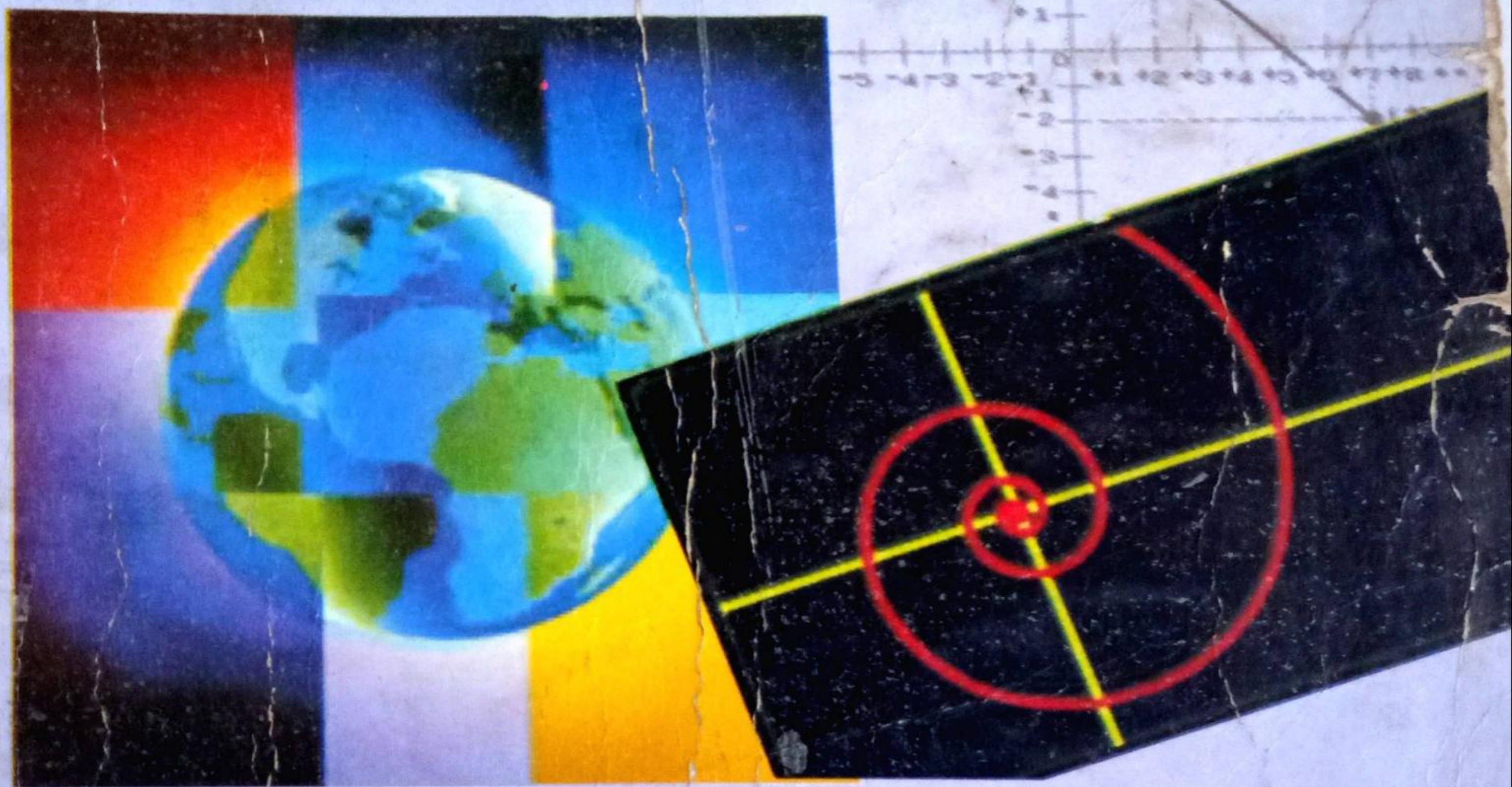


New College

Algebra

B.A. / B.Sc. I



JEEVANSONS PUBLICATIONS

SYLLABUS

B. Sc. 1st Year

FIRST SEMESTER

ALGEBRA : (BM - 111)

Kurukshetra University, Kurukshetra

Maximum Marks : 50

Time Allowed : 3 Hours

Section - I

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 matrices. Row rank and column rank of a matrix. Eigen values, eigen vectors and the characteristic equation of a matrix. Minimal polynomial of a matrix. Cayley Hamilton theorem and its use in finding inverse of a matrix.

Section - II

Applications of matrices to a system of linear (both homogeneous and non-homogeneous) equations. Theorems on consistency of a system of linear equations. Unitary and Orthogonal Matrices, Bilinear and Quadratic forms.

