CMG Govt. College for Women, Bhodia Khera

Lesson Plan Mathematics (2023-24)

B.A./B.Sc. – Ist Year (Semester – II)

BM – 123 : Vector Calculus

January 2024 (Section – I)

Scalar and vector product of three vectors, product of four vectors. Reciprocal vectors. Vector differentiation Scalar Valued point functions, vector valued point functions, derivative along a curve, directional derivatives

February 2024 (Section – II)

Gradient of a scalar point function, geometrical interpretation of grad Φ , character of gradient as a point function. Divergence and curl of vector point function, characters of Div f, and Curl f as point function, examples. Gradient, divergence and curl of sums and product and their related vector identities. Laplacian operator.

March 2024 (Section – III)

Orthogonal curvilinear coordinates Conditions for orthogonality fundamental triad of mutually orthogonal unit vectors. Gradient, Divergence, Curl and Laplacian operators in terms of orthogonal curvilinear coordinates, Cylindrical co-ordinates and Spherical coordinates.

April 2024 (Section – IV)

Vector integration; Line integral, Surface integral, Volume integral.

Theorems of Gauss, Green & Stokes and problems based on these theorems.

Dr. Kavita Rani

(Assistant Prof. Maths)

CMG Govt. College for Women, Bhodia Khera

Lesson Plan Mathematics (2023-24)

B.A./B.Sc. - IInd Year (Semester – IV)
BM -241 : SEQUENCES AND SERIES

January 2024 (Section – I)

Boundedness of the set of real numbers; least upper bound, greatest lower bound of a set, neighborhoods, interior points, isolated points, limit points, open sets, closed set, interior of a set, closure of a set in real numbers and their properties. Bolzano-Weiestrass theorem, Open covers, Compact sets and Heine-Borel Theorem.

February 2024 (Section – II)

Sequence: Real Sequences and their convergence, Theorem on limits of sequence, Bounded and monotonic sequences, Cauchy's sequence, Cauchy general principle of convergence, Subsequences, Subsequential limits.
Infinite series: Convergence and divergence of Infinite Series, Comparison Tests of positive terms Infinite series, Cauchy's general principle of Convergence of series, Convergence and divergence of geometric series, Hyper Harmonic series or p-series.

March 2024 (Section – III)

Infinite series: D-Alembert's ratio test, Raabe's test, Logarithmic test, de Morgan and Bertrand's test, Cauchy's Nth root test, Gauss Test, Cauchy's integral test, Cauchy's condensation test.

April 2024 (Section – IV)

Alternating series, Leibnitz's test, absolute and conditional convergence, Arbitrary series: abel's lemma, Abel's test, Dirichlet's test, Insertion and removal of parenthesis, rearrangement of terms in a series, Dirichlet's theorem, Riemann's Re-arrangement theorem, Pringsheim's theorem (statement only), Multiplication of series, Cauchy product of series, (definitions and examples only) Convergence and absolute convergence of infinite products.

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Lesson Plan Mathematics (2023-24)

B.A . /B.Sc. - IInd Year (Semester – IV)
BM -243 : PROGRAMMING IN C & NUMERICAL METHODS

January 2024 (Section – I)

Programmer's model of a computer, Algorithms, Flow charts, Data types, Operators and expressions, Input / outputs functions.

February 2024 (Section – II)

Decisions control structure: Decision statements, Logical and conditional statements, Implementation of Loops, Switch Statement & Case control structures. Functions, Preprocessors and Arrays.

March 2024 (Section – III)

Strings: Character Data Type, Standard String handling Functions, Arithmetic Operations on Characters. Structures: Definition, using Structures, use of Structures in Arrays and Arrays in Structures. Pointers: Pointers Data type, Pointers and Arrays, Pointers and Functions.
Solution of Algebraic and Transcendental equations: Bisection method, Regula-Falsi method, Secant method, Newton-Raphson's method. Newton's iterative method for finding pth root of a number, Order of convergence of above methods.

April 2024 (Section – IV)

Simultaneous linear algebraic equations: Gauss-elimination method, Gauss-Jordan method, Triangularization method (LU decomposition method). Crout's method, Cholesky Decomposition method. Iterative method, Jacobi's method, Gauss-Seidal's method, Relaxation method.

Note: Practical will be conducted simultaneously.

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Lesson Plan Mathematics (2023-24)

B.A./B.Sc. - IIIrd Year (Semester – VI)

BM -363 : Dynamics

January 2024 (Section – I)

Velocity and acceleration along radial, transverse, tangential and normal directions.Relative velocity and acceleration. Simple harmonic motion. Elastic strings.

February 2024 (Section – II)

Mass, Momentum and Force. Newton's laws of motion. Work, Power and Energy. Definitions of Conservative forces and Impulsive forces.

March 2024 (Section – III)

Motion on smooth and rough plane curves. Projectile motion of a particle in a plane.Vector angular velocity.

April 2024 (Section – IV)

General motion of a rigid body. Central Orbits, Kepler laws of motion. Motion of a particle in three dimensions. Acceleration in terms of different co-ordinate systems.

