Definitions, Path components, Locally connected, Locally path connected: Definitions and Theorems	3	To compare the concepts components and path components, connectedness and local connectedness	Lecture	Test
III	**Compactness**					
	1	Compact space: Definition, Examples, Lemma, Theorems and Image of a compact space, Product of finitely many compact spaces, Tube lemma, Finite intersection property: Definition & Theorem	4	To understand the concept compact space with examples and theorems. To practice various theorems related to product of finitely many compact spaces, Tube lemma, Finite intersection property	Lecture and Seminar	Assignment
	2	Compact Subspaces of the Real Line: Theorem, Characterize compact subspaces of R^n, Extreme value theorem, The Lebesgue number lemma, Uniform continuity theorem	3	To characterize the compact subspace and prove various theorems	Lecture	Formative Assessment Test

	3	Limit Point Compactness: Definitions, Examples and Theorems, Sequentially compact	2	To under the concept of limit point compactness and analyze the sequentially compactness	Lecture with group discussion	Test
	4	Complete Metric Spaces: Definitions, Examples and Theorems, Isometric embedding	3	To analyze the concept of completeness of metric space to be complete, and to understand that every metric space can be imbedded isometrically in a complete metric space	Lecture	Test
	5	Compactness in Metric spaces: Totally bounded, Pointwise bounded, Equicontinuous, Definitions, Lemmas, Theorems	3	To understand the concept of compactness in metric spaces.	Lecture	Class test
IV	**Compactness, Countability and Separation axioms**					
	1	Local compactness: Definition & Examples, Theorems	3	To understand the concept local compactness with examples and theorems	Lecture with illustration	Quiz
	2	First Countability axiom, Second Countability axiom: Definitions, Theorems, Dense subset: Definitions & Theorem, Examples, Lindelof space : Definition , Examples	3	To compare countability axioms and understand the definition of dense subset and identify Lindelof space	Lecture	Test

	3	The Separation Axioms: Regular space & Normal space: Definitions, Lemma, Relation between the separation axioms, Examples based on separation axioms, Theorem based on separation axioms and Metrizable space	4	To distinguish various topological spaces such as normal and regular spaces. To practice examples and theorems based on separation axioms	Lecture	Test
	4	Normal Spaces: Theorems and Examples	2	To understand the concept of Normal Spaces	Group discussion	Test
	5	Urysohn lemma	3	To constuct Urysohn lemma	Lecture	Formative Assessment Test
V	**Urysohn Metrization Theorem, Tietze Extension Theorem,& The Tychonoff Theorem**					
	1	Urysohn metrization theorem, Imbedding theorem	3	To construct the Urysohn metrization theorm and Imbedding theorem	Lecture with illustration	Quiz
	2	Tietze extension theorem	3	To constuct Tietze extension theorem	Lecture	Assignment
	3	The Tychonoff Theorem	3	To understand and analyze the The Tychonoff Theorem	Lecture	Test
	4	The Stone-Cech Compactification: Defintions, Lemmas, Theorems	3	To understand the concept of Stone-Cech Compactification	Lecture	Test

Course Instructor (Aided): Dr. M.K. Angel Jebitha HoD(Aided): Dr. V.M. Arul Flower Mary

Course Instructor (S.F): Ms. R.N. Rajalekshmi HoD(S.F): Ms. J. Anne Mary Leema

Semester **III**

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

Course Code :PM2033

Number of hours/ week	Credits	Total number of hours	Marks
6	5	90	100

Objectives: 1. To generalize the concept of integration using measures.

2. To develop the concept of analysis in abstract situations.

Course Outcome

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

Total contact hours: 90 (Including lectures, assignments and tests)

Uni t	**Sectio n**	**Topics**	**Lectur e hours**	**Learning Outcome**	**Pedagog y**	**Assessment Evaluation**
I	**Lebesgue Measure**					
		Lebesgue Measure - Introduction, outer measure	4	To understand the measure and outer measure of any interval	Lecture, Illustratio n	Evaluation through : Class test on outer measure and Lebesgue measure Quiz
		Measurable sets and Lebesgue measure	5	To be able to prove Lebesgue measure using measurable sets	Lecture, Group discussio n	

