E.M. GOPALAKRISHNA KONE YADAVA WOMEN'S COLLEGE

An Autonomous Institution –Affiliated to Madurai Kamaraj University

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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
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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	
August	II	**The Riemann-Stieltjes integral:** Definition and Existence of the Integral - Properties of the Integral. Integration and differentiation -	15	Chalk & Talk	
Sep	III	Integration of vector- valued functions - Rectifiable curve	15	Chalk & Talk	
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	
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	

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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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LESSON PLAN
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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	
August	II	The metric local intrinsic properties of a surface – Curves on a surce – Surface of revolution Helicoides – Metric Direct coefficients – Families curves – Isometric curves – Intrinsic properties	18	Chalk & Talk	
Sep	III	Canonical Equations – Normal properties – Existense theorem – Geodes parallels – Geodemic curvature – Gauss Bennet theorem – Gaussian Curvature – Surface of Constant curvature	18	Chalk & Talk	
Oct	IV	The Second fundamental form – Principal Curvature – Lines of Curvature	18	Chalk & Talk	
Nov	V	Developables – Developables curve – Associated with curves on surface – Minimal surface – Ruled surface	18	Chalk & Talk	

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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. Mu
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 $\sigma_\alpha(n)$ - 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 Ù(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. Mu
Sep	III	Introduction – Chebyshev's functions (x) and (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. Mu

		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			R. Mu
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	R. Mu
Nov	**V**	Discrete logarithm – Principles of public key – Cryptosystem – RSA algorithm – Elliptic curve cryptography.	18	Chalk & Talk	R. Mu

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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	T.Thilli
August	II	Coding and Decoding Test number and Alphabetical series test ,Number related, test blood relations test	6	Chalk & Talk	T.Thilli
Sep	III	Assertions and presumption ,statement and conclusion	6	Chalk & Talk	T.Thilli
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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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	
August	II	**Introduction To Statistical Inference (cont):** Test of Statistical Hypothesis –Additional comments about statistical test-Chi-Square Test	18	Chalk & Talk	
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	
Oct	IV	**More About Estimation :**Bayesian Estimation-Fisher Information and the Rao-Cramer Inequality –Limiting Distributions of Maximum likelihood Estimations	18	Chalk & Talk	
Nov	V	**Theory of Statistical Tests:** Certain Best Tests- Uniformly Most powerful Test- Likelihood Ratio Test-The sequential probability Ratio Test	18	Chalk & Talk	

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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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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. Mar
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. Mu
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. Mu
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. Mu

		law potential-Conditions for closed orbits (Bertrand's theorem)		R.	R.
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.

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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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