Section - III

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.

Section - IV

Nature of the roots of an equation. Descartes's rule of signs. Solutions of cubic equations (Cardan's method). Biquadratic equations and their solutions.

Note. The examiner is requested to set **nine questions** in all, selecting two questions from each section and **one compulsory question** consisting of five parts distributed over all the four sections. Candidates are required to attempt five questions, selecting at least one question from each section and the compulsory question.

SYLLABUS

B. Sc. 1st Year

FIRST SEMESTER

ALGEBRA (BM - 111)

Maharishi Dayanand University, Rohtak

Maximum Marks : 45

Time Allowed : 3 Hours

Section - I (3 Questions)

Symmetric and Skew-symmetric matrices, Hermitian and Skew-Hermitian matrices, Orthogonal and Unitary matrices, Elementary operations on matrices. Inverse of a matrix. Linear independence of rows and columns matrices. Row rank, column rank and rank of a matrix. Equivalence of column and row ranks.

Section - II (2 Questions)

Eigen values, eigen vectors and the characteristic equation of a matrix. Cayley Hamilton theorem and its use in finding inverse of a matrix. Applications of matrices to a system of linear (both homogeneous and non-homogeneous) equations. Theorems on consistency of a system of linear equations.

Section - III (3 Questions)

Relation 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. Descarte's rule of signs. Solution of cubic equations (Cardan's method) and Biquadratic equations (Descarte's and Ferrari's Methods).

eight

Note. The examiner is requested to set **eight questions** in all, selecting questions section wise as indicated in the syllabus. The candidate is required to attempt five questions selecting at least one question from each section.

SYLLABUS

B. A. 1st Year PAPER I

Maharishi Dayanand University & Kurukshetra University

ALGEBRA & TRIGONOMETRY

ALGEBRA

Section - I (3 Questions)

Symmetric, Skew-symmetric, Hermitian and Skew-Hermitian matrices. Elementary operations on matrices. Inverse of a matrix. Linear independence of row and column matrices. Row rank, column rank and rank of a matrix. Equivalence of column and row ranks. Eigen values, eigen vectors and the characteristic equation of a matrix. Cayley Hamilton theorem and its use in finding inverse of a matrix. Applications of matrices to a system of linear (both homogeneous and non-homogeneous) equations. Theorems on consistency of a system of linear equations.

Section - II (2 Questions)

Relations between the roots and coefficients of general polynomial equation in one variable. Transformation of equations. Descartes's rule of signs. Solution of cubic equations (Cardan method) and Biquadratic equations (Descartes's and Ferrari's Methods).

Section - III (3 Questions)

Mappings. Equivalence relations and partitions. Congruence modulo n . Definition of a group with examples and simple properties. Subgroups. Generation of groups. Cyclic groups. Coset decomposition. Lagrange's theorem and its consequences. Fermat's and Euler's theorem. Homomorphism and Isomorphism. Normal subgroups. Quotient groups. The fundamental theorem of homomorphism. Permutation groups. Even and odd permutations. The alternating groups A_n . Cayley's theorem. Introduction to rings, Subrings, integral domains and fields. Characteristic of a ring.

TRIGONOMETRY

Section - IV (2 Questions)

DeMoivre's theorem and its applications. Direct and inverse circular and hyperbolic functions. Logarithm of a complex quantity. Expansion of trigonometrical functions. Gregory's Series. Summation of series.

Note : The examiner is requested to set **ten questions** in all selecting questions sectionwise as indicated in the syllabus. The candidate is required to attempt five questions selecting at least one question from each section.

N.B. The present book covers Section I and II of the above syllabus for B.A. 1st Year students. Section III and IV are covered in the book New College Modern Algebra & Trigonometry which is available separately.

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Chapter	Pages
✓ 1. Matrices ✓	1 – 32
✓ 2. Orthogonal And Unitary Matrices	33 – 41
✓ 3. Rank of a Matrix	42 – 90
✓ 4. Characteristic Equation of a Matrix ✓	91 – 121
✓ 5. Applications of Matrices to a System of Linear Equations ✗	122 – 141
6. Bilinear and Quadratic Forms	142 – 172
7. Relation Between the Roots and Coefficients of an Equation	173 – 209
8. Transformation of Equations	210 – 242
✓ 9. Solution of Cubic and Biquadratic Equations ✓	243 – 264
✓ 10. Descarte's Rule of Signs	265 – 269

Note For B.A. Students :

The above chapters constitute Section I and Section II of the Syllabus. For Section III and IV, a separate book titled '**New College Modern Algebra & Trigonometry**' is available separately.