		Measurable functions	4	To understand the measurable functions and its uses to prove various theorems	Lecture, Discussion	Formative assessment- I
		Littlewood's three principles (no proof for first two).	2	To differentiate convergence and pointwise convergence	Lecture, Illustration	
II	**The Lebesgue integral**					
	1.	The Lebesgue integral - the Riemann Integral	1	To recall Riemann integral and its importance	Lecture, Discussion	Formative assessment- I Multiple choice questions Short test on the integral of a non-negative function Formative assessment-II
	2.	The Lebesgue integral of a bounded function over a set of finite measure	5	To understand the use of integration in measures	Lecture, Group discussion	
	3.	The integral of a non-negative function	5	To prove various theorems using non-negative functions	Lecture, Illustration	
	4.	The general Lebesgue integral	4	To understand a few named theorems and proofs	Lecture	
III	**Differentiation and integration**					
		Differentiation and integration-differentiation of monotone functions	4	To recall monotone functions and use them with differentiation and integration	Lecture, Group discussion	Multiple choice questions Unit test on functions of bounded variation Formative assessment- II
		Functions of bounded variation	4	To evaluate the bounded variation of different functions	Lecture, Illustration	
		Differentiation of an integral	4	To find differentiation of integrals	Lecture	
		Absolute continuity	3	To differentiate continuity and absolute continuity	Lecture, Illustration	
IV	**Measure and integration**					
	1.	Measure and integration-	3	To understand concepts of measure spaces	Lecture, Group	Seminar on measure

		Measure spaces			discussion	spaces, measurable functions and integration. Short test on general convergence theorems and signed measures Formative assessment- II
	2.	Measurable functions	3	To recall measurable functions and use them in measure spaces	Lecture, Discussion	
	3.	Integration	3	To integrate functions in measure spaces	Lecture, Illustration	
	4.	General convergence theorems	3	To learn various convergence theorems in measure spaces	Lecture, Discussion	
	5.	Signed measures	3	To understand signed measures in detail	Lecture	
V	**The L^p spaces and Measure and outer measure**					
	1.	The L^p spaces	5	To understand L^p spaces	Lecture, Illustration	Seminar on outer measure, measurability and extension theorem Short test on outer measure and measurability
	2.	Measure and outer measure- Outer measure and measurability	3	To understand outer measure and measurability in L^p spaces	Lecture, Discussion	
	3.	The extension theorem	7	To prove various theorems based on σ-algebra	Lecture, Group discussion	

Course Instructor(Aided): Dr. V. M. Arul Flower Mary HOD(Aided) :Dr. V. M. Arul Flower Mary
Course Instructor(S.F): Ms. C.Joselin Jenisha HOD(S.F) :Ms. J. Anne Mary Leema

Semester : III **Elective III**

Name of the Course: Algebraic Number Theory and Cryptography

Course code : PM2034

No. of Hours per Week	Credit	Total No. of Hours	Marks
6	4	90	100

Objectives: 1. To gain deep knowledge about Number theory

2. To study the relation between Number theory and Abstract Algebra.

3. To know the concepts of Cryptography.

Course Outcome

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

Total contact hours: 90 (Including lectures, assignments and tests)

Unit	Sections	Topics	Lecture hours	Learning Outcome	Pedagogy	Assessment / Evaluation
I	**Quadratic reciprocity and Quadratic forms**					
	1	Quadratic Residues, definition, Legendre symbol definition and Theorem based on Legendre symbol	3	To understand definition and examples of quadratic residues and Legendre symbol and theorems on Legendre symbol.	Lecture with Illustration	Question and Answer
	2	Lemma of Gauss, Theorem based on Legendre symbol	4	To understand quadratic and power series forms and Lemma of Gauss, Theorem based on Legendre symbol .	Lecture with Illustration	Test
	3	Quadratic reciprocity law, Theorem based on Quadratic reciprocity.	3	To understand quadratic and power series and Quadratic reciprocity law, Theorem based on Quadratic reciprocity	Lecture with PPT Illustration	Quiz and Test
	4	The Jacobi symbol definition and examples, Theorems	2	To understand the concept of Jacobi symbol and	Lecture with Illustration	Assignment

