Lesson Plan

Name: Prateek Mor

Class: B.Sc.- 1 (2nd Sem.)

Subject: Mathematics

Paper: Ordinary Differential Equations

April 2022	Unit I:	Geometrical meaning of a differential equation. Exact differential equations, integrating factors. First order higher degree equations solvable for x,y,p Lagrange's equations, Clairaut's equations. Equation reducible to Clairaut's form. Singular solutions. Problems discussion and revision of unit 1, Assignment 1 and Test 1.
May 2022	Unit 2:	Orthogonal trajectories: in Cartesian coordinates and polar coordinates. Self orthogonal family of curves.. Linear differential equations with constant coefficients. Homogeneous linear ordinary differential equations. Equations reducible to homogeneous. Problems discussion and revision of unit 2, Assignment 2 and Test 2.
June 2022	Unit 3:	Linear differential equations of second order: Reduction to normal form. Transformation of the equation by changing the dependent variable/ the independent variable. Solution by operators of non-homogeneous linear differential equations. Reduction of order of a differential equation. Method of variations of parameters. Method of undetermined coefficients. Problems discussion and revision of unit 3, Assignment 3 and Test 3.
July 2022	Unit 4:	Ordinary simultaneous differential equations. Solution of simultaneous differential equations involving operators x (d/dx) or t (d/dt) etc. Simultaneous equation of the form dx/P = dy/Q = dz/R. Total differential equations. Condition for Pdx + Qdy +Rdz = 0 to be exact. General method of solving Pdx + Qdy + Rdz = 0 by taking one variable constant. Method of auxiliary equations. Problems discussion and revision of unit 4, Assignment 4 and Test 4.

Books Recommended:

1. D.A. Murray: Introductory Course in Differential Equations. Orient Longaman (India) . 1967

2. A.R.Forsyth: A Treatise on Differential Equations, Machmillan and Co. Ltd. London.

3. E.A. Codington: Introduction to Differential Equations.

4. S.L.Ross: Differential Equations, John Wiley & Sons.

5. B.Rai & D.P. Chaudhary : Ordinary Differential Equations; Narosa, Publishing House Pvt. Ltd.

Lesson Plan

Name: Prateek Mor

Class: B.Sc.- 2 (4th Sem.)

Subject: Mathematics

Paper: Special Functions and Integral Transforms

April 2022	Unit I:	Series solution of differential equations – Power series method, Definitions of Beta and Gamma functions. Bessel equation and its solution: Bessel functions and their propertiesConvergence, recurrence, Relations and generating functions, Orthogonality of Bessel functions. Problems discussion and revision of unit 1, Assignment 1 and Test 1.
May 2022	Unit 2:	Legendre and Hermite differentials equations and their solutions: Legendre and Hermite functions and their properties-Recurrence Relations and generating functions. Orhogonality of Legendre and Hermite polynomials. Rodrigues' Formula for Legendre & Hermite Polynomials, Laplace Integral Representation of Legendre polynomial. Problems discussion and revision of unit 2, Assignment 2 and Test 2.
June 2022	Unit 3:	Laplace Transforms – Existence theorem for Laplace transforms, Linearity of the Laplace transforms, Shifting theorems, Laplace transforms of derivatives and integrals, Differentiation and integration of Laplace transforms, Convolution theorem, Inverse Laplace transforms, convolution theorem, Inverse Laplace transforms of derivatives and integrals, solution of ordinary differential equations using Laplace transform. Problems discussion and revision of unit 3, Assignment 3 and Test 3.
July 2022	Unit 4:	Fourier transforms: Linearity property, Shifting, Modulation, Convolution Theorem, Fourier Transform of Derivatives, Relations between Fourier transform and Laplace transform, Parseval's identity for Fourier transforms, solution of differential Equations using Fourier Transforms. Problems discussion and revision of unit 4, Assignment 4 and Test 4.

Books Recommended:

1. Erwin Kreyszing : Advanced Engineering Mathematics, John Wiley & Sons, Inc., New York, 1999

2. A.R. Forsyth : A Treatise on Differential Equations, Macmillan and Co. Ltd.

3. I.N. Sneddon : Special Functions on mathematics, Physics & Chemistry.

4. W.W. Bell : Special Functions for Scientists & Engineers.

5. I.N. Sneddon: the use of integral transform, McGraw Hill, 1972

6. Murray R. Spiegel: Laplace transform, Schaum's Series.

Lesson Plan

Name: Prateek Mor

Class: B.Sc.- 3 (6th Sem.)

Subject: Mathematics

Paper: Real and Complex Analysis

April 2022	Unit I:	Jacobians, Beta and Gama functions, Double and Triple integrals, Dirichlets integrals, change of order of integration in double integrals. Problems discussion and revision of unit 1, Assignment 1 and Test 1.
May 2022	Unit 2:	Fourier's series: Fourier expansion of piecewise monotonic functions, Properties of Fourier Co- efficients, Dirichlet's conditions, Parseval's identity for Fourier series, Fourier series for even and odd functions, Half range series, Change of Intervals. Problems discussion and revision of unit 2, Assignment 2 and Test 2.
June 2022	Unit 3:	Extended Complex Plane, Stereographic projection of complex numbers, continuity and differentiability of complex functions, Analytic functions, Cauchy-Riemann equations. Harmonic functions. Problems discussion and revision of unit 3, Assignment 3 and Test 3.
July 2022	Unit 4:	Mappings by elementary functions: Translation, rotation, Magnification and Inversion. Conformal Mappings, Mobius transformations. Fixed pints, Cross ratio, Inverse Points and critical mappings. Problems discussion and revision of unit 4, Assignment 4 and Test 4.

Books Recommended:

1. T.M. Apostol: Mathematical Analysis, Narosa Publishing House, New Delhi, 1985

2. R.R. Goldberg : Real analysis, Oxford & IBH publishing Co., New Delhi, 1970

3. D. Somasundaram and B. Choudhary : A First Course in Mathematical, Analysis, Narosa Publishing House, New Delhi, 1997

4. Shanti Narayan : A Course of Mathematical Analysis, S. Chand & Co., New Delhi

5. R.V. Churchill & J.W. Brown: Complex Variables and Applications, 5th Edition, McGraw-Hill, New York.

6. Shanti Narayan : Theory of Functions of a Complex Variable, S. Chand & Co., New Delhi.

Lesson Plan

Name: Prateek Mor

Class: B.Sc.- 1 (2nd Sem.)

Subject: Mathematics

Paper: Vector Calculus

April 2022	Unit 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. Problems discussion and revision of unit 1, Assignment 1 and Test 1.
May 2022	Unit 2:	Gradient of a scalar point function, geometr ical interpretation of grad F , 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. Problems discussion and revision of unit 2, Assignment 2 and Test 2.
June 2022	Unit 3:	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. Problems discussion and revision of unit 3, Assignment 3 and Test 3.
July 2022	Unit 4:	Vector integration; Line integral, Surface integral, Volume integral Theorems of Gauss, Green & Stokes and problems based on these theorems. Problems discussion and revision of unit 4, Assignment 4 and Test 4.

Books Recommended:

1. Murrary R. Spiegal : Theory and Problems of Advanced Calculus, Schaum Publishing Company, New York.

2. Murrary R. Spiegal : Vector Analysis, Schaum Publisghing Company, New York.

3. N. Saran and S.N. NIgam. Introduction to Vector Analysis, Pothishala Pvt. Ltd., Allahabad.

4. Shanti Narayna : A Text Book of Vector Calculus. S. Chand & Co., New Delhi.