

Department of Higher education, Govt. of M.P.
Semester wise Syllabus for Undergraduates
As recommended by Central board of Studies and
Approved by HE the Governor of M.P.

Class - B.Sc./ B.A.

Subject - Mathematics - I

Paper Title - Matrices, Theory of Equations and Trigonometry

Semester – I

MM-50

Unit – I

Linear independence of row and column matrices , Row rank & column rank of a matrix.
equivalence of

column and row rank. Eigen values, eigen vectors.

Unit – II

Characteristic equation of a matrix. Cayley Hamilton theorem and its use in finding
inverse of matrix.

Application of matrix to a system of linear (both homogenous and non - homogenous)
equations. Theorem on
consistency and inconsistency of a system of linear equation. Solving the linear equation
with three unknowns.

Unit – III

Relation between the roots and coefficients of general polynomials in one variable.

Transformation of

equations, Descarte's rule of signs.

Unit – IV

Solution of cubic equation (Cardon Method). De Moivre's theorem and its application.

Unit – V

Direct and inverse circular and hyperbolic functions, Logarithm of a complex quantity,
Expansion of trigonometrical function. (Gregory's Series, Summation of Series)

Texts Books :

1. S.L. Loney – Plane Trigonometry Part II
2. K.B. Datta – Matrix and Linear Algebra Prentice Hall of India Pvt. New Delhi 2000
3. Chandrika Prasad – A Text Book on Algebra and Theory of Equations, Pothishala Pvt. Ltd. Allahabad

Reference Books:

1. P. B. Bhattacharya, S. K. Jain and S.R. Nagpaul, First Courses in Linear Algebra, Wiley Eastern, New Delhi. 1983.
2. S. K. Jain, A. Gunewardena and P. B. Bhattacharya, Basic Linear Algebra with MATLAB, Key College Publishing, 2001. Allahabad
3. H.S. Hall and S.R. Knight, Higher Algebra, H.M. publication, 1994.
4. R.S. Verma and K.S. Shukla, Text Book on Trigonometry Pothishala Pvt. Ltd.

Department of Higher education, Govt. of M.P. Semester wise Syllabus for Undergraduates As recommended by Central board of Studies and Approved by HE the Governor of M.P.

Class - B.Sc./ B.A.

Subject - Mathematics - II

Paper Title - Calculus

Semester – I

MM-50

Unit – I

Concept of Partial differentiation, Successive differentiation, Leibnitz theorem, Maclaurin and Taylor series expansions.

Unit – II

Asymptotes and Curvature, Tests for concavity and convexity, points of inflexion. Multiple points.

Unit – III

Tracing of curves in cartesian and polar co-ordinates. Integration of irrational algebraic functions and transcendental functions.

Unit – IV

Reduction formulae, Definite Integrals.

Unit – V

Quadrature, Rectification, Volumes and Surfaces of solids of revolution of curves.

Texts Books :

1. Gorakh Prasad – Differential Calculus, Pothishala pvt. Ltd. Allahabad

2. Gorakh Prasad – Integral Calculus, Pothishala pvt. Ltd. Allahabad

Reference Books:

1. Gabriel Klambauer, Mathematical Analysis Marcel Dekkar, Inc. New York, 1975.

2. Murray R. Spiegel, Theory & problems of Advanced Calculus. Schaum's outline series, Schaum Publishing Co. New York.

3. P.K. Jain and S. K. Kaushik, An introduction of Real Analysis, S.Chand & Co. New Delhi 2000.

4. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, 1999.

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Class - B.Sc./ B.A.

Subject - Mathematics - III

Paper Title - Geometry

Semester – I

MM-50

Unit – I

General equation of second degree. Tracing of conics.

Unit – II

System of conics, Confocal conics, Polar equation of a conic.

Unit – III

Equation of cone with given base, generators of cone, condition for three mutually perpendicular generators, Right circular cone.