		based on Jacobi symbol		theorems based on Jacobi symbol.		
	5	Theorem based on Jacobi symbol and Legender symbol	2	To understand theorem based on Jacobi symbol and Legender symbol.	Lecture with Illustration	Evaluation through test
II	**Binary Quadratic forms**					
	1	Definition and examples of quadratic form, definite, indefinite and semidefinite form.	2	To recall the basic results of field theory and to understand the concept of quadratic form.	Lecture with PPT Illustration	Test
	2	Theorems based on binary Quadratic forms	4	To understand the quadratic and power series forms and Theorems based on binary Quadratic forms	Lecture with Illustration	Quiz and Test
	3	Definition and Theorems based on modular group, Definition, theorem based on perfect square	3	To understand the Definition and Theorems based on modular group and perfect square.	Lecture with Illustration	Test
	4	Theorems based on reduced Quadratic forms	2	To calculate the possible partitions of a given number and draw Ferrer's graph	Lecture with PPT Illustration	Formative Assessment Test
	5	Sum of two squares, Theorems based on sum of two squares	2	To apply binary quadratic forms for the decomposition of a number into sum of sequences	Lecture with Illustration	Quiz and Test
III	**Some Functions of Number Theory**					
	1	Definition and examples based on Arithmetic functions, Multiplicative function and theorems on arithmetic and multiplicative function.	3	To understand the definition and examples of Arithmetic function and to determine solutions using Arithmetic Functions.	Lecture with Illustration	Formative Assessment Test
	2	Definition and theorem of Mobius function, The Mobius Inversion Formula and theorem on Mobius function and Multiplicative function.	3	To understand the definition and theorem on Mobius function, The Mobius Inversion Formula and to determine solutions using Arithmetic Functions.	Lecture with PPT Illustration	Test
	3	Definition and examples of Diophantine Equations, theorem on	3	To understand the definition and examples of Diophantine equations and	Group Discussion	Quiz and Test

		finding solutions of Diophantine Equations and solving problems on Diophantine equation.		find the solutions of Diophantine equations.		
	4	Definition and examples of Pythagorean triangle, Lemma on perfect square and theorem and problems for finding primitive solutions.	3	To understand the Pythagorean triangle and problems for finding primitive solutions.	Lecture with Illustration	Test
IV	**The partition Function**					
	1	Partitions definitions, theorems based on Partitions	2	To understand the Partitions definitions, theorems based on Partitions and to Calculate the possible partitions of a given number	Lecture with Illustration	Question and Answers
	2	Ferrers Graphs, Theorems based on Ferrers Graphs	3	To understand the Ferrers Graphs, Theorems based on Ferrers Graphs and how to draw the Ferrer's graph	Lecture with Illustration	Quiz and Test
	3	Formal power series and identity Euler formula.	2	To understand the Formal power series and identity and Euler formula.	Lecture with Illustration	Formative Assessment Test
	4	Theorems on Euler identity and bounds on p(n).	3	To understand theorems on Euler identity and bounds on p(n).	Lecture with Illustration	Test
	5	Theorems based on Euler formula converges of power series and absolute convergent.	3	To understand Theorems based on Euler formula ,converges of power series and absolute convergent.	Lecture with Illustration	Assignment
V	**Public Key Cryptography**					
	1	Definition and examples of Cryptography, the concepts of Public Key Cryptography with examples	2	To understand the concept of Cryptography	Lecture with Illustration	Question and Answer
	2	The idea of classical vesus public key, Authentication, Hash functions, key exchange and probabilistic Encryption.	3	To understand the idea of public key Cryptography and to Identify the public key using Cryptography	Lecture	Quiz

	3	RSA Cryptosystem with examples, Discrete log cryptosystem with examples, The Diffie – Hellman key exchange system and assumption with examples.	4	To understand and apply the concept of RSA cryptosystem and Diffie – Hellman key exchange system	Lecture with illustration	Test
	4	The Massy- Omura cryptosystem for message transmission, the ElGamal cryptosystem, the Digital Signature Standard, Algorithm for finding discrete log in finite fields with example and index calculus algorithm for discrete logs	4	To understand and apply the idea of Massy- Omura cryptosystem, ElGamal cryptosystem and solve the problem on discrete log using Silver Pohlig Hellman algorithm.	Lecture with illustration	Formative Assignment Test
	5	Basic facts of Elliptic curves, Elliptic curves over the reals, complexes and rationals, Points of finite order with examples.	4	To understand the concept of Elliptic curves and solve the problems on points of finite order	Lecture	Quiz
	6	Analog of the Diffie-Helman key exchange, Analog of Massey - Omura, Analog of ElGamal, reducing a global modulo p with examples.	5	To understand the concept of Elliptic curve Cryptosystem and Analog of all cryptosystem.	Lecture with illustration	Assignment

Course Instructor: Dr. V.Sujin Flower HOD(Aided): Dr. V. M. Arul Flower Mary

Course Instructor: Dr.S.Kavitha HOD (SF) : Ms. Anne Mary Leema

Semester : IV Major Core XII

Name of the Course : Complex Analysis

Course Code : PM2041

No. of Hours per Week	Credits	Total No. of Hours	Marks
6	5	90	100

Objectives: 1. To impart knowledge on complex functions.
2. To facilitate the study of advanced mathematics.

