

Dr. Ram Manohar Lal Avadh University Faizabad
Syllabus of B.A. /B.Sc. Mathematics (for affiliated colleges)

B.A.II /B.Sc. II (Mathematics)
(From 2018-19 onwards)
2019-20

Paper I: Linear Algebra and Matrices

Marks: 65

Linear Algebra

Unit 1. Vector spaces and their elementary properties, Subspaces, Linear dependence and independence, Basis and dimension, Linear Sum, Direct sum, Quotient space.

Unit 2. Linear transformations and their algebra, Range and null space, Rank and nullity, Matrix representation of linear transformations, Change of basis.

Unit 3. Linear functional, Dual space, Bi-dual space, Natural isomorphism, Annihilators, Inner product spaces, Cauchy-Schwarz's inequality, Bessel's inequality. Bilinear and quadratic forms.

Matrices

Unit 4. Symmetric and skew-symmetric matrices, Hermitian and skew-Hermitian matrices, Orthogonal and unitary matrices, Triangular and diagonal matrices, Elementary transformations, Echelon and normal forms, Inverse of a matrix by elementary transformations. Rank of a matrix.

Unit 5. Application of matrices to solve a system of linear (both homogeneous and non-homogeneous) equations, Consistency and general solution, Characteristic equation, Eigen values and eigen vectors of a matrix, Cayley-Hamilton's theorem and its use in finding inverse of a matrix, Diagonalization of matrices.

B.A.II /B.Sc. II (Mathematics)

Paper II: Differential Equations and Integral Transforms

Marks: 65

Differential Equations

Unit 1. Formation of a differential equation (D.E.), Degree, order and solution of a D.E., Equations of first order and first degree: Separation of variables method, Solution of homogeneous equations, linear equations and exact equations. Linear differential equations with constant coefficients, Homogeneous linear differential equations.

Unit 2. Differential equations of the first order but not of the first degree, Clairaut's equations and singular solutions, Orthogonal trajectories, Simultaneous linear differential equations with constant coefficients. Linear differential equations of the second order (including the method of variation of parameters).

Unit 3. Order, degree and formation of partial differential equations, Partial differential equations of the first order, Lagrange's equations, Charpit's general method, Linear partial

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differential equations with constant coefficients. Partial differential equations of the second order, Monge's method.

Unit 4. Integral transforms and kernel, Linearity property of transforms, Laplace transform and elementary properties of Laplace transform, Inverse Laplace transform, Convolution theorem, Applications of Laplace transform to solve differential equations.

Unit 5. Fourier transforms (Finite and Infinite) and elementary properties of Fourier transform, Fourier integral, Inverse Fourier transform Applications of Fourier transform to boundary value problems.

B.A.II /B.Sc. II (Mathematics)

Paper III: Mechanics

Marks: 70

Dynamics

Unit 1. Velocity and acceleration along radial and transverse directions, and along tangential and normal directions, Simple harmonic motion, Motion under other laws of forces. Earth attraction, Elastic strings.

Unit 2. Motion in resisting medium, Constrained motion (circular and cycloidal only).

Unit 3. Motion on smooth and rough plane curves, Rocket motion, Central orbits and Kepler's law, Motion of a particle in three dimensions.

Statics

Unit 4. Common catenary, Virtual work, Centre of gravity, Stable and unstable equilibrium.

Unit 5. Forces in three dimensions, Poinsot's central axis, Wrenches, Null line and null plane.

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