

Lesson Plan

Name of Subject : Mathematics Session: 2024-25 Semester: 3rd

Nomenclature of Course: Statics

Course Code:MA03

Credits (L+T+P): 4:0:0

MONTH	WEEK	SYLLABUS
July	4 th week	Composition and resolution of forces
	5 th week	Composition and resolution of forces
August	1 st week	Parallel forces
	2 nd week	Parallel Forces
	3 rd week	Moments and Couples
	4 th week	Moments and Couples.
	5 th week	Analytical conditions of equilibrium of coplanar forces
September	1 st week	Analytical conditions of equilibrium of coplanar forces
	2 nd week	Friction.
	3 rd week	Centre of Gravity
	4 th week	Virtual work.
	5 th week	Virtual work.
October	1 st week	Poinsots central axis.
	2 nd week	Doubts, test
	3 rd week	Wrenches
	4 th week	Null lines and planes
November	2 nd week	Stable and unstable equilibrium.
	3 rd week	Stable and unstable equilibrium.
	4 th week	Doubt and Test

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Lesson Plan

Name of Subject : Mathematics Session: 2024-25 Semester: 3rd

Nomenclature of Course: Partial Differential Equations

Course Code:MA03

Credits (L+T+P): 4:0:0

MONTH	WEEK	SYLLABUS
July	4 th week	Formation, order and degree of differential equations.
	5 th week	Complete solution, singular solution and general solution of linear and non-linear Partial differential equations of 1 st Order.
August	1 st week	Solution of Lagrange's equations
	2 nd week	Charpit's general method of solution
	3 rd week	Compatible system of first order equations, Jacobi's method
	4 th week	Linear partial differential equations of 2 nd and higher order
	5 th week	Linear and Non-linear homogeneous and non-homogeneous equations with constant coefficients
September	1 st week	Partial differential equations with variable coefficients reducible to equations with constant coefficients
	2 nd week	Partial differential equations with variable coefficients reducible to equations with constant coefficients(contd)
	3 rd week	Classification of linear partial differential equation of 2 nd order, Hyperbolic, Parabolic and elliptic Types
	4 th week	Canonical form and their solutions
	5 th week	Monge's method of partial differential equations of 2 nd order
October	1 st week	Cauchy's problem for 2 nd order partial differential equations
	2 nd week	Characteristic equations and characteristic curve of 2 nd order partial differential equations
	3 rd week	Method of separation of variables for solving Laplace's equation and wave equation (one and two dimensions)
	4 th week	Method of separation of variables for solving Laplace's equation and wave equation (one and two dimensions) (Contd.)
November	2 nd week	Heat equation(one and two dimension) in cartesian coordinate system
	3 rd week	Doubts and Test
	4 th week	Doubts and Test

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Lesson Plan

Name of Program:UG Multi/Interdisciplinary Program in Mathematics

Name of Course: Skill Enhancement Course(SEC)

Nomenclature of Course: Mathematical Programming in C and Numerical Methods

Course Code: 23MAT501SE01

Credits (L+T+P): 2:0:1

Marks: 75 [Th:50(Int: 15+Ext: 35) and Pr[Int: 05 + Ext: 20]

MONTH	WEEK	SYLLABUS
July	4 th week	Programmer's model of a computer, Algorithms, Flow charts.
	5 th week	Data types, Operators and expressions, Input / Output functions. Decisions control structure:
August	1 st week	Decision statements, Logical and conditional statements.
	2 nd week	Implementation of Loops, Switch Statement & Case control structures.
	3 rd week	Functions, Preprocessors and Arrays.
	4 th week	Strings: Character Data Type, Standard String handling Functions
	5 th week	Arithmetic Operations on Characters. Structures: Definition, using Structures.
September	1 st week	Use of Structures in Arrays and Arrays in Structures
	2 nd week	Pointers: Pointers Data type, Pointers and Arrays, Pointers and Functions.
	3 rd week	Solution of Algebraic and Transcendental equations: Bisection method, Regula-Falsi method.
	4 th week	Secant method, Newton-Raphson's method. Newton's iterative method for finding pth root of a number, Order of convergence of above methods
	5 th week	Simultaneous linear algebraic equations: Gauss-elimination method.
October	1 st week	Gauss-Jordan method.
	2 nd week	Triangularization method (LU decomposition method).
	3 rd week	Crout's method, Cholesky Decomposition method. Iterative method.
	4 th week	Jacobi's method.
November	2 nd week	Gauss-Seidal's method.
	3 rd week	Relaxation method
	4 th week	Revision, Assignments and Tests

