

E.M. GOPALAKRISHNA KONE YADAVA WOMEN'S COLLEGE

An Autonomous Institution -Affiliated to Madurai Kamaraj University

Re-accredited (3rd Cycle) with Grade A⁺ & CGPA 3.51 by NAAC



LESSON PLAN

2022-2023

DEPARTMENT OF **MATHEMATICS**

(PG –Odd Semester)



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DEPARTMENT OF MATHEMATICS

I - M.Sc., Mathematics

LESSON PLAN

2022-2023

Sub. Code : 22OPMA11

Title of the Paper: Abstract Algebra

Total Hours : 75

Month	Unit	Description Of The Syllabus	Hours Allocated	Teaching Mode & Methods	Course Teacher Signature
July	I	Group Theory: Another Counting Principle – Sylow's Theorems.	15	Chalk & Talk	S. Selvi
August	II	Continuation of Group Theory and Ring Theory: Direct Products – Finite Abelian Groups - Polynomial Rings	15	Chalk & Talk	S. Selvi
Sep	III	Continuation of Ring Theory and Fields: Polynomials over the Rational Fields - Extension Fields – Roots of Polynomials.	15	Chalk & Talk	S. Selvi
Oct	IV	Continuation of Fields : More About Roots -The Elements of Galois Theory	15	Chalk & Talk	S. Selvi
Nov	V	Continuation of Fields and Selected Topics Solvability by Radicals – Galois Groups over the Rationales -Finite Fields	15	Chalk & Talk	S. Selvi

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DEPARTMENT OF MATHEMATICS


I - M.Sc., Mathematics
LESSON PLAN
2022-2023

Sub. Code : 22OPMA12

Title of the Paper: Real Analysis

Total Hours : 75

Month	Unit	Description Of The Syllabus	Hours Allocated	Teaching Mode & Methods	Course Teacher Signature
July	I	The derivative of a real function: Mean Value Theorem - The continuity of derivatives - L' Hospital's Rule - Taylor's Theorem- Differentiation of vector -valued functions.	15	Chalk & Talk	T. Thiruvalluvar
August	II	The Riemann-Stieltjes integral: Definition and Existence of the Integral - Properties of the Integral. Integration and differentiation -	15	Chalk & Talk	T. Thiruvalluvar
Sep	III	Integration of vector- valued functions - Rectifiable curve	15	Chalk & Talk	T. Thiruvalluvar
Oct	IV	Uniform convergence and Continuity: Uniform convergence and Integration- Uniform convergence and differentiation - Equicontinuous Families of functions- The Stone- Weierstrass Theorem	15	Chalk & Talk	T. Thiruvalluvar
Nov	V	Power Series: The Exponential and Logarithmic Functions - The Trigonometric Functions- The Algebraic Completeness of the complex Field- Fourier series- The Gamma functions	15	Chalk & Talk	T. Thiruvalluvar


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DEPARTMENT OF MATHEMATICS

I - M.Sc., Mathematics
LESSON PLAN
2022-2023

Sub. Code : 22OPMA13

Title of the Paper: Differential Equations

Total Hours : 90

Month	Unit	Description Of The Syllabus	Hours Allocated	Teaching Mode & Methods	Course Teacher Signature
July	I	Linear Equations with Variable Coefficients: Introduction - Initial value problems for the homogeneous equation - Solutions of the homogeneous equation - The Wronskian and Linear independence - Reduction of the order of a homogeneous equation-The Non-homogeneous equation-Homogeneous equation with analytic coefficients - The Legendre Equation.	18	Chalk & Talk	R. Revathy
August	II	Linear Equations with Regular Singular Points: Introduction - The Euler equation - Second order equations with regular singular points - An example - Second order Equations with regular singular points - the general case - The Bessel equation- The Bessel equation(continued)	18	Chalk & Talk	R. Revathy
Sep	III	Existence and Uniqueness of Solutions to First Order Equations: Introduction - Equations with variables separated - Exact equations - The method of successive approximations - The Lipschitz condition - Convergence of the successive approximations - Non-local existence of solutions - Equations with complex - valued functions.	18	Chalk & Talk	R. Revathy

Oct	IV	Partial Differential Equations of the First Order : Partial Differential Equations - Origins of First -order Partial Differential Equations - Cauchy's Problem for First-order Equations - Linear Equations of the First Order - Integral Surfaces Passing through a Given Curve - Surfaces Orthogonal to Given System of Surfaces.	18	Chalk & Talk	R. Revathy.
Nov	V	Partial Differential Equations of The First Order : Nonlinear Partial Differential Equations of the First Order -Cauchy's Method of Characteristics - Compatible Systems of First order Equations - Charpit's Method - Special Types of First order Equations-Solutions Satisfying Given Conditions- Jacobi's Method- Applications of First- order Equations.	18	Chalk & Talk	R. Revathy.