Dr. Kavita Rani

(Assistant Prof. Maths)

Lesson Plan

Department of Mathematics Session: 2023-24 (w.e.f. 01-01-2024 to 30-04-2024)

Name of the Teacher: Dr. Sonu Ram Designation: Assistant Professor

Class and Section: BA/BSC-II (4th sem.) Subject: Special functions and Integral Transform

Week	Topics
1	Chapter -1 Convergence of power series, operation on power series analytic function, ordinary and singular points of differential equation, existence of power series solution Previous method of power series, discuss different cases of solution of power series examples and exercises
2	Chapter-2 Bessel's equation (definition), solution of Bessel's equation, Bessel's function, reductions of Bessel's function in the form of series, recurrence relation for Bessel's function. Generating function for Jn(x), representation of Jn(x) in integral, Jacobi series, equations reducible to Bessel equation, orthogonality relation
3	Chapter 3 Legend's equation (definition), solution of Legendre's equation, Rodrigue's formula, derivation of Legendre polynomial from Rodrigues's formula, recurrence relation, orthogonality of Legendre polynomial.
4	Chapter -4 Hermite's equation (definition), Hermite polynomial, generating function for Hermite's polynomial, Rodrigue's formula for Hn(x), recurrence relation, orthogonal property of Hermite's polynomial.
5	Chapter -5 Laplace transforms, Laplace transform of some elementary functions, some standard results obtained by applying shifting property, function of exponential order, second shifting theorem
6	Laplace transform of derivatives, related examples, transform of a periodic function, Laplace transform of integrals, Laplace transform of some important functions,
7	Chapter -6 Inverse Laplace transform (definition), other methods for finding inverse transform, convolution theorem, related examples and exercise Test, Assignment and viva.
8	Chapter -7 Use of Laplace transform in integral equations, example and exercise, Method to solve different types of equations, related examples and exercise
9	Chapter-8 Solution of differential equation by Laplace transformation. linear differential equation with constant coefficient by transform method,
10	Chapter -9 Fourier transforms (definition), Fourier sine transform & cosine transform, properties of Fourier transforms, example based on Fourier sine and cosine transform.
11	Example based on the use of inverse transforms, convolution theorem Fourier transform, Fourier transform of the derivative, relation between Fourier and
12	Parseval's identity for Fourier transform, Parseval's identity for Fourier sine and cosine transform, finite sine and cosine transform. Take test
13	solution of ordinary differential equation with variable coefficients by transform method, solution of simultaneous linear equation with constant coefficient by transform method.
14	Laplace transform. Solution of differential equation by Fourier transforms.
15	Revision and discuss problems

Lesson Plan

Department of Mathematics **Session: 2023-24**

Name of the Teacher: Dr. Sonu Ram Designation: Assistant Professor

Class and Section: - B.A/B.Sc. 1st (2nd sem.)

Subject: - Number theory and Trigonometry

W.E.F. from 01-01-2024 to 30-04-2024

Week	Topics
1	Divisibility, G.C.D.(greatest common divisors), L.C.M.(least common multiple) The Principal of mathematical induction
2	Primes, Fundamental Theorem of Arithmetic. Linear Congruences, Fermat's theorem.
3	Wilson's theorem and its converse. Linear Diophantine equations in two variables
4	Complete residue system and reduced residue system modulo m. Euler function Euler's generalization of Fermat's theorem. Chinese Remainder Theorem. Take
5	Quadratic residues. Legendre symbols. Lemma of Gauss; Gauss reciprocity law. Greatest integer function [x].
6	The number of divisors and the sum of divisors of a natural number n (The functions d(n) and s (n)). Moebius function and Moebius inversion formula.
7	De Moivre's Theorem and its Applications. Expansion of trigonometrical functions. Take Assignment
8	Direct circular and hyperbolic functions and their properties.
9	Inverse circular and hyperbolic functions and their properties.
10	Logarithm of a complex quantity
11	Gregory's series. Summation of Trigonometry series
12	Method of differences, C+iS method, some standard results, Series depending on the G.P. series and A.P. series. Take test.
13	Revision all syllabus and discuss doubts of students.

Lesson Plan

Department of Mathematics Session: 2023-24 (w.e.f. from 01-01-2024 to 30-04-2024)