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Lesson Plan

Name of Subject : Mathematics

Nomenclature of Course: Real Analysis

Course Code:MA05

Credits (L+T+P): 4:0:0

MONTH	WEEK	SYLLABUS
July	4 th week	Riemann integral. Lower sums Upper Sums, introductory theorems and numericals.
	5 th week	Integrability of continuous and monotonic functions, The Fundamental theorem of integral calculus.
August	1 st week	Mean value theorems of integral calculus.
	2 nd week	Continue Riemann integral theorems and numerical.
	3 rd week	Improper integrals and their convergence, Comparison tests
	4 th week	Abel's and Dirichlet's tests, Frullani's integral.
	5 th week	Integral as a function of a parameter.
September	1 st week	Continuity, Differentiability and integrability of an integral of a function of a parameter.
	2 nd week	Definition and examples of metric space.
	3 rd week	Neighbourhoods, interior points, open sets.
	4 th week	limit points, closed sets .
	5 th week	Subspace of a metric space, equivalent metrics, Cauchy sequences, completeness.
October	1 st week	Continuous functions, uniform continuity.
	2 nd week	Compactness for metric spaces, sequential compactness
	3 rd week	Bolzano-Weierstrass property, total boundedness.
	4 th week	Finite intersection property, continuity in relation with compactness.
November	2 nd week	connectedness , components, continuity in relation with connectedness.
	3 rd week	Doubts and Test
	4 th week	Doubts and Test

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Lesson Plan

Semester 01(ODD)

Name of Subject : Mathematics

Nomenclature of Course: Advanced Calculus

MONTH	WEEK	SYLLABUS
July	4 th week	Indeterminate forms.
	5 th week	Partial differentiation.
August	1 st week	Total Differentials; Composite functions & implicit functions
	2 nd week	Change of variables. Homogenous functions & Euler's theorem on homogeneous functions.
	3 rd week	Taylor's theorem for functions of two variables. Problems on previous topics. Test.
	4 th week	Curves: Tangents, Principal normals, Binormals, Serret-Frenet formulae.
	5 th week	Locus of the centre of curvature, Spherical curvature, Locus of centre of Spherical curvature.
September	1 st week	Maxima, Minima and saddle points of two variables. Lagrange's method of multiplier. Discussion of theory.
	2 nd week	Continuity, Sequential Continuity, properties of continuous functions.
	3 rd week	Continuity, Sequential Continuity, properties of continuous functions continue.
	4 th week	Limit and continuity of real valued functions of two variables, Differentiability of real valued functions of two variables.
	5 th week	Schwarz and Young's theorem. Implicit function theorem.
October	1 st week	Rolle's Theorem and Lagrange's mean value theorem and their geometrical interpretations. Taylor's Theorem with various forms of remainders.
	2 nd week	Darboux's intermediate value theorem for derivative. Taylor's Theorem with various forms of remainders,
	3 rd week	Uniform continuity. Involutives,
	4 th week	evolutes, Bertrand Curves.
November	2 nd week	Surfaces: Tangent planes, one parameter family of surfaces, Envelopes.
	3 rd week	Doubts and Test

Credits (L+T+P): 4:0:0

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Lesson Plan

Name of Subject : Mathematics

Nomenclature of Course: Numerical Analysis

Course Code:MA05

Credits (L+T+P): 4:0:1

MONTH	WEEK	SYLLABUS
July	4 th week	Finite Difference Operators. Forward difference operator, Backward difference operator, Central difference operator and their properties. Fundamental theorem of difference calculus
	5 th week	The operator E and their properties.Numerical problems related to different difference operators.Effect of an error in a tabular value(Missing terms).Numerical problems related to effect of an error in a tabular value.Relation between different Finite difference operators. Give brief overview of Chapter 1 and take problems.
August	1 st week	Defining the term interpolation and extrapolation, Difference between Interpolation with equal intervals and Interpolation with unequal intervals.Newton-Gregory formula for forward interpolation and their problems.Newton-Gregory formula for backward interpolation and their problems.More problems related to Newton's interpolation formulas interpolation.
	2 nd week	Subdivision of intervals and related examples, Interpolation with equal intervals. Interpolation with unequal intervals. Discussion on Chapter 2 and Take problems of Chapter 2.Define the term divided difference and related theorems.Newton's divided difference interpolation formula for unequal intervals and related examples.Relation between divided differences and ordinary differences and related examples.
	3 rd week	More examples related to Divided Differences. Lagrange's interpolation formula and related examples. Lagrange's interpolation formula and related examples. Hermite's interpolation formula and related examples. Brief overview of Interpolation with unequal intervals.Assignments: State when Lagrange and Hermite interpolation is applied and Test of Chapter 3.
	4 th week	Problems of Chapter 3 Chapter 4: Central Difference Interpolation formula and related examples. Define central difference, Gauss forward interpolation formula and related examples. Gauss backward interpolation formula and related examples