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DEPARTMENT OF MATHEMATICS

I - M.Sc., Mathematics
LESSON PLAN
2022-2023

Sub. Code : 22OPMA14

Title of the Paper: Differential Geometry

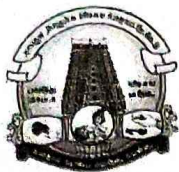
Total Hours : 90

Month	Unit	Description Of The Syllabus	Hours Allocated	Teaching Mode & Methods	Course Teacher
July	I	The theory of space curves – Arc length – Tangent normal and binormal – curvature and torsion of a given as intersection of two surfaces – Contact between curves and surfaces – Fundamental theorem for space curve	18	Chalk & Talk	Q. Mary
August	II	The metric local intrinsic properties of a surface – Curves on a surface – Surface of revolution Helicoides – Metric Direct coefficients – Families curves – Isometric curves – Intrinsic properties	18	Chalk & Talk	Q. Mary
Sep	III	Canonical Equations – Normal properties – Existence theorem – Geodesic parallels – Geodesic curvature – Gauss Bonnet theorem – Gaussian Curvature – Surface of Constant curvature	18	Chalk & Talk	Q. Mary
Oct	IV	The Second fundamental form – Principal Curvature – Lines of Curvature	18	Chalk & Talk	Q. Mary
Nov	V	Developables – Developable curve – Associated with curves on surface – Minimal surface – Ruled surface	18	Chalk & Talk	Q. Mary

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DEPARTMENT OF MATHEMATICS

I - M.Sc., Mathematics

LESSON PLAN

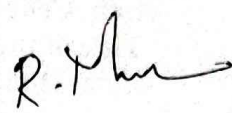
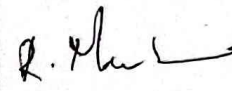

2022-2023

Sub. Code : 22OPMADSE1A

Title of the Paper: Number Theory & Cryptography

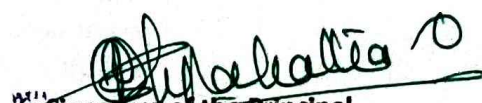
Total Hours : 90

Month	Unit	Description Of The Syllabus	Hours Allocated	Teaching Mode & Methods	Course Teacher
July	I	Introduction – Divisibility – The Mobius function $\mu(n)$ – The Euler totient function $\Phi(n)$ – A relation connecting Φ and	18	Chalk & Talk	R. N. K.
August	II	Introduction – The big oh notation. Asymptotic equality of functions – Euler's summation formula – Some elementary asymptotic formulas – The average order of $d(n)$ - The average order of the divisor functions $\sigma_a(n)$ - The average order of $\Phi(n)$ - An application to the distribution of lattice points visible from the origin – The average order of $\mu(n)$ and of $\dot{U}(n)$ - The partial sums of a Dirichlet product - Applications to $\mu(n)$ and $L(n)$ - Another identity for the partial sums of a Dirichlet product.	18	Chalk & Talk	R. N. K.
Sep	III	Introduction – Chebyshev's functions $\psi(x)$ and $\theta(x)$ - Definition and basic properties of congruence - Residue classes and complete residue systems – Linear congruence – Reduced residue systems and Euler Fermat theorem –	18	Chalk & Talk	R. N. K.

