

GOA BOARD OF SECONDARY AND HIGHER SECONDARY EDUCATION

REVISED SYLLABUS

MATHEMATICS (2024 – 2025)

CLASS XII -SCIENCE

UNIT I: RELATIONS AND FUNCTIONS

1. Relations and Functions:

Periods-10

Types of relations: Reflexive, symmetric, transitive and equivalence relations. One to one and onto functions, composite functions, inverse of a function (only concept)

2. Inverse Trigonometric Functions :

Periods-12

Definition, range, domain, principal value branches. Graphs of inverse trigonometric functions. Elementary properties of inverse trigonometric functions.

UNIT II: ALGEBRA

1. Matrices:

Periods-18

Concept, notation, order, equality, types of matrices, zero matrix, transpose of a matrix, symmetric and skew symmetric matrices. Addition, multiplication and scalar multiplication of matrices, simple properties of addition, multiplication and scalar multiplication. Non-commutativity of multiplication of matrices and existence of non-zero matrices whose product is the zero matrix (restrict to square matrices of order 2). Invertible matrices and proof of the uniqueness of inverse, if it exists; (Here all matrices will have real entries).

2. Determinants:

Periods-20

Determinant of a square matrix (up to 3×3 matrices), minors, cofactors and applications of determinants in finding the area of a triangle. Adjoint and inverse of a square matrix. Consistency, inconsistency and number of solutions of system of linear equations by examples, solving system of linear equations in two or three variables (having unique solution) using inverse of a matrix.

UNIT III: CALCULUS

1. Continuity and Differentiability:

Periods-18

Continuity and differentiability, derivative of composite functions, chain rule, derivatives of inverse trigonometric functions, derivative of implicit function. Concepts of exponential, logarithmic functions.

Derivatives of $\log_e x$ and e^x . Logarithmic differentiation. Derivative of functions expressed in parametric forms. Second order derivatives.

2. Applications of Derivatives:

Periods- 10

Applications of derivatives: Rate of change, increasing/decreasing functions, maxima and minima (first derivative test motivated geometrically and second derivative test given as a provable tool). Simple problems (that illustrate basic principles and understanding of the subject as well as real-life situations).

3. Integrals:

Periods- 20

Integration as inverse process of differentiation. Integration of a variety of functions by substitution, by partial fractions and by parts, only simple integrals of the type –

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

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

$$\int \sqrt{ax^2 + bx + c} dx,$$

to be evaluated.

Definite integrals as a limit of a sum(not for evaluation). Fundamental Theorem of Calculus (without proof). Basic properties of definite integrals and evaluation of definite integrals.

4.Applications of the Integrals:

Periods- 10

Applications in finding the area under simple curves, especially lines, arcs of circles/parabolas/ellipses (in standard form only), area between the two above said curves (the region should be clearly identifiable).

5.Differential Equations:

Periods-10

Definition, order and degree, general and particular solutions of a differential equation..Solution of differential equations by method of separation of variables, homogeneous differential equations of first order and first degree. Solutions of linear differential equation of the type –

$$\frac{dy}{dx} + Py = Q$$

where P and Q are functions of x or constant

$$\frac{dx}{dy} + Px = Q$$

where P and Q are functions of y or constant

UNIT IV: VECTORS AND THREE-DIMENSIONAL GEOMETRY

1. Vectors:

Periods- 10

Vectors and scalars, magnitude and direction of a vector. Direction cosines/ratios of vectors. Types of vectors (equal, unit, zero, parallel and coplanar vectors), position vector of a point, negative of a vector, components of a vector, addition of vectors, multiplication of a vector by a scalar, position vector of a point dividing a line segment in a given ratio. Scalar (dot) product of vectors, projection of a vector on a line. Vector (cross) product of vectors,

2. Three-dimensional Geometry:

Periods-12

Direction cosines/ratios of a line joining two points. Cartesian and vector equation of a line, coplanar and skew lines, shortest distance between two lines. Cartesian and vector equation of a plane. Angle between (i) two lines, (ii) two planes, (iii) a line and a plane. Distance of a point from a plane.

UNIT V: LINEAR PROGRAMMING:

Periods-12

Introduction, related terminology such as constraints, objective function, optimization, different types of linear programming (L.P.) problems, graphical method of solution for problems in two variables, feasible and infeasible regions, feasible and infeasible solutions, optimal feasible solutions (up to three non-trivial constraints).

UNIT VI: PROBABILITY:

Periods-18

Multiplication theorem on probability. Conditional probability, independent events, total probability, Baye's theorem. Random variable and its probability distribution, mean and variance of haphazard variable. Repeated independent (Bernoulli) trials and Binomial distribution.

GOA BOARD OF SECONDARY AND HIGHER SECONDARY EDUCATION

REVISED SYLLABUS

MATHEMATICS & STATISTICS (2024– 2025)

CLASS XII -COMMERCE

UNIT I: RELATIONS AND FUNCTIONS

1. Relations and Functions:

Periods-10

Types of relations: Reflexive, symmetric, transitive and equivalence relations. One to one and onto functions,

UNIT II: ALGEBRA

1. Matrices :

Periods -18

Concept, notation, order, equality, types of matrices, zero matrix, transpose of a matrix, symmetric and skew symmetric matrices. Addition, multiplication and scalar multiplication of matrices, simple properties of addition, multiplication and scalar multiplication. Non-commutativity of multiplication of matrices and existence of non-zero matrices whose product is the zero matrix (restrict to square matrices of order 2). Invertible matrices if it exists; (Here all matrices will have real entries).

