Vector Calculus

January:

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.

Febuary:

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

March:

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 co-ordinates.

April:

Vector integration; Line integral, Surface integral, Volume integral. Theorems of Gauss, Green & Stokes and problems based on these theorms.

Sequence and Series

January:

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.

Febuary:

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:

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:

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, re-arrangement 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.

B.Sc./B.A. – 6th Semester
Session 2023-24

Dr. Naveen Kumar, Assistant Professor, Department of Mathematics   Even Semester

<u>Real and Complex Analysis</u>

<u>Januray</u>:

Jacobians, Beta and Gama functions, Double and Triple integrals, Dirichlets integrals, change of

order of integration in double integrals.

<u>Febuary</u>:

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.

<u>March</u>:

Extended Complex Plane, Stereographic projection of complex numbers, continuity and

differentiability of complex functions, Analytic functions, Cauchy-Riemann equations.

Harmonic functions.

<u>April</u>:

Mappings by elementary functions: Translation, rotation, Magnification and Inversion.

Conformal Mappings, Mobius transformations. Fixed pints, Cross ratio, Inverse Points and

critical mappings.

B.Com. – 2nd Semester
Session 2023-24

Dr. Naveen Kumar, Assistant Professor, Department of Mathematics   Even Semester

Business Mathematics-II

January:

Matrices and Determinants: Definition of a Matrix ; Types of Matrices, Algebra of Matrices; Calculation of values of Determinants up to third order; adjoint of a Matrix, elementary row and column operations; Finding inverse matrix through adjoint and elementary row or column operations; Solution of a system of Linear equations having unique Solution and involving not more than three variables

Febuary:

Differentiation (only algebraic problem) ; Application of differentiation

March:

Compound Interest and Annuities: Certain different types of interest rate; Concept of present value and amount of a sum; Types of annuities; Present value and amount of an annuity, including the case of continuous compounding

April:

Ratio, Proportion and Percentage; Profit and Loss