		Polynomial congruence modulo p . Lagrange's theorem – Applications of Lagrange's theorem – Simultaneous linear Congruence. The Chinese Remainder theorem – Applications of the Chinese Remainder theorem – Polynomial congruence with prime power moduli - The Principle of cross classification – A decomposition property of reduced residue systems			
Oct	IV	Quadratic residues – Legendre's symbol and its properties – Evaluation of $(-1/p)$ and $(2/p)$ – Gauss' lemma- The quadratic reciprocity law-Applications of the reciprocity law- The Jacobi symbol - Applications of Diophantine equations- Gauss sums and the Quadratic reciprocity law.	18	Chalk & Talk	
Nov	V	Discrete logarithm – Principles of public key – Cryptosystem – RSA algorithm – Elliptic curve cryptography.	18	Chalk & Talk	



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I - M.Sc., Mathematics
LESSON PLAN
2022-2023

Sub. Code : 22OPMAID1

Title of the Paper: Teaching and Research Aptitude Paper - I

Total Hours : 30

Month	Unit	Description Of The Syllabus	Hours Allocated	Teaching Mode & Methods	Course Teacher
July	I	Alphabet test, Classification Test- Analogy Test	6	Chalk & Talk	P. Thy
August	II	Coding and Decoding Test number and Alphabetical series test ,Number related, test blood relations test	6	Chalk & Talk	P. Thy
Sep	III	Assertions and presumption ,statement and conclusion	6	Chalk & Talk	P. Thy
Oct	IV	Series completion test, Venn diagram, diagram type test different position of dice	6	Chalk & Talk	S. Selvi
Nov	V	Missing number-figure analogy test figure classification test classification of figures into groups.	6	Chalk & Talk	S. Selvi


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II- M.Sc., Mathematics
LESSON PLAN
2022-2023

Sub. Code : 22OPMA31

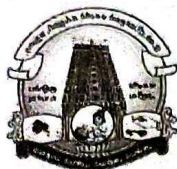
Title of the Paper: Advanced Statistics - II

Total Hours : 90

Month	Unit	Description Of The Syllabus	Hours Allocated	Teaching Mode & Methods	Course Teacher
July	I	Introduction To Statistical Inference- Point Estimation- Confidence Interval for mean- Confidence intervals for difference of mean	18	Chalk & Talk	<i>Shanu</i>
August	II	Introduction To Statistical Inference (cont): Test of Statistical Hypothesis –Additional comments about statistical test-Chi-Square Test	18	Chalk & Talk	<i>Shanu</i>
Sep	III	Sufficient Statistics: Measures of quality estimation – A sufficient statistic for a parameter-Properties of a sufficient statistic –Completeness and uniqueness-The exponential class of probability density function –Functions of a parameter	18	Chalk & Talk	<i>Shanu</i>
Oct	IV	More About Estimation : Bayesian Estimation-Fisher Information and the Rao-Cramer Inequality –Limiting Distributions of Maximum likelihood Estimations	18	Chalk & Talk	<i>Shanu</i>
Nov	V	Theory of Statistical Tests: Certain Best Tests- Uniformly Most powerful Test- Likelihood Ratio Test-The sequential probability Ratio Test	18	Chalk & Talk	<i>Shanu</i>

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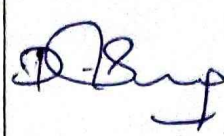
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DEPARTMENT OF MATHEMATICS
II - M.Sc., Mathematics
LESSON PLAN
2022-2023

Sub. Code : 22OPMA32

Title of the Paper: Complex Analysis

Total Hours : 90

Month	Unit	Description Of The Syllabus	Hours Allocated	Teaching Mode & Methods	Course Teacher
July	I	Complex Integration-Fundamental Theorems: Line Integrals – Rectifiable Arcs – Line Integrals as Functions of Arcs – Cauchy's Theorem for a Rectangle – Cauchy's Theorem in a Disk – Cauchy Integral formula: The Index of a point with respect to a Closed Curve – The Integral Formula – Higher Derivatives	18	Chalk & Talk	
August	II	Local Properties of Analytical Functions – Removable Singularities – Taylor's Theorem – Zeros and Poles – The Local Mapping – The Maximum Principle – The General form of Cauchy's Theorem – Chains and Cycles – Simple Connectivity – Homology – The General Statement of Cauchy's Theorem – Proof of Cauchy's Theorem – Locally Exact Differentials	18	Chalk & Talk	
Sep	III	The Calculus of Residues – The Residue Theorem – The Argument Principle – Evaluation of Definite Integrals – Harmonic Functions – Definition and Basic properties – The Mean Value Property – Poisson's Formula – Schwarz's Theorem – The Reflection Principle – Series and product developments – Power Series Expansions- Weierstrass's Theorem – The Taylor Series – The Laurent Series	18	Chalk & Talk	
Oct	IV	Complex Integration-Fundamental Theorems: Line Integrals – Rectifiable Arcs – Line Integrals as Functions of Arcs – Cauchy's Theorem for a Rectangle – Cauchy's Theorem in a Disk – Cauchy Integral formula: The Index of a point with respect to a Closed Curve – The Integral Formula – Higher Derivatives	18	Chalk & Talk	

