

**REVISED SYLLABUS INTERMEDIATE I YEAR**  
**MATHEMATICS IA**  
**(Algebra, Vector Algebra & Trigonometry)**  
**PAPER I A –ALGEBRA**

**No. of Periods (65)**

1. Functions of Mappings	9
2. Surds	6
3. Logs	6
4. Mathematical Induction	6
<b>VECTOR ALGEBRA:</b>	
5. Addition of Vectors	14
6. Multiplication of Vectors	24
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	65
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**TRIGONOMETRY**

**No. of Periods (60)**

7. Graphs & Periodic Functions	9
Trigonometric ratios of Compound angles	16
Multiple & Sub-multiple angles	5
Transformations	5
8. Trigonometric Equations	3
9. Inverse Trigonometric functions	10
10. Hyperbolic functions	7
11. Properties of triangles	6
12. Heights and distances in single plane	5
13. Complex Numbers	3
14. De-movires Theorem	3
15. Trigonometric expansions	3
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	60
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**INTERMEDIATE MATHEMATICS –1A**  
**(ALGEBRA, VECTOR ALGEBRA & TRIGNOMETRY)**

S. No.	Topics/Chapter	Sub-topics/Sections/Sub-sections	Periods of Instructions
1.	Functions or Mappings	1.1 Definitions of one-one, onto, bijection functions, Identity and constant functions Equality of two functions  1.2. Definitions of Inverse function, composite Function and Inverse of composite Function Theorems with proofs  i) $f:A \rightarrow B, g:B \rightarrow C$ are bijective functions, then $g \circ f:A \rightarrow C$ is also a bijection.  ii) Let $A$ & $B$ be two sets. If $f:A \rightarrow B$ is a Bijective then $f^{-1}:B \rightarrow A$ is also a bijective function  iii) If $f:A \rightarrow B$ and $g:B \rightarrow C$ are two Bijective functions then $(g \circ f)^{-1} = f^{-1} \circ g^{-1}$ .  iv) If $f:A \rightarrow B$ is a function and $IA: A \rightarrow A, IB: B \rightarrow B$ are identity functions then $f \circ IA = f = IB \circ f$  v) If $f: A \rightarrow B$ is a bijective function Then / $f^{-1} \circ f = IA, f \circ f^{-1} = IB$  vi) If $f:A \rightarrow B, g:B \rightarrow C$ and $h:C \rightarrow D$ are any 3 functions then $h \circ (g \circ f) = (h \circ g) \circ f$ or composition of functions is associative  1.3 Definition of real valued function  i) Definition of domain, Range  ii) Algebra of real valued functions	9 periods
		Total:	9 periods
2.	Surds	2.1 Evaluating Surds of the form $a+k\sqrt{b}$ and $a+k\sqrt{b} + l\sqrt{c} + m\sqrt{d}$	

- 2.2 Cube root of the surds of the form  $a+k\sqrt{b}$
- 2.3 Rationalising factors (upto 3<sup>rd</sup> degree)
3. Logarithms
- 3.1 Definitions Introduction of common logarithms
- Total: 6 periods

**Theorems :**

$$\log mn = \log m + \log n$$

$$\log (m/n) = \log m - \log n$$

$$\log m^k = k \log m$$

$$\log_a m = \log_b m \cdot \log_a b$$

- 3.2 Nature of Logarithms through graphs, Logarithms functions
- 3.3 Types of Logarithms
4. Mathematical Induction
- 4.1 Principle of Mathematical Induction; Theorem of Principle of finite Mathematical Induction
- 4.2 Application of Mathematical Induction  $\Sigma n, \Sigma n^2, \Sigma n^3$  etc.,
- 4.3  $x-y$  divides  $x^n - y^n$  for all positive integral values of  $n$  and other divisibility problems

6 Periods

**VECTOR ALGEBRA**

**5. ADDITION OF VECTOR**

**14 Periods**

- 5.1 Introduction of Vector as an ordered triad of real numbers- Representation of a vector as a directed line segment – Free and localised Vectors.
- 5.2 Classification of Vectors – Collinear or parallel, like, unlike vectors, Co-initial vectors, coplanar and non-coplanar vectors, position vector, unit vector etc.,
- 5.3 Addition of vectors – parallelogram and triangle laws – Properties of additions. Subtraction of Vectors
- i)  $m(n \vec{a}) = mn (\vec{a}) = mn(\vec{a})$
- ii)  $(m+n) \vec{a} = m \vec{a} + n \vec{a}$
- iii)  $m(\vec{a} + \vec{b}) = m \vec{a} + m \vec{b}$

- 5.4 Multiplication of Vector by Scalar
- 5.5 Angle between two Non-Zero vectors.  
Vector of the points of division – Concurrence of Medians of a Triangle by Vector Method
- 5.6 Linear combination of Vectors – linearly dependent and independent vectors
- 5.7 Components of Vector in three dimension – Direction cosines,
- 5.8 modulus of a vector, Right and Left hand systems – Orthogonal triad of Vectors.
- 5.9 Vector equation of line and plane in parametric form collinearity of three points and coplanarity of four points.

## 6. MULTIPLICATION OF VECTORS

- 6.1 Definition of the Scalar or dot product of two vectors its geometrical representation and Orthogonal projection of  $\vec{a}$  &  $\vec{b}$ .
- 6.2 Properties of Scalar product – Commutative, and distributive laws – condition for perpendicularity of two vectors  $\vec{a}$ ,  $\vec{b}$  are perpendicular vectors, Then  $\vec{a} \cdot \vec{b} = 0$ .
  - i)  $\vec{a} \cdot (-\vec{b}) = -(\vec{a} \cdot \vec{b})$
  - ii)  $(-\vec{a}) \cdot (-\vec{b}) = \vec{a} \cdot \vec{b}$
- 6.3 Analytic expressions for scalar product in terms of  $i, j, k$ , angle between the two vectors. Some identities such as  $(\vec{a} + \vec{b})^2$  etc.
- 6.4 Proof by Vector Method of (i) angle in a semi-circle is a right angle (ii) laws of cosines and projection formula in a triangle (iii) Concurrence of the altitudes and perpendicular bisectors of sides of a triangle (iv)  $\cos(A \pm B) = \cos A \cos B \pm \sin A \sin B$  formal form – Angle between two planes.
- 6.5 Vector equation of a plane in the normal form of two types: (I) Vector equation of sphere, angle between two planes.
- 6.6 Vector or Cross product of two vectors – Non-commutativity vector product is distribution over addition
  - i)  $(-\vec{a}) \times (\vec{b}) = \vec{a} \times (-\vec{b}) = -(\vec{a} \times \vec{b})$
  - ii)  $(-\vec{a}) \times (\vec{b}) = \vec{a} \times \vec{b}$

- 6.7 Vector product among  $i, j, k$ , sine or the angle between two Vectors, Unit vector perpendicular to a given pair of Vectors
- 6.8 Vector area of a parallelogram and a triangle – Proofs by vector method  
(i) sin rule
- ii)  $\sin(A \pm B) = \sin A \cos B \pm \cos A \sin B$  and
- iii) area of triangle  $\Delta = \sqrt{s(s-a)(s-b)(s-c)}$
- 6.9 Triple Products – Scalar triple product and its geometric interpretation. Coplanarity of three vectors and deductions volume of a tetrahedron.
- 6.10 Vector area of a plane in different parts, skew lines – simple problems.
- 6.11 Vector triple product and its results.
- 6.12 Product of Four vectors – Scalar and vector product of Four vectors

## 7. TRIGONOMETRY

S.No.	Topics/Chapter	Sub-topics/Sections/Sub-sections	Periods of Instructions
7.1.	Graph & Periodicity	Definition of Trigonometric functions with the help of unit circle  Particular values - Variation of $\sin\theta$ , $\cos\theta$ , $\tan\theta$ , Variation in values as $\theta$ changes periodicity and extreme values, trigonometric ratio of any angle  Graphs $y=\sin\theta$ , $y=\cos\theta$ , $y=\tan\theta$	3 periods
7.2	Trigonometric ratios of compound angles	Trigonometric Ratios of compound angles such as Summation Formulae $\sin(A+B)$ , $\cos(A+B)$ , $\tan(A+B)$	5 periods
7.3.	Trigonometric ratios of Multiple and submultiple Angles	Trigonometric ratios of $2A$ , $3A$ and $A/2$ (Multiple and submultiple angles)	4 periods

7.4, Transformations and Identities	Transformation from sum to products Transformation from products to sums	4 periods
8. Trigonometric Equations	.8.1 General solution of $\text{Sin}\theta =k$ , $\text{Cos}\theta =k$ , $\text{Tan}\theta =k$  8.2 Solving simple Trigonometric Equations	4 periods
9. Inverse circular functions	9.1 Inverse of all the six Trigonometric functions, domains, ranges-graphs.  9.2 Solving simple Equations involving Inverse trigonometric functions	5 periods
10. Hyperbolic functions	10.1 Meaning of $e$ , exponential of the series  10.2 Definitions Domain and Range of Hyperbolic and Inverse Hyperbolic functions  10.3 Addition formulae of Hyperbolic functions $\text{Sinh}(x\pm y)$ , $\text{Cosh}(x\pm y)$ etc.,	3 periods
11. Properties of triangles	11.1 Relation between the sides and angles of an triangle. 11.2 Sine and Cosine rules – Nepiers formulae- Projection formulae 11.3 Half angle formulae and area of a triangle 11.4 Incircle and ex-circle of a triangle	10 periods
12. Heights & Distances	12.1 Angles of Elevation and Depression  12.2 Problems involving one plane	10 periods
13. Complex Numbers	13.1 Complex number as an ordered pair of real numbers. Representation in the form of $a+ib$ , real and imaginary part- equality of Complex Numbers  13.2 Fundamental operations on Complex	

Numbers.

- 13.3 Conjugate Complex Numbers
- 13.4 Modulus and amplitude of a Complex Numbers
- 13.5 Geometrical Representation of a complex number, Argand Plane and Argand diagram 6 periods
- 14. Demovieris Theorem
  - 14.1 Demovier's theorem for integral index and for rational index.
  - 14.2  $n$ th root of unity and its geometrial representation.
  - 14.3 Cube roots of unity
- 15. Trigonometric Expansions
  - 15.1 Expansion of Trigonometric functions,  $\sin n\theta$ ,  $\cos n\theta$  as series, expansion of  $\tan^n n\theta$  and  $\cos n\theta$
  - 15.2 Expressing  $\sin^n \theta$  and  $\cos \theta$  interms of Sines and Cosines of multiples of  $\theta$  7 periods

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