Lesson Plan

Session: 2023-24

Name of the Assistant Professor: Bharat Kumar

Class: B.A./B.Sc. 2nd Semester

Subject: Mathemactics **Paper:** Vector Calculus

Dates	Week	Topics
01.01.2024 to 06.01.24	1	Chapter 1- multiple product of vectors, Triple product, geometrical interpretation of scalar triple product, theorem related vector volume of tetrahedron examples related vectors exercise 1.1 vector triple product example related vector triple product exercise 1.2
08.01.24 To 13.01.24	2	Scalar product of four vectors vector product of four vectors examples related for vectors exercise 1.3 reciprocal system of vectors properties of reciprocal system of vectors examples related reciprocal of vectors exercise 1.4
15.01.24 To 20.01.24	3	Chapter 2 differentiation of vectors Scalar function vector function scalar and vector field limit of a vector function theorem on continuity successive derivatives derivative of function
22.01.24 To 27.01.24	4	constant vector some important theorems related examples exercise 2.1Curve in space velocity and acceleration related example exercise 2.2 chapter 3 gradient divergence and curl partial derivative of vector functions higher order Partial derivatives rules for finding Partial derivatives of vectors related examples **Assignment 1**
29.01.24 To 03.02.24	5	exercise 3.1 the vector differential operator, Exercise 3.2-gradient of a scalar field properties of gradient.
05.02.24 To 10.02.24	6	Level surfaces directional derivative of a scalar point function equation of tangent plane and normal to level surface examples related exercise 3.3
12.02.24 To 17.02.24	7	divergence of a vector function properties of divergence examples exercise 3.4 Curl of a vector point function properties of curl related examples

Dates	Week	Topics
19.02.24 To 24.02.24	8	exercise 3.5 second order differential function Laplace operator harmonic function and related examples length in cylindrical coordinates
26.02.24 To 02.03.24	9	Gradient of the product of two scalar point function gradient of quotient of a two scalar function related example exercise 3.5 exercise 3.6 **Class Test 1**
04.03.24 To 09.03.24	10	Chapter 4- curvilinear coordinates co-ordinates surfaces and curves condition orthogonal unit vectors in earth organic curvy linear coordinates
11.03.24 To 16.03.24	11	Arc length volume element and area element volume element area element gradient divergence and curl in terms of curvilinear coordinates two special curvilinear system square of the element of Arc
18.03.24 To 22.03.24	12	cylindrical coordinates system in orthogonal, spherical coordinates square of an element of Arc length in spherical coordinates ,examples exercise 4.1 **Class Test 2**
01.04.24 To 06.04.24	13	Chapter 5 vector integration indefinite integral definite integral some standard result for integration examples exercise 5.1
08.04.24 To 13.04.24	14	Some basics line integrals related examples exercise 5.2Surface integral surface integral of vector function flux related examples exercise 5.3
15.04.24 To 20.04.24	15	Volume integrals examples related volume integrals Chapter 6 green and Stokes theorem Gauss divergence theorem divergence theorem in cartesian coordinates deduction from gas divergence theorem examples **Assignment 2**
22.04.24 To 30.04.24	16	Exercise 6.1 green theorem another form of green theorem system reduction of surface integral to line integral, Stokes theorem Stokes theorem in cartesian form cartesian form of Stokes theorem in space related Examples, Green theorem in plane is a special case of Stokes theorem examples exercise 6.2 **Class Test 3**

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Lesson Plan

Session: 2023-24

Name of the Assistant Professor: Bharat Kumar

Class: B.A./B.Sc. 4th Semester

Subject: Mathemactics Paper: Special functions and Integral Transformations

Dates	Week	Topics
01.01.2024 to 06.01.24	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
08.01.24 To 13.01.24	2	Chapter -1 Previous method of power series, discuss different cases of solution of power series examples and exercises **Assignment 1**
15.01.24 To 20.01.24	3	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.
22.01.24 To 27.01.24	4	Generating function for $J_n(x)$, representation of $J_n(x)$ in integral, Jacobi series, equations reducible to bessel equation, orthogonality relation of bessel function.
29.01.24 To 03.02.24	5	Chapter 3 Legende's equation (definition), solution of legendre's equation, Rodrigue's formula, derivation of legendre polynomial from Rodrigues formula, recurrence relation, orthogonality of legendre polynomial. **Class Test**
05.02.24 To 10.02.24	6	Chapter -4 Hermite's equation (definition), hermite polynomial, generating function for Hermite's polynomial, Rodrigue's formula for $H_n(x)$, recurrence relation, orthogonal property of Hermite's polynomial.
12.02.24 To 17.02.24	7	Chapter -5 Laplace transforms (definition), Laplace transform of some elementary functions, some standard results obtained by applying shifting property, function of exponential order, second shifting theorem, related examples. **Assignment 2**