2. Determinants:

Periods-20

Determinant of a square matrix (up to 3×3 matrices), minors, cofactors and applications of determinants in finding the area of a triangle. Adjoint and inverse of a square matrix. Consistency, inconsistency and number of solutions of system of linear equations by examples, solving system of linear equations in two or three variables (having unique solution) using inverse of a matrix.

UNIT III: CALCULUS

1. Continuity and Differentiability:

Periods-18

Continuity and differentiability, derivative of composite functions, chain rule, derivative of implicit function.
Derivatives of $\log_e x$ and e^x . Logarithmic differentiation. Derivative of functions expressed in parametric forms. Second order derivatives.

2. Applications of Calculus in Commerce :

Periods- 10

Average cost, Marginal Cost, Total Revenue, Average Revenue, Marginal Revenue, Break Even analysis, Maximization of total revenue and total profit minimisation of average cost

3. Integrals:

Periods-20

Integration as inverse process of differentiation. Integration of a variety of functions by substitution, by partial fractions and by parts, only simple integrals of the type –

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

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to be evaluated.

Definite integrals as a limit of a sum(not for evaluation). Fundamental Theorem of Calculus (without proof). Basic properties of definite integrals and evaluation of definite integrals.

4. Differential Equations:

Periods-10

Definition, order and degree, general and particular solutions of a differential equation.. Solution of differential equations by method of separation of variables, homogeneous differential equations of first order and first degree.

UNIT IV: LINEAR PROGRAMMING:

Periods-12

Introduction, related terminology such as constraints, objective function, optimization, different types of linear programming (L.P.) problems,. problems, graphical method of solution for problems in two variables, feasible and infeasible regions, feasible and infeasible solutions, optimal feasible solutions (up to three non-trivial constraints).

UNIT V: PROBABILITY:

Periods-18

Multiplication theorem on probability. Conditional probability, independent events, total probability, Baye's theorem. Random variable and its probability distribution.

UNIT VI: Bill of Exchange:

Periods-14

Introduction, Bankers Discount, true discount, Bankers gain, to find date of discount , date of draw, period of bill, interest , due date.

UNIT VII: Partnership:

Periods- 15

Investment of Capital for unequal period, sharing profit, Partners Salaries. Interest on capital. Profit sharing on the admission of a new partner or retirement of an existing partner.

UNIT VIII: Annuity:

Periods-15

Annuity and its types, present value and amount in case of ordinary annuity. Annuity due. Deferred annuity, Sinking fund(using both log tables and annuity tables)

Std XII COMMERCE (Mathematics and Statistics)
INTERNAL ASSESSMENT SCHEME (2024-25): 20 marks

Topics for Assignment /Project/Mathematical Activity /Innovative method:

1. Project-Based Assignments : Students can work on mathematical projects that apply concepts to real-world problems. Projects could involve statistical analysis, mathematical modeling, or exploring mathematical concepts through programming.

2. Peer Teaching : Assign students topics to teach to their peers. This method encourages deep understanding since one must understand a concept thoroughly to teach it effectively. It also fosters collaborative learning environments.

3. Mathematical Journals : Encourage students to maintain journals where they reflect on what they've learned, explore mathematical ideas, and document their understanding of various concepts. This can help in developing their analytical and reflective skills.

4. Portfolio Assessment : Have students compile a portfolio of their work throughout the year, including solved problems, projects, and reflective essays on their learning. This allows for a comprehensive assessment of their progress and understanding.

5. Presentations: Students can create presentations on specific mathematical theories, historical mathematicians, or real-world applications of mathematical concepts. This method encourages research, critical thinking, and public speaking skills.

6. Problem-Solving Sessions: Instead of traditional tests, organize sessions where students collaboratively work on complex problems like problems from JEE exams. These sessions can help in assessing students' problem-solving strategies and their ability to work as part of a team.

7. Digital Simulations and Games: Utilize educational technology tools that offer interactive simulations or games related to mathematical concepts. These can be great for understanding complex theories through visualization and interaction.

8. Peer Assessment and Feedback: Allow students to assess each other's work on assignments or projects. This not only helps in learning from peers but also teaches them to evaluate work critically and provide constructive feedback.

9. Concept Mapping : Have students create concept maps that connect different mathematical ideas they've learned. This can help in assessing their understanding of how mathematical concepts interrelate.

10. Oral Exams: Conduct oral exams/quiz where students explain how they would solve a problem or discuss a mathematical concept. This assesses their understanding and ability to articulate mathematical ideas verbally.

INTERNAL ASSESSMENT	20 marks
Problems assigned by teachers after each topic.	10 marks
Mathematical Activity .	10 marks

Std XII SCIENCE (Mathematics)

INTERNAL ASSESSMENT SCHEME(2024-25): 20 marks

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