Unit – IV

Equation of Cylinder and its properties. Right circular cylinder, enveloping cylinder and their properties.

Unit – V

Central conicoids, Paraboloids. Plane sections of Conicoids.

Texts Books :

1. N. Saran & R.S. Gupta : Analytical Geometry of Three dimensions. Pothishala Pvt. Ltd. Allahabad
2. S.L. Loney, Elements of Coordinate Geometry, Macmillan and Co. London.

Reference Books:

1. P.K. Jain & Khalil Ahmad, A text book of Analytical Geometry of Two Dimensions, Wiley Eastern Ltd. 1994
2. P.K. Jain & Khalil Ahmad, A text book of Analytical Geometry of Three Dimensions, Wiley Eastern Ltd. 1999
3. R.J.T. Bell : Elementary Treatise on Coordinate Geometry of Three dimensions, Macmillan India Ltd. 1994.

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Class - B.Sc./ B.A.

Subject - Mathematics - I

Paper Title - Elementary Abstract Algebra

Semester – II

MM-50

Unit – I

Definition and basic properties of group. Order of an element of a group. Residue classes Modulo,

Congruence relation. Subgroups, algebra of subgroups.

Unit – II

Cyclic groups, simple properties. Coset decomposition and related theorems. Lagrange's theorem and

its consequences, Fermat's theorem and Euler's theorem.

Unit – III

Normal subgroups, Quotient groups, Homomorphism and isomorphism of groups, kernel of

Homomorphism. Fundamental theorem of homomorphism of groups.

Unit – IV

Permutation groups (even and odd permutations) Alternating groups A_n , Cayley's theorem.

Unit – V

Introduction to rings, subrings, integral domains and fields, with simple properties and examples. Characteristic of a ring.

Text Books :

1. I. N. Herstein – Topics in Algebra, Wiley Eastern Ltd. New Delhi 1977

Reference Books:

1. P.B. Bhattacharya, S.K. Jain and S.R. Nagpaul, Basic Abstract Algebra, Wiley Eastern, New Delhi, 1997.

2. I. S. L.uther and I.B. S. Passi, Algebra Vol- I , II, Narosa Publishing House.

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Class - B.Sc./ B.A.

Subject - Mathematics - II

Paper Title - Differential Equations (Part – I)

Semester – II

MM – 50

Unit – I

Linear equations and equations reducible to the linear form, Exact differential equations..

Unit – II

First order higher degree equations for x, y, p , Clairaut's form and singular solutions.

Unit – III

Geometrical meaning of a differential equation, Orthogonal trajectories, Linear differential equations with constant coefficients.

Unit – IV

Homogenous linear ordinary differential equations, linear differential equations of second order.

Transformation of the equation by changing the dependent variable and the independent variable.

Unit – V

Method of variation of parameters, Ordinary simultaneous differential equations.

Text Books :

1. D.A. Murray : Introductory Course in Differential Equations, Orient Long man, India 1967.

2. Gorakh Prasad : Integral Calculus, Pothishala Pvt. Ltd., Allahabad.

Reference Books:

1. G. F. Simmons, Differential Equations, Tata Mcgraw Hill, 1972.

2. E.A. Codington, An introduction to ordinary differential equations, Prentice Hall of India 1961.

3. H.T.H. Piaggio, Elementary Treatise on Differential equations and their applications, C.B.S. Publisher and Distributors, Delhi 1985.
4. W.E. Boyce and P.C. Dippa, Elementary Differential equations & Boundary Value problems, John Wiley 1986.
5. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons 1999.

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Class - B.Sc./ B.A.

Subject - Mathematics - III

Paper Title - Vector Analysis and Vector Calculus

Semester - II

MM-50

Unit - I

Scalar and Vector product of three vectors, Product of four vectors, Reciprocal vectors.

Unit - II

Vector differentiation. Gradient, Divergence and Curl.

