Lesson Plan

Name: Anup Singh (Ext. Lecturer Mathematics)
Paper 4 :(MM-511: Mathematical Aspect of Seismology)
Class and Section: M.Sc.- 2nd (4 Sem.)

Feb 2023	Unit 1:	Introduction to Seismology: Earthquakes, causes of earthquakes; Elastic rebound theory, Location of earthquakes, Strength of earthquakes; Earthquake magnitude and intensity, Observation of earthquakes; Seismograms, Seismometers, Earthquake Focal Mechanisms, Energy released by earthquakes, Seismic waves as probes of Earth's interior. General form of progressive waves, Harmonic waves, Plane waves, Wave equation. Principle of superposition, Stationary waves. Special types of solutions: Progressive and Stationary type solutions of wave equation in Cartesian, cylindrical and spherical coordinate systems.
March 2023	Unit 2:	Equation of telegraphy. Exponential form of harmonic waves. D'Alembert formula. Inhomogeneous wave equation, Boundary conditions and mixed problems, Extension of solutions by reflection. Doppler Effect, Beats, Amplitude modulation, Dispersion, Group velocity, Relation between phase velocity and group velocity, Motion of wave packets.
April 2023	Unit 3:	Seismic waves: Reduction of equation of motion to wave equations. P and S waves and their characteristics. Polarization of plane P and S waves; Wave potentials. Energy in a plane wave. Snell's law of reflection and refraction. Ray parameter and slowness. Reflection of plane P and SV waves at a free surface. Partition of reflected energy. Reflection at critical angles. Reflection and reflection of plane P, SV and SH waves at an interface.
May 2023	Unit 4:	Surface waves: Rayleigh waves, Love waves and Stoneley waves. (Relevant articles from the book, Elastic waves in Layered Two-dimensional Lamb's problems in an isotropic elastic solid: Area sources and Line Sources in an unlimited elastic solid. A normal force acts on the surface of a semi-infinite elastic solid Three-dimensional Lambs problems in an isotropic elastic solid: Area sources and Point sources in an unlimited elastic solid, Area source and Point source on the surface of semi-infinite elastic solid. Haskell matrix method for Love waves in multilayered medium.

10/02/2025

Lesson Plan

Name: Anup Singh (Ext. Lecturer Mathematics)
Class and Section: M.Sc.-1st (2nd Sem.)
Subject: Computer Programming with MATLAB
Paper 3:(M24-MAT-205: MATLAB)

Feb 2023	Unit 1:	Introduction: Basics of programming; Anatomy of a program; Constants; Characters; Variables; Data types; Assignments; Operators; functions; Examples of expressions; Entering long statements; Command line editing. Good programming style. Working with vectors: Defining a Vector, accessing elements within a vector, Basic operations on vectors; Mathematical functions; Strings; String functions; Cell array; Creating cell array; Concatenation. Working with Matrices: Generating matrices; Mathematical operations and functions; Deleting rows /columns; Linear algebra; Arrays; Multivariate data; Scalar expansion; Logical subscripting; Input and output: Save/Load functions, M-files, the find function; The format function; Suppressing output;
March 2023	Unit 2:	Flow Control: if and else, switch and case, for loop, while loop, continue, break, try – catch, return. Data Structures: Multidimensional arrays; Cell arrays, Characters and text; Structures, Scripts and Functions: Scripts; Functions; Types of functions; Global variables; Passing string arguments to functions; The eval function; Function handles; Function functions; Vectorization.
April 2023	Unit 3:	Graphics: Plotting process; Graph components; Figure tools; Arranging graphs within a figure; Selecting plot types; Plot editing mode, using functions to edit graphs; Modifying a graph data source; Modify a graph to enhance the presentation; Printing a graph; Exporting a graph. Basic Plotting Functions: Creating a plot; Multiple data sets in one graph; Specifying line styles and colors; Plotting lines and markers; Imaginary and complex data; Adding plots to existing graph; Figure windows; Multiple plots in one figure; Controlling the axes; Axis labels and titles; Saving figures.
May 2023	Unit 4:	Symbolic Math: Symbolic objects; Creating symbolic variables and expressions; The find sym Command; The default symbolic variable; Constructing real and complex variables; Creating abstract functions; Creating symbolic math functions; Creating an M-file.

10/02/2025

Lesson Plan

Name: Dr. Anup Singh (Ext. Lecturer Mathematics)
Class and Section: B.Sc.-2ⁿᵈ (4ᵗʰ Sem.) and B.A.-2ⁿᵈ (4ᵗʰ Sem.)
Subject: Mathematics
Paper 1:(B23-MAT-401: Analytical Geometry & Vector Calculus)

Feb 2025	Unit 1:	General equation of second degree: Classification of conic sections; centre, asymptotes, axes, eccentricity, foci and directrices of conics. Tangent at any point to a conic, chord of contact, pole of line to a conic, director circle of a conic. Polar equation of a conic, tangent and normal to a conic, confocal conics.
March 2025	Unit 2:	Sphere: General form, Plane section of a sphere. Sphere through a given circle. Intersection of two spheres, tangent plane and line, polar plane and line, orthogonal spheres, radical plane of two spheres and co-axal system of spheres
April 2025	Unit 3:	Cylinder: Right circular cylinder and enveloping cylinder. Central Conicoid: Equation of tangent plane. Director sphere. Normal to the conicoid
May 2025	Unit 4:	Scalar and Vector product of three vectors, four vectors, reciprocal vectors, vector differentiation and derivative along a curve, Vector integration: line integral, surface integral and volume integral. Theorem of Gauss, Green, Stoke and problems based on these.

Paper 2 (B23-MAT-201: Algebra and Number Theory)

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

Feb 2023	Unit I:	Symmetric, skew symmetric, Hermitian and skew Hermitian matrices, Elementary operations on matrices, 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 2023	Unit 2:	Relations between the roots and coefficients of general polynomial equation in one variable, Transformation of equations, Nature of the roots of an equation, Descarte's rule of signs.
April 2023	Unit 3:	Solutions of cubic equations (Cardon's method), Biquadratic equations and their solutions
May 2023	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.

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