Nov	V	Local Properties of Analytical Functions – Removable Singularities – Taylor's Theorem – Zeros and Poles – The Local Mapping – The Maximum Principle – The General form of Cauchy's Theorem – Chains and Cycles – Simple Connectivity – Homology – The General Statement of Cauchy's Theorem – Proof of Cauchy's Theorem – Locally Exact Differentials	18	Chalk & Talk	
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II - M.Sc., Mathematics

LESSON PLAN

2022-2023

Sub. Code : 22OPMA33

Title of the Paper: Mechanics

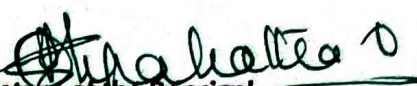
Total Hours : 90

Month	Unit	Description Of The Syllabus	Hours Allocated	Teaching Mode & Methods	Course Teacher
July	I	Survey of the elementary principles: Mechanics of a particle-Mechanics of a system of particles-Constraints-D'Alembert's principle and Lagrange's equations	18	Chalk & Talk	R. Mur
August	II	Survey of the elementary principles (Continuation) Velocity dependent potential and the dissipation function- Simple application of the Lagrangian formulation Variation principles and Lagrange's equations: Hamilton's principle – Some techniques of the calculus of variations.	18	Chalk & Talk	R. Mur
Sep	III	Variation principles and Lagrange's equations(cont): Derivation of Lagrange's equations from Hamilton's principle- Extension of Hamilton's principle to nonholonomic system- Advantages of a variational principle formulation- Conservation theorems and symmetry properties.	18	Chalk & Talk	R. Mur
Oct	IV	The two-body central force problem: Reduction to the equivalent one-body problem- The equation of motion and first integrals- The equivalent one-dimensional problem and classification of orbits-The virial theorem-The differential equation for the orbit, and integrable power-	18	Chalk & Talk	R. Mur

		law potential-Conditions for closed orbits (Bertrand's theorem)		R.	R. sh
Nov	V	The two-body central force problem(cont): The Kepler Problem : Inverse square law of force- The motion in time in the Kepler problem- The Laplace - Runge-Lenz vector.	18	Chalk & Talk	R. sh

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II - M.Sc., Mathematics
LESSON PLAN
2022-2023

Sub. Code : 22OPMADSE3A

Title of the Paper: Numerical Analysis

Total Hours : 90

Month	Unit	Description Of The Syllabus	Hours Allocated	Teaching Mode & Methods	Course Teacher
July	I	Transcendental and Polynomial Equations: Introduction- Bisection Method - Iteration Methods Based on First degree Equation - Iteration Methods Based on Second Degree Equation –Rate of Convergence(Secant method, Regular false method ,Newton Ropson method only) System of Nonlinear Equations – Methods for Complex Roots.	18	Chalk & Talk	
August	II	System of Linear Algebraic Equations and Eigen value Problems: Introduction - Direct Methods – Error Analysis for Direct Methods – Iteration Methods – Eigen values and Eigen vectors – Power Method.	18	Chalk & Talk	
Sep	III	Interpolation and Approximation: Introduction - Lagrange and Newton Interpolations - Finite Difference Operators – Interpolating Polynomials Using Finite Differences – Hermite Interpolation – Piecewise and Spline Interpolation.	18	Chalk & Talk	
Oct	IV	Differentiation and Integration: Introduction-Numerical Differentiation – Optimum Choice of Step Length – Extrapolation Methods – Numerical Integration-Methods based on Interpolation – Composite Integration Methods – Romberg Integration –Double Integration.	18	Chalk & Talk	
Nov	V	Ordinary Differential Equations: Initial Value Problems Introduction – Difference Equations – Numerical Methods –Single step method- Runge - Kutta method-Higher order methods only	18	Chalk & Talk	

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