Course Outcome

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
CO - 6	Know the theory of conformal mappings which has many physical applications and analyse its concepts	PSO – 3, 4	An

Total contact hours: 90 (Including lectures, assignments and tests)

Unit	Section	Topics	Lecture hours	Learning outcomes	Pedagogy	Assessment /evaluation
I	Power series					
	1	Abel's theorem,Abel's limit theorem	3	To understand the concept and practice theorems	Lecture	Quiz
	2	The periodicity	2	The periodicity and solve problems based on the concept	Lecture with Group disscussion	Test

	3	Conformality: Arcs and closed curves, Analytic Functions in Regions	4	To understand the definition of Arcs and closed curves& Analytic Functions in Regions	Lecture with illustration	Test
	4	**Conformal Mapping**	3	To understand the concept of Conformal Mapping	**Lecture**	Test
	5	Length and Area	2	To understand the concepts and give illustrations	Lecture	Quiz
II	**Complex Integration – Fundamental theorems**					
	1	Cauchy's Theorems for a Rectangle, Cauchy's Theorem in a Disk	5	To practice theorems based on this concepts	Lecture	Test
	2	Cauchy's integral formula, The Index of a Point with Respect to a Closed Curve	3	To understand the concept and practice theorems related to this concepts.	Lecture with illustration	Test
	3	The Integral Formula, Higher Derivatives	3	To solve problems using this concepts.	Lecture	Formative Assessment Test II &III
	4	Local Properties of Analytic Functions - Removable singularties and Taylor's theorem, Zeros and poles.	4	To understand the concepts and give illustrations& practice theorems	Seminar	
III	**Complex Integration**					
	1	The local mapping, The maximum principle, The General Form of Cauchy's Theorem	5	To understand the concept and practice theorems related to this concepts.	Lecture with illustration	Assignment
	2	Chains and Cycles, Simple Connectivity, Homology	4	To understand the concept and practice theorems related to this concepts.	Lecture with illustration	Quiz
	3	The General Statement of Cauchy's Theorem (statement only),Calculus of Residues	3	To understand the concept about Calculus of Residues.	Lecture	Test
	4	The Residue Theorem, The Argument Principle	2	To understand the concept and practice theorems related to this concepts.	Lecture with illustration	Formative Assessment Test III
	5	Evaluation of Definite Integrals.	2	To solve problems related to Definite Integrals.	Video	Test
IV	**Series and Product developments**					

	1	Partial Fractions and Entire Functions, Partial Fractions, Infinite products, Canonical products	3	To understand the concept and practice theorems	Lecture with illustration	Test
	2	Gamma functions, Jensen's formula, Hadamard's Theorem	4	To practice theorems based on this concepts	Lecture	Test
	3	Riemann Theta Functions and Normal Families, product development, Extension of $\zeta(s)$ to the whole plane	3	To understand the concept and practice theorems related to this concepts.	Lecture with illustration	Test
	4	The zeros of zeta functions, Equicontinuity, Normality and compactness	2	To solve problems using this concepts.	Lecture	Formative Assessment Test II &III
	5	Arzela's theorem, Families of analytic functions, The classical Definitions	3	To understand the concepts and give illustrations& practice theorems	Seminar	
V	**Conformal Mappings**					
	1	Riemann mapping theorem, Statement and proof, Boundary Behaviour, Use of the Reflection principle	5	To understand the concept and practice theorems related to this concepts.	Lecture with illustration	Assignment
	2	Conformal mappings of Polygons, Behaviour at an angle	3	To understand the concept and practice theorems related to this concepts.	Lecture with illustration	Quiz
	3	Schwarz-Christoffel formula, Mapping on a rectangle	3	To understand the concept about mapping on a rectangle	Lecture	Test
	4	Harmonic Functions, Functions with mean value Property, Harnack's Principle	4	To understand the concept about Harmonic functions	Lecture with illustration	Formative Assessment Test III

Course InstructorAided): Dr. A. JancyVini HOD(Aided) :Dr. V.M. Arul Flower Mary

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