

Unit	Topic / Portion deleted for 2020-2021 academic session
I-Relations and Functions	<p>1. Relations and Functions: Composite functions, Inverse of a functions, binary operations</p> <p>2. Inverse Trigonometric Functions: Graph of inverse trigonometric function. Elementary properties of inverse trigonometric functions.</p>
II-Algebra	<p>1. Matrices: Concept of elementary row and column operation, Invertible matrices and proof of uniqueness of inverse if it exists.</p> <p>2. Determinants: Properties of determinants, consistency, inconsistency and number of solutions of system of linear equations by examples.</p>
III-Calculus	<p>1. Continuity and Differentiability: Rolle's and Lagrange's Mean Value Theorem (Without proof) and their geometric interpretation.</p> <p>2. Applications of Derivatives: Rate of change of bodies, use of derivatives in approximation.</p> <p>3. Integrals: $\int \sqrt{ax^2 + bx + c} dx$, $\int (px+q) \sqrt{ax^2 + bx + c} dx$ Definite integral as limit of sum</p> <p>4. Applications of the Integrals: Area between the two above-said curves (For eg. Area between Parabola and Circle etc.)</p> <p>5. Differential Equations: Formation of differential equation whose general solution is given, Solution of linear differential equation of the type $\frac{dx}{dy} + Px = Q$; where P and Q are function of y or constant</p>
IV-Vectors and three-dimensional geometry	<p>1. Vectors: Scalar triple product of vectors, projection vector on a line</p> <p>2. Three-dimensional geometry: Angle between (i) two lines (ii) two planes (iii) a line and a plane. Distance of a point from a plane</p>
VI-Probability	Mean and variance of random variable, Binomial distribution, Repeated independent (Bernoulli) trials.

MATHEMATICS
Revised COURSE STRUCTURE
CLASS 12 (THEORY)

One Paper	Time: 3 hours	Max Marks: 80
<u>Units</u>	<u>Titles</u>	<u>Weightage</u>
I	Relation and Functions	08 Marks
II	Algebra	10 Marks
III	Calculus	34 Marks
IV	Vector and Three Dimensional Geometry	14 Marks
V	Linear Programming	06 Marks
VI	Probability	08 Marks
TOTAL		80 Marks

Unit-I: RELATIONS AND FUNCTIONS

08Marks

1. Relations and Functions

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

2. Inverse Trigonometric Functions

Definition, range, domain, principal value branches.

Unit-II: ALGEBRA

10 Marks

1. Matrices

Concept, notation, order, equality, types of matrices, zero and identity matrix, transpose of a matrix, symmetric and skew symmetric matrices. Operation on matrices: Addition and multiplication and multiplication with a scalar. 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).

2. Determinants

Determinant of a square matrix (upto 3x3) matrices, minors, co-factors and applications of determinants in finding the area of a triangle. Adjoint and inverse of a square matrix, solving system of linear equations in two or three variables (having unique solution) using inverse of a matrix.

Unit-III: CALCULUS

34 Marks

1. Continuity and Differentiability

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

Derivatives of logarithmic and exponential functions. Logarithmic differentiation, derivative of functions expressed in parametric forms. Second order derivatives.

2. Applications of Derivatives

Applications of derivatives: increasing/decreasing functions, tangents and normal, 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

Integration