Lesson Plan

Name: Dr. Anup Singh (Ext. Lecturer Mathematics)

Subject: Mathematics

Paper 1 (MMATH20-205: ORDINARY DIFFERENTIAL EQUATIONS)

Class and Section: M.Sc.-1st (2nd Sem.)

Jan 2024	Unit 1:	Understand preliminary, oscillation and Sturm' theory of second order ordinary differential equations and comparison theorems. Apply this knowledge to solve problems of checking second order ODEs for oscillatory, finding common zeros and applying Prüffer transformation. Problems discussion and revision of unit 1, Assignment 1 and Test 1.
Feb 2024	Unit 2:	Have good understanding of boundary value problems of second order, their classification and solution. Appreciate the concept of Green's function. Attain skills to solve boundary value problems which find great applications in areas of applied mathematics, science and engineering. Problems discussion and revision of unit 2, Assignment 2 and Test 2.
March 2024	Unit 3:	Know critical points of linear and non-linear system of differential equations, their types and stability. Understand concepts of potential energy function, limit cycles, semi orbit and limit sets. Apply the gained knowledge to determine type and stability of critical points and check for existence of limit cycles of given systems. Have a foundation to understand area of non-linear analysis of dynamical systems where mathematics and space science connect to each other. Problems discussion and revision of unit 3, Assignment 3 and Test 3.
April-May 2024	Unit 4:	Understand stability of linear, quasi-linear and non-linear systems. Learn to apply Lyapunov direct method to determine stability of such systems for investigating and solving problems. Problems discussion and revision of unit 4, Assignment 4 and Test 4.

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Name: Dr. Anup Singh (Ext. Lecturer Mathematics)

Subject: Mathematics

Paper 1:(MMATH20-204: COMPLEX ANALYSIS)

Class and Section: M.Sc.-1st (2nd Sem.)

Jan 2024	Unit I:	Analytic functions; Harmonic functions; Reflection principle: Elementary functions: Exponential, Logarithmic, Trigonometric, Hyperbolic, Inverse trigonometric , Inverse hyperbolic, Complex exponents: Complex Integration: Definite integral; Contours; Branch cuts. Problems discussion and revision of unit 1, Assignment 1 and Test 1.
Feb 2024	Unit 2:	Cauchy-Goursat theorem; Simply/ multiply connected domains: Cauchy integral formula; Morera's theorem; Liouville's theorem; Fundamental theorem of algebra; Maximum modulus principle: Power series: Taylor series; Laurent series; Uniform/ absolute convergence.
March 2024	Unit 3:	Differentiation, integration, multiplication, division of power series; Singularities; Poles; Residues; Cauchy's residue theorem; Zeros of an analytic function; Evaluation of improper integrals; Jordan's lemma.
April-May 2024	Unit 4:	Indented paths; Integration along a branch cut; Definite integrals involving sines and cosines; Winding number of closed curve: Argument principle; Rouche's theorem; Schwarz Lemma ; Transformations: linear, bilinear (Mobius), sine, z2, z1/2 ; Mapping: Isogonal; Conformal; Scale factors; Local inverses: harmonic conjugates

Class and Section: B.A.-1st (2nd Sem.)

Subject: Mathematics

Paper 1:(CC M– 2: BasicAlgebra)

Feb 2024	Unit I:	Symmetric, Skew symmetric, Hermitian and skew Hermitian matrices, Elementary operations on matrices, Rank of a matrix, Inverse of a matrix,
March 2024	Unit 2:	Relations between the roots and coefficients of general polynomial equation in one variable, Problems discussion and revision of unit 1, Assignment 1 and Test 1.
April 2024	Unit 3:	Applications of matrices to a system of linear (both homogeneous and non–homogeneous) equations, Theorems on consistency of a system of linear equations.
May 2024	Unit 4:	Relations between the roots and coefficients of general polynomial equation in one variable, Solutions of polynomial equations having conditions on roots.

Problems discussion and Revision of Unit 4
Assignment 2 and Test.

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Lesson Plan

Name: Dr. Anup Singh (Ext. Lecturer Mathematics)
Class and Section: B.A/B.Sc.-1st (2nd Sem.)
Subject: Mathematics
Paper 1:(CC – 2: Algebra and Number Theory)

Feb 2024	Unit 1:	Symmetric, Skew symmetric, Hermitian and skew Hermitian matrices, Elementary operations on matrices, Rank of a matrix. Inverse of a matrix, Linear dependence and independence of rows and columns of matrix. Row rank and column rank of a matrix, Eigen values, Eigen vectors and characteristic equation of a matrix, Minimal polynomial of a matrix. Cayley-Hamilton theorem and its use in finding the inverse of a matrix. Unitary and orthogonal matrices.
March 2024	Unit 2:	Relations between the roots and coefficients of general polynomial equation in one variable. Solutions of polynomial equations having conditions on roots. Common roots and multiple roots, Transformation of equations, Nature of the roots of an equation, Descarte's rule of signs Problems discussion and revision of unit 1, Assignment 1 and Test 1.
April2024	Unit 3:	Solutions of cubic equations (Cardon's method), Biquadratic equations and their solutions. Divisibility, Greatest common divisor (gcd), Least common multiple (lcm), Prime numbers, Fundamental theorem of arithmetic.
May 2024	Unit 4:	Linear congruences, Fermat's theorem, Euler's theorem, Wilson's theorem and its converse, Chinese Remainder theorem, Linear Diophantine equations in two variables. Problems discussion and revision of unit 2, Assignment 2 and Test 2.

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