Dates	Week	Topics
19.02.24 To 24.02.24	8	Laplace transform of derivatives, related examples, transform of a periodic function, Laplace transform of integrals, Laplace transform of some important functions,
26.02.24 To 02.03.24	9	Chapter -6 Inverse Laplace transform (definition), other methods for finding inverse transform, convolution theorem, related examples and exercise. Chapter -7 Useof Laplace transform in integral equations, example and exercise. **Class Test**
04.03.24 To 09.03.24	10	Chapter-8 Solution of differential equation by Laplace transformation.linear differential equation with constant coefficient by transform method,solution of ordinary differential equation with variable coefficients by transform method, solution of simultaneous linear equation with constant coefficient by transform method. **Assignment 3**
11.03.24 To 16.03.24	11	Chapter -9 Fourier transforms(definitiont), fourier sine transform & cosine transform, properties of Fourier transforms, example based on fourier sine and cosine transform.
18.03.24 To 22.03.24	12	Example based on the use of inverse transforms, convolution theorem fourier transform, fourier transform of the derivative, relation between fourier and Laplace transform.
01.04.24 To 06.04.24	13	Parseval's identity for fourier transform, Parseval's identity for fourier sine and cosine transform, finite sine and cosine transform.
08.04.24 To 13.04.24	14	Chapter-10 Solution of differential equation by fourier transforms. Method to solve different types of equations, related examples and exercise
15.04.24 To 20.04.24	15	Revision
22.04.24 To 30.04.24	16	**Class Test- All Syllabus**

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Lesson Plan

Session: 2023-24

Name of the Assistant Professor: Bharat Kumar

Class: B.A./B.Sc. 4th Semester

Subject: Mathemactics **Paper:** Sequence and Series

Dates	Week	Topics
01.01.2024 to 06.01.24	1	chapter1 topology of real numbers ,various definitions sets ,finite set ,infinite set ,interval ,subset, bounded above set ,and bounded above set ,bounded below set, unbounded below set, bounded set ,unbounded set, greatest element, least element ,least upper bound ,some theorems on supremum of a set, greatest lower bound or infimum, some theorems on infimum of a set
08.01.24 To 13.01.24	2	completeness axiom, archimedean property of reals, examples and exercise 1.1, neighbourhood of a point, deleted neighbourhood ,interior of a set ,open set, some theorems on open set, theorems on interior of a set, closed set, some theorems on closed sets ,examples and exercise 1.2. **Assignment 1**
15.01.24 To 20.01.24	3	limit point of a set ,isolated point ,adherent point ,closure of a set ,bolzano weierstrass theorem, some theorems on closure of a set, examples and exercise 1.3 ,compact set, Heine borel property, Heine borel theorem ,Converse of Heine borel theorem, example and exercise 1.4
22.01.24 To 27.01.24	4	chapter 2 sequences, definition of sequence, representation of a sequence ,methods to describe a sequence, range of a sequence,constant sequence convergent sequence, some theorems on convergent sequences, divergent sequence, oscillatory sequence ,null sequence ,examples and exercise 2.1 ,some basic theorems on limits ,Cauchy"s first theorem on limits.
29.01.24 To 03.02.24	5	Cauchy's second theorem on limits, examples and exercise 2.2 , monotonic sequence, monotone convergence theorem, nested sequence examples and exercise 2.3 ,limit point or cluster point ,some theorems on limit point, bolzano theorem, cauchy's sequence. **Class Test**
05.02.24 To 10.02.24	6	cauchy's general principle of convergence examples and exercise 2.4 subsequence ,theorems on subsequence.
12.02.24 To 17.02.24	7	chapter 3infinite series, definition of infinite series convergence and divergence of an infinite series ,oscillate finitely or infinite ,examples and theorems exercise 3.1 **Assignment 2**

