

TRIPPURA BOARD OF JOINT ENTRANCE EXAMINATION
SYLLABUS FOR MATHEMATICS
Full Marks - 100
Each Module Carries 10 marks

MODULE - 1

Principle of Mathematical Induction (PMI) :

Statement of the principle of divisibility, summation and inequality by using P M I, Simple applications.

Arithmetic, geometric and harmonic progressions :

Arithmetic, geometric and harmonic means and relation among them, sum to first n terms of an arithmetic, geometric and arithmetic-geometric series, simple applications.

Theory of quadratic equations :

Its rational, irrational and complex roots, relation between roots and coefficients of a quadratic equation, nature of roots, formation of quadratic equation, symmetric functions of the roots, quadratic expression, its maximum and minimum values. Simple applications.

Complex numbers :

Its real and imaginary parts, polar form and conjugate of a complex number, Argand diagram, cube roots of unity, triangle inequality, simple problems.

Permutation and combination :

Fundamental theorem of counting, permutation as arrangement and combination as selection. Permutation and combination of like and unlike things. Circular permutation is to be excluded. Simple applications

MODULE - 2

Binomial Theorem :

Binomial theorem for a positive integral index, general term, middle term (terms), equidistant terms, simple applications.

Infinite series :

Infinite geometric series, Binomial theorem for fractional and negative index, exponential series, logarithmic series, simple applications

Matrices and determinants :

Matrices upto third order, addition, subtraction, scalar multiplication and multiplication of matrices.

Determinants upto third order, Properties of determinants, Minors and cofactors, application of determinants for evaluation of area of a triangle and solution of a system of linear equations by using Cramer's rule.

Inverse of a 2 X 2 matrix, simple applications.

Probability Theory :

Random experiment and their outcomes, events, sample space, equally likely, mutually exclusive and exhaustive cases, classical definition of probability, addition and multiplication theorems. Simple applications.

MODULE - 3

Trigonometric ratios of associated angles, compound angles, multiple and submultiple angles, conditional identities, general solution of trigonometric equations, inverse circular functions. Simple applications.

MODULE - 4

Properties of triangles :

Sine, Cosine, Tangent rules, formulae for semi angles, expression for area of a triangle, circum radius.

Co-ordinate geometry :

Cartesian & Polar co-ordinates, relation between them, distance between two points, section ratio, co-ordinates of centroid and incentre of a triangle, area of the triangle, idea of loci, equations of straight

line in different forms, angle between two straight lines, condition of perpendicularity & parallelism, position of a point with respect to a straight line, distance of a point from a straight line. Simple applications.

MODULE - 5

Circle :

Equation of a circle, its centre and radius, equation of circle in general form, equation of a circle in terms of end points of a diameter, length of intercept on a circle by a straight line.

Conics :

Idea of a conic, equation of parabola, ellipse, hyperbola in standard form, focus, directrix, chord, elementary properties, Parametric representation of conics. Simple applications.

MODULE - 6

Differential calculus :

Concept of a function, different kinds of functions, domain and range of a function, geometrical representation of a function.

Concept of limit of a function at a point, right and left hand limits. Evaluation of limits using standard limits and not by using L-Hospital's Theorem.

Concept of continuity of a function (i) at a point, (ii) in an interval, Idea of discontinuity, removable discontinuity, height of the jump. Determination of continuity of a function graphically and analytically. Concept of derivative of a function at a point, derivative from first principle, first and second order derivative of a function. Simple applications.

MODULE - 7

Integral calculus :

Integration as an inverse of differentiation, integration by substitution and by parts, integration by partial fraction, simple integrals of

the type :

$$\int \frac{dx}{a^2 \pm x^2}, \int \frac{dx}{\sqrt{x^2 \pm a^2}}, \int \frac{dx}{\sqrt{a^2 - x^2}}, \int \frac{dx}{ax^2 + bx + c},$$

$$\int \frac{dx}{\sqrt{ax^2 + bx + c}}, \int (px + q)\sqrt{ax^2 + bx + c} dx, \int \frac{(px + q)dx}{\sqrt{ax^2 + bx + c}}$$

$$\int \frac{dx}{(ax + b)\sqrt{1x + m}}, \int \frac{dx}{(ax + b)\sqrt{1x^2 + mx + n}}, \int \sqrt{\frac{ax + b}{cx + d}} dx$$

$$\int \frac{dx}{(ax^2 + bx + c)\sqrt{1x^2 + mx + n}}, \int \frac{dx}{(ax^2 + b)\sqrt{1x^2 + m}}$$

MODULE - 8

Definite integral :

Definite integral as the limit of a sum, geometrical meaning of a definite integral, properties of definite integral, fundamental theorem of integral calculus. Evaluation of definite integrals.

Differential Equation :

Genesis of differential equation, meaning of solution of differential equation, solution of differential equation of 1st order by variable separable method, homogeneous differential equation of 1st order, solution of equation of the type

$$\frac{d^2y}{dx^2} = f(x). \text{ Simple applications.}$$

MODULE - 9

Significance of $\frac{dy}{dx}$:

Derivative as a rate measure.

Calculation of approximate value and error.

Increasing and decreasing functions.

Tangents and normals.

Maxima and minima :

Determination of maxima and minima of a function by using (i) first order derivative only, (ii) first and second order derivatives.

Determination of area :

Calculation of area of a closed region. Simple applications.

MODULE - 10

Relations & Mapping :

Ordered pair, Cartesian product of sets, relation - different types of relations, different types of mappings.

Vectors :

Idea of vectors - addition and subtraction of vectors, scalar multiplication of a vector, triangle law, Position vector of a point dividing a line segment in a given ratio, dot and cross product of vectors, projection of a vector on another vector, application of vectors in geometry. Simple application.