Name of the Teacher: Sonu Ram Designation: Assistant Professor

Class and Section: BA/BSC-I (2nd sem.) Subject: Ordinary differential Equation

Week	Topics
1	Introduction to ordinary differential equation order and degree. Formation of the exact differential equation, integrating factor, and rule to find the integrating factor for the solution of the differential equation.
2	To special rule for finding the integrating factor equation solvable p equation solvable for x equation to y
3	Lagrange equation Clairaut's equation is reducible to clearout's form singular solution discriminant solution.
4	Doubts discussion and test of above chapters and assignment as given
5	Introduction of orthogonal trajectories with cartesian coordinates and polar coordinate's introduction to a linear differential equation with constant coefficients with a complete solution rule to solve an equation and theorem to find the particular integral of special cases.
6	Case second third fourth fifth order with constant coefficients for the solution of the linear differential equation
7	Introduction to homogeneous equation method of solution equation reducible to homogeneous linear form introduction to the linear differential equation of second order by changing the dependent variable when an integral included in the CF is known.
8	Doubt discussion and test
9	Method for finding the integral of second order equation by removing the first derivative and changing dependent variable and by changing the independent variable.
10	Method of variation of parameters of undetermined constant's introduction to ordinary simultaneous linear differential equations.
11	Method of solving simultaneous linear differential equations with constant coefficients special form of simultaneous linear differential equations for second order with the help of order 1.
12	Doubt, test and discussion and assignment
13	Introduction to total differential equation method of solving of total differential equation method of second regarding one variable as constant out of 3 variables
14	Method of solving homogenous equation method 4th of auxiliary equation special form of solution of total differential equation.
15	Doubt discussion and test, Revision and problem discussion

Lesson Plan

Department of Mathematics Session: 2023-24 (wef 01-01-2024 to 30-04-2024)

Name of the Teacher: Dr. Sonu Ram Designation: Assistant Professor

Class and Section: BA/BSC-III (6^{th} sem.) Subject: Linear Algebra

Week	Topics
1	Chapter 1: Vector spaces and subspaces, properties of vector spaces, subspaces, Exercise
2	Chapter 1: Theorems on vector-subspaces, Examples, Linear sum of subspaces, Direct sum, Disjoint subspaces, Examples and Exercise.
3	Chapter 2: Linear combination of vectors, linear dependence and independence of vectors, spanning sets, Basis of vector space, Ordered basis,
4	Chapter 2: Dimensions of a vector space, Identical spaces complementary subspaces Quotient space, Dimension of quotient spaces Linear transformations, Properties of L.T. vector space isomorphism, Find L.T.
5	Minimal generating set, Maximal linearly, independent set
6	Chapter 5: Null space, Range or Image of L.T., Fundamental theorem of vector space homomorphism, Rank and nullity of a L.T.
7	Chapter 6: Algebra of L.T.,Sum of L.T., Composition of two L.T., Singular and non-singular L.T., Invertible L.T.
8	Chapter 7: Matrix of a L.T. relative to ordered basis, Matrices of identity and zero transformations change of basis
9	Chapter 8: Dual space, Vector space of all L.T., Bidual of a Vector space, assignment
10	Chapter 9: Eigen values and eigen vectors of a L.T., Eigen space, Simplar matrices, Diagonalisation, Minimal polynomial
11	Chapter 10: Inner product spaces, Normal of a vector, Triangle inequality, Schwarz inequality, Normal linear space, Examples and theorems. Orthonormal set, Bessel's inequality,
12	Chapter 10: Orthonormal set, Bessel's inequality, Gram-Schmidt orthogonalization process, Theorems and Exercise. Take test
13	Chapter 11: Linear operations on inner product spaces, Adjoint operator, Same theorems on linear operators
14	Gram-Schmidt orthogonalization process, Theorems and Exercise.
15	Revision and problems discussion

Lesson Plan

Department of Mathematics Session: 2023-24 (w.e.f. 01-01-2024 to 30-04-2024)

Name of the Teacher: Dr. Sonu Ram Designation: Assistant professor

Class and Section: BA/BSC-III (6^{th} sem.) Subject: Real and Complex Analysis

Week	Topics
1	Chapter-1 Jacobian, chain rule for Jacobian, examples, functional dependence and exercises
2	Chapter-2 Properties of Beta function, gamma function, recurrence formula for gamma function, examples related to beta and gamma function
3	Chapter-2 Relation between beta and gamma function, duplication formula, examples and exercises
4	Chapter-3 Double and triple integral, evolution of double integral substitution method for double integral,
5	triple integral substitution method for triple integral and take doubts
6	Chapter-3Application of double and triple integrals for finding area and volume of surfaces, Dirichlet's integral Liouville's extension of Dirichlet's integral, change of order of integration
7	Chapter-4 Fourier series (Definition), determination of Fourier coefficients Fourier series for even and odd function, Dirichlet's conditions, Fourier expansion of piecewise monotonic continuous function
8	Chapter-4 Fourier expansion of functions having points of discontinuity, examples and exercise 4Change of interval, half range series Parseval's identity for Fourier series
9	Chapter-5 Calculus of complex functions, stereographic projection of complex number, assignment and test
10	chapter-5 complex function or functions of complex variable, continuity of a complex function, uniform continuity, differentiability of complex function analytic function, C -R equation, harmonic function
11	chapter-6 Elementary functions and mobius transformation, properties of exponential function mapping by elementary functions, some elementary mapping
12	chapter -6 Conformal mapping, linear transformation critical points, mobius transformation
13	chapter-7 Critical mapping, linear functional transformation (definition and examples) Some more mappings (examples and exercises)
14	Take doubts of chapter 6 and 7
15	Division and problem discussion