

**Intermediate II YEAR - MATHEMATICS IIA
(ALGEBRA AND PROBABILITY)**

ALGEBRA, PROBABILITY: (125 Periods)

- 1) Quadratic Expressions 10 Periods
- 2) Theory of Equations 12 Periods
- 3) Matrices 24 Periods
- 4) Permutations and Combinations 18 Periods
- 5) Binomial Theorem 16 Periods
- 6) Partial fractions 6 Periods
- 7) Exponential and Logarithmic series 6 Periods

PROBABILITY:

- 8) Probability 18 Periods
 - 9) Random variable and distributions 12 Periods
- Total: 125 Periods

**INTERMEDIATE SECOND YEAR SYLLABUS.
MATHEMATICS-IIA**

ALGEBRA

1: QUADRATIC EXPRESSIONS: 10 PERIODS

1.1 Quadratic Expressions, Equations in one Variable, Extreme Values – Changes in sign and Magnitude – Quadratic Inequality.

2: THEORY OF EQUATIONS: 12 PERIODS

- 2.1 The relation between the roots and coefficients in an equation
- 2.2 Solving the equation when two or more roots of it are connected by certain relations
- 2.3 Equations with real coefficients, imaginary roots occur in conjugate pairs and its consequences.
- 2.4 Transformation of equations, Reciprocal equations

3: MATRICES: 24 PERIODS

3.1 Definition - Types of Matrices – Equality, Addition, Commutative and associative, Properties of Addition

3.2 Scalar Multiplication of a Matrix – Additive inverse and identity. Multiplication of Matrices – Non-commutativity – Associative and distributive laws of multiplication

3.3 Transpose of Matrix-Properties Symmetric and skew Symmetric Matrices.

Transpose of a Matrix Properties:

i) $(A^T)^T = A$

ii) $(KA)^T = KA^T$

iii) $(A+B)^T = (A^T + B^T)$

iv) $(AB)^T = B^T A^T$

Symmetric and skew symmetric Matrices

3.4 Determinant of a Matrix, Singular, Non-singular Matrices, Minor, Co-factor of an element in the Matrix – Properties of determinants

3.5 Adjoint of a Matrix, Inverse of a Matrix Properties

i) $A^{-1} = \text{Adj } A / \det A$

ii) $(AB)^{-1} = B^{-1} A^{-1}$

iii) $(A^T)^{-1} = (A^{-1})^T$

3.6 Solution of simultaneous linear equation in two and three variables by Cramer's rule, Matrix inversion method

and Gauss – Jordan method, Consistency and inconsistency of simultaneous equations.

NOTE: In the treatment, upto 3x3 determinants and matrices should be considered.

4. PERMUTATIONS & COMBINATIONS: 18 PERIODS

4.1 Definition of linear and circular permutations

4.2 To find the number of permutations of n dissimilar things taken ' r ' at a time.

4.3 To prove $nP_r = (n-1)P_r + r(n-1)P_{r-1}$ from the first principles

4.4 To find number of Permutations of n Dissimilar Things taken ' r ' at a time when repetition of Things is allowed any number of times.

4.5 To find number of circular Permutations of n Different things taken all at a time.

4.6 To find the number of Permutations of ' n ' things taken at a time when some of them are alike and the rest are dissimilar

4.7 To find the number of combinations of ' n ' dissimilar things taken ' r ' at a time

4.8 To prove

i) If $nC_r = nC_s$ then $n=r+s$ or $r=s$

ii) $nC_r + nC_{r-1} = (n+1)C_r$

5. BINOMIAL THEOREM: 16 PERIODS

5.1 Binomial theorem for positive Integral Index, Binomial coefficients and simple results on them, Numerically greatest term.

5.2 Binomial Theorem for rational Index (statement only) Important particular cases of Binomial Expansion.

5.3 Approximations using Binomial Theorem

6. PARTIAL FRACTIONS: 6 PERIODS

Resolving $f(x)/g(x)$ into Partial fractions when $g(x)$ contains:

6.1 Non-repeated linear factors

6.2 contains repeated and non repeated linear fractions only.

6.3 $g(x)$ contains non-repeated and non-repeated irreducible factors only.

6.4 $g(x)$ contains repeated and non-repeated irreducible factors only.

(Note: Number factors of $g(x)$ should not exceed 4)

7. EXPONENTIAL AND

LOGARITHMIC SERIES: 6 PERIODS

7.1 e^x Expansion for real x

7.2 $\log(1+x)$ expansion, condition on x

(Note: Statements of the results and very simple problems such as finding the general term should only be given)

8: PROBABILITY: 30 PERIODS

8.1 Random experiment, random event, elementary events, exhaustive events, mutually exclusive events

8.2 Classical definition – relative frequency approach – sample space, sample events, Addition theorem on Probability

8.3 Dependent and independent events, multiplication theorem, Baye's theorem

9. RANDOM VARIABLES AND DISTRIBUTIONS:

9.1 Random variables, Distributive functions, probability distributive functions, Mean variance of a random variable

9.2 Theoretical discrete distributions like Binomial, poisson distribution – Mean and variance of above distributions (without proof)