Dates	Week	Topics
19.02.24 To 24.02.24	8	cauchy's general principle of convergence ,convergence or divergence of geometric series, general test for the convergence of positive term series, comparison test, hyper harmonic series or p-test series, class test of chapter 2
26.02.24 To 02.03.24	9	examples and exercise 3.2., chapter 4 infinite series continued, D'Alembert Ratio test, examples and exercise 4.1, cauchy's root test. examples and exercise 4.2 class test of chapter 3.
04.03.24 To 09.03.24	10	logarithmic test for the convergence of a series examples and exercise 4.3. De morgan's and Bertrand"s test. examples and exercise 4.4. gauss test exercise and examples, cauchy's integral test for the convergence of a series, Cauchy's condensation test. examples and exercise **Class Test**
11.03.24 To 16.03.24	11	chapter 5, alternating series, Leibnitz 's test for the convergence of alternating series. examples, absolute convergence ,conditional convergence, exercise 5.1, assignment 2
18.03.24 To 22.03.24	12	chapter 6 arbitrary series, Abel test, Dirichlet"s test, exercise and its examples of 6.1, insertion and removal of parenthesis, example and exercise 6.2, multiplication of series ,Cauchy's product, Mertin"s theorem, Cesaro's theorem. **Assignment 3**
01.04.24 To 06.04.24	13	Abel's theorem, infinite product, absolute convergence of an infinite product theorems and examples
08.04.24 To 13.04.24	14	exercise 7.1 and 7.2 class test of chapter 4
15.04.24 To 20.04.24	15	Revision
22.04.24 To 30.04.24	16	**Class Test- All Syllabus**

Bharat Kumar

Lesson Plan

Session: 2023-24

Name of the Assistant Professor: Bharat Kumar

Class: B.A./B.Sc. 6th Semester

Subject: Mathemactics **Paper:** Linear Algebra

Dates	Week	Topics
01.01.2024 to 06.01.24	1	Chapter 1: Vector spaces and subspaces, properties of vector spaces, subspaces, Exercise.
08.01.24 To 13.01.24	2	Chapter 1: Theorems on vector-subspaces, Examples, Linear sum of subspaces, Direct sum, Disjoint subspaces, Examples and Exercise. **Assignment 1**
15.01.24 To 20.01.24	3	Chapter 2: Linear combination of vectors, linear dependence and independence of vectors, Spanning sets, Basis of vector space, Ordered basis, Minimal generating set, Maximal linearly, Independent set.
22.01.24 To 27.01.24	4	Chapter 2: Dimensions of a vector space, Identical spaces complementary subspaces **Class Test**
29.01.24 To 03.02.24	5	Chapter 3: Quotient space, Dimension of quotient spaces, Test, Assignments-I
05.02.24 To 10.02.24	6.	Chapter 4: Linear transformations, Properties of L.T. vector space isomorphism, Find L.T. **Assignment 2**
12.02.24 To 17.02.24	7	Chapter 5: Null space, Range or Image of L.T., Fundamental theorem of vector space homomorphism, Rank and nullity of a L.T.

Dates	Week	Topics
19.02.24 To 24.02.24	8	Chapter 6: Algebra of L.T.,Sum of L.T., Composition of two L.T., Singular and non-singular L.T., Invertible L.T.
26.02.24 To 02.03.24	9	Chapter 7: Matrix of a L.T. relative to ordered basis, Matrices of identity and zero transformations change of basis **Class Test-Chapter 4**
04.03.24 To 09.03.24	10	Chapter 8: Dual space, Vector space of all L.T., Bidual of a Vector space, Test and assignment- II
11.03.24 To 16.03.24	11	Chapter 9: Eigen values and eigen vectors of a L.T., Eigen space, Simplar matrices, Diagonalisation, Minimal polynomial **Assignment 3**
18.03.24 To 22.03.24	12	Chapter 10: Inner product spaces, Normal of a vector, Triangle inequality, Schwarz inequality, Normal linear space, Examples and theorms.
01.04.24 To 06.04.24	13	Chapter 10: Orthonormal set, Bessel's inequality, Gram-schmidt orthogonalization process, Theorems and Exercise.
08.04.24 To 13.04.24	14	Chapter 11: Linear operations on inner product spaces, Adjoint operator , Same theorems on linear operators
15.04.24 To 20.04.24	15	Revision
22.04.24 To 30.04.24	16	**Class Test- All Syllabus**

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