	5 th week	Sterling formula and related examples. Bessel's formula and related examples. Brief overview of Central Difference interpolation formulas. Problems of Chapter 4.
September	1 st week	Examples of probability distribution of a random variable, Mean and variance of a random variable. Problems based on mean and variance of a random variable. Binomial distribution and related examples. Mean and variance of binomial distribution, recurrence formula. Problems based on properties of binomial distribution
	2 nd week	Problems based on fitting a binomial distribution. Poisson distribution, Mean, variance and recurrence formula of poisson distribution. Problems related to poisson distribution and their properties. Fitting a poisson distribution and related properties. Normal distribution and its properties. Problems related to Normal distribution and its properties
	3 rd week	Method of area to find the expected frequencies for normal curve. Problems to find the expected frequencies for normal curve under the method of area. More problems related to Probability distribution. Chapter 6: Derivatives Using Newton's Forward and Backward Interpolation formula Derivatives Using Sterling and Bessel's Central Difference Formula and Newton's Divided Difference formula. Problems to find the different derivative when some tabulated table is given
	4 th week	Chapter 7: Define Eigen values and Eigen vectors and some properties of eigen values, Problems to find the eigen values and their corresponding eigen vectors of the matrix Power method and problems to find the largest eigen value of the matrix Jacobi's method for symmetric matrix, method to find all the eigen values and eigen vectors of the matrix Given's Method, Problems on how to transform a matrix into tridiagonal form by Given's method and to find the eigen

		<p>vector corresponding to the largest eigen value from the eigen vectors of the tridiagonal matrix.</p> <p>House-Holder's method and problems based on House-Holder's method</p> <p>More Problems based on House-Holder's method QR method and related problems Lanczo's method and related problems.</p> <p>More problems on power, jacobi's, Given's, House Holder's method, QR and Lanczo's method. Problem discussion on Eigen value Problems</p>
	5 th week	<p>Presentation on Eigen value Problems. Newton Cotes Quadrature formula and related problems. Numerical Integration by trapezoidal rule and related problems. Test of Chapter-6.</p> <p>Numerical Integration by Simpson's 1/3 rule and related problems.</p>
October	1 st week	<p>Numerical Integration by Chebyshev's Quadrature formula and related problems Problems discussion. Introducing the concept: Initial and Boundary conditions, Single step and Multi step method, Euler's method and related examples. Modified Euler's Method and related examples</p>
	2 nd week	<p>More problems on Euler's method and Modified Euler's method. Taylor's series method and problems related to Taylor's series method. Runge-Kutta method of First and Second order and its examples</p>
	3 rd week	<p>Runge-Kutta method of Third and Fourth order and its examples. Picard's Method and problems related with Picard's method,</p>
	4 th week	<p>Predictor-Corrector Methods, Milne-Simpson's method and its examples</p>
November	2 nd week	<p>Adams-Bashforth Predictor Formula and Adams-Moulton Corrector Formula and its examples More examples related to Numerical Solution of Ordinary Differential Equations More examples related to Numerical Solution of Ordinary Differential Equations Take Problems of Chapter 9.</p>
	3 rd week	<p>Doubts, Revision and Test</p>
	4 th week	<p>Doubts, Revision and Test</p>

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Lesson Plan

Name of Program: UG Multi/Interdisciplinary Program in Mathematics

Name of Course: Multi/Interdisciplinary Course (MDC)

Nomenclature of Course: Introductory Mathematics

Course Code: 23MATX01MD01

Credits (L+T+P): 2:1:0

Marks: 50

MONTH	WEEK	SYLLABUS
July	4 th week	Numbers, H.C.F. and L.C.M of Numbers
	5 th week	Decimal and Fraction
August	1 st week	Decimal and Fraction,
	2 nd week	Simplification
	3 rd week	Square root and Cube root
	4 th week	Surds and indices
	5 th week	Problem on numbers
September	1 st week	Average
	2 nd week	Percentage
	3 rd week	Profit and Loss
	4 th week	Ratio and Proportion
	5 th week	Problem on ages
October	1 st week	Partnership
	2 nd week	Time and Work
	3 rd week	Time and Distance
	4 th week	Problems on Trains, Mixture Problems
November	2 nd week	Problems based on Calendar and Clock
	3 rd week	Revision and Test
	4 th week	Revision and Test

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Lesson Plan

Semester 01(ODD)

Name of Subject : Mathematics

Nomenclature of Course: BASIC MATHEMATICS

Name of Course: Minor Course

Course Code: 24MAT401MI01

Credits (L+T+P): 3:0:1

Maximum Marks:100 {External (term-end exam) – 70} (Internal – 30)

MONTH	WEEK	SYLLABUS
July	4 th week	Calculus Preliminary
	5 th week	Differentiation: Partial derivatives up to second order
August	1 st week	Homogeneity of functions and Euler's theorem;
	2 nd week	Total differentials, Differentiation of implicit function with the help of total differentials.
	3 rd week	Maxima and Minima; Cases of one variable involving second or higher order derivatives;
	4 th week	Maxima and Minima; Cases of two variables involving not more than one constraint.
	5 th week	Integration: Integration as anti-derivative process; Standard forms;
September	1 st week	Methods of integration by substitution, by parts, and by use of partial fractions;
	2 nd week	Definite integration; Finding areas in simple cases; Consumers and producers surplus;
	3 rd week	Nature of Commodities learning Curve;
	4 th week	Leontiff Input-Output Model.
	5 th week	Matrices: Definition of matrix; Types of matrices;
October	1 st week	Algebra of matrices.
	2 nd week	Determinants: Properties of determinants;
	3 rd week	calculation of values of determinants up to third order; Adjoint of a matrix, through Adjoint and
	4 th week	Elementary row or column operations;
November	2 nd week	Solution of system of linear equations having unique solution and involving not more than three variables
	3 rd week	Revision and test
	4 th week	Revision and test

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Lesson Plan

Name of Subject : Mathematics Session: 2024-25 Semester: 5th

Nomenclature of Course: Group and ring

Course Code:MA05

Credits (L+T+P): 4:0:0

MONTH	WEEK	SYLLABUS
July	4 th week	Introduction. Some pre-requisite. Definition of groups and its brief introduction. Examples of groups. General properties of groups.
	5 th week	Subgroups and Subgroup criteria,
August	1 st week	Generation of groups, cyclic groups.
	2 nd week	Cosets, Left and right cosets, Index of a sub-group
	3 rd week	Coset decomposition, Lagrange's theorem and its consequences.
	4 th week	Normal subgroups, Quotient groups. Revision and Class test.
	5 th week	Homomorphisms, isomorphisms,
September	1 st week	automorphisms and inner automorphisms of a group.
	2 nd week	Automorphisms of cyclic groups, Permutations groups.
	3 rd week	Even and odd permutations. Alternating groups, Cayley's theorem.
	4 th week	Center of a group and derived subgroup of a group. Revision and Class test.
	5 th week	Introduction to rings, subrings, integral domains and fields.
October	1 st week	Characteristics of a ring. Ring homomorphisms
	2 nd week	Ring homomorphisms(Contd.) ideals (principle, prime and Maximal).
	3 rd week	Quotient rings, Field of quotients of an integral domain.
	4 th week	Euclidean rings, Polynomial rings, Polynomials over the rational field.

November	2 nd week	Unique factorization domain, R unique factorization domain implies so is $R[X_1, X_2, \dots, X_n]$
	3 rd week	Doubts and Test
	4 th week	Doubts and Test

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Lesson Plan

Semester 01(ODD)

Name of Subject : Mathematics

Nomenclature of Course: Functions and Algebra

Name of Course: Discipline Specific Course/ Major Course (DSC)

Course Code: 24MATS401DS01

Credits (L+T+P): 3:0:1

Maximum Marks: 100(75 Theory+25 Practical)

MONTH	WEEK	SYLLABUS
July	4 th week	Relations, Functions along with domain and range
	5 th week	Composition of functions
August	1 st week	Invertibility and inverse of functions
	2 nd week	One-to-one correspondence and the cardinality of a set
	3 rd week	Relations between the roots and coefficients of general polynomial equation in one variable.
	4 th week	Relations between the roots and coefficients of general polynomial equation in one variable.
	5 th week	Transformation of equations. Nature of the roots of an equation Descarte's rule of signs.
September	1 st week	Solutions of cubic equations (Cardon's method). Biquadratic equations and their solutions.
	2 nd week	Matrix and its types. Symmetric, Skew-symmetric, Hermitian and Skew Hermitian matrices
	3 rd week	Unitary and Orthogonal Matrices, Idempotent, Involuntary, Nilpotent Matrices. Rank of a Matrix & its applications. Rank of a matrices, Row rank and column rank of a matrix
	4 th week	Elementary Operations on matrices, Inverse of a matrix , Normal Form, PAQ Form, Linear dependence and independence of rows and columns of matrices
	5 th week	Applications of matrices to a system of linear (both homogeneous and non- homogeneous) equations, Theorems on consistency of a system of linear equations
October	1 st week	Cayley Hamilton theorem. Eigenvalues, eigenvectors and the characteristic equation of a matrix.
	2 nd week	Eigenvectors and the characteristic equation of a matrix.
	3 rd week	Minimal polynomial of a matrix. Cayley Hamilton theorem and its use in finding the inverse of a matrix. Diagonalization of matrix.
	4 th week	Minimal polynomial of a matrix. Cayley Hamilton theorem and its use in

		finding the inverse of a matrix. Diagonalization of matrix.
November	2 nd week	Doubt and revision
	3 rd week	Revision and test
	4 th week	Revision and test

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