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# *The Ramanujan Mathematics Challenge*

**Class:12**

## **SYLLABUS**

### **RELATIONS AND FUNCTIONS**

- Introduction
- Types of Relations
- Types of Functions
- Composition of Functions and Invertible Function

### **INVERSE TRIGONOMETRIC FUNCTIONS**

- Introduction
- Basic Concepts
- Properties of Inverse Trigonometric Functions

### **MATRICES**

- Introduction
- Matrix
- Types of Matrices
- Operations on Matrices
- Transpose of a Matrix
- Symmetric and Skew Symmetric Matrices
- Invertible Matrices

### **DETERMINANTS**

- Introduction
- Determinant
- Area of a Triangle
- Minors and Cofactors
- Adjoint and Inverse of a Matrix
- Applications of Determinants and Matrices

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## **SYLLABUS**

### CONTINUITY AND DIFFERENTIABILITY

- Introduction
- Continuity
- Differentiability
- Exponential and Logarithmic Functions
- Logarithmic Differentiation
- Derivatives of Functions in Parametric Forms
- Second Order Derivative

### APPLICATION OF DERIVATIVES

- Introduction
- Rate of Change of Quantities
- Increasing and Decreasing Functions
- Maxima and minima

### INTEGRALS

- Introduction
- Integration as an Inverse Process of Differentiation
- Methods of Integration
- Integrals of Some Particular Functions
- Integration by Partial Fractions
- Integration by Parts
- Definite Integral
- Fundamental Theorem of Calculus
- Evaluation of Definite Integrals by Substitution
- Some Properties of Definite Integrals

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## **SYLLABUS**

### **APPLICATION OF INTEGRALS**

- Introduction
- Area under Simple Curves

### **DIFFERENTIAL EQUATIONS**

- Introduction
- Basic Concepts
- General and Particular Solutions of a Differential Equation
- Methods of Solving First Order, First Degree Differential Equations

### **VECTOR ALGEBRA**

- Introduction
- Some Basic Concepts
- Types of Vectors
- Addition of Vectors
- Multiplication of a Vector by a Scalar
- Product of Two Vectors

### **THREE-DIMENSIONAL GEOMETRY**

- Introduction
- Direction Cosines and Direction Ratios of a Line
- Equation of a Line in Space
- Angle between Two Lines
- Shortest Distance between Two Lines

### **LINEAR PROGRAMMING**

- Introduction
- Linear Programming Problem and its Mathematical Formulation



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## SYLLABUS

### PROBABILITY

- Introduction
- Conditional Probability
- Multiplication Theorem on Probability
- Independent Events
- Bayes' Theorem