Unit - III

Vector integration, Theorem of Gauss (without proof) and problems based on it.

Unit - IV

Theorem of Green's (without proof) and problems based on it.

Unit - V

Stoke's theorem (without proof) and problems based on it.

Text Book :

1. N. Saran & S.N. Nigam - Introduction to Vector Analysis, Pothishala Pvt. Ltd., Allahabad

Reference Books:

1. Murray R. Spiegel, Vector Analysis, Schaum Publishing Co. New York.
2. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons 1999.
3. Shanti Narayan, A text book of Vector Calculus, S. Chand & Co., New Delhi

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Class - B.Sc./ B.A.

Subject - Mathematics - I

Paper Title - Advanced Calculus (Part I)

Semester – III

MM-50

Unit – I

Definition of a sequence. Theorems on limits of sequences. Bounded and monotonic sequences. Cauchy's convergence criterion.

Unit – II

Series of non-negative terms. Comparison test, Cauchy's integral test, Ratio test. Raabe's test, logarithmic test, De-Morgan and Bertrand's test (without proofs). Alternating series. Leibnitz's theorem. Absolute and conditional convergence.

Unit – III

Continuity of functions of one variable , sequential continuity. Properties of continuous functions. Uniform continuity.

Unit – IV

Chain rule of differentiability. Mean value theorems and their geometrical interpretations. Darboux's intermediate value theorem for derivatives.

Unit – V

Limit and continuity of functions of two variables

Texts Books :

1. R.R. Goldberg, Real Analysis, I.B.H. Publishing Co. New Delhi, 1970.
2. Gorakh Prasad, Differential Calculus, Pothishala Pvt. Ltd. Allahabad.

Reference Books:

1. T.M. Apostol Mathematical Analysis Narosa Publishing House New Delhi 1985.
2. Murray R. Spiegel, Theory and Problems of Advanced Calculus, Schaum Publishing Co. New York.
3. N. Piskunov, Differential and Integral Calculus , Peace Publishers, Moscow.
4. S.C. Malik, Mathematical Analysis, Wiley Eastern Ltd. New Delhi.

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Class - B.Sc./ B.A.

Subject - Mathematics - II

Paper Title - Differential Equations (Part – II)

Semester – III

MM – 50

Unit – I

Series Solution of Differential Equations-Power series Methods, Bessel's Equations
Bessel's function and its Properties, recurrence and generating relations.

Unit – II

Legendre's Equations, Legendre's function and its properties, recurrence and generating
relations.

Unit – III

Orthogonality of functions, Sturm-Liouville problem. Orthogonality of eigen functions,
reality of
eigen value.

Unit – IV

Laplace transformations. Linearity of the Laplace transformation. Existence theorem of
Laplace
transforms, Laplace transforms for derivatives and integrals. Shifting theorem.

Unit – V

Differentiation and integration of transforms. Inverse Laplace transforms, Convolution
theorem.

Applications of Laplace transformation in solving linear differential equations with
constant coefficients.

Text Books :

1. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & sons, 1999
2. R.V. Churchill, Fourier series and boundary value problem.

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Subject - Mathematics - III

Paper Title - Mechanics Part - I

Semester – III

MM-50

Unit – I

Analytical conditions of equilibrium of Coplanar forces.

Unit – II

Virtual work, catenary.

Unit – III

Forces in three dimensions, Poinsot's central axis.

Unit – IV

Stable and unstable equilibrium, Null lines and planes.

Unit – V

Velocities and accelerations along radial and transverse direction, and along tangential and normal directions.

Texts Books :

1. S.L. Loney, Statics, Macmillan & Co. London

2. S.L. Loney, An Elementary Treatise on the Dynamics of a Particle and of Rigid Bodies, Cambridge Uni. Press 1956.

Reference Book:

1. R.S. Verma, A Text Book on Statics, Pothishala Pvt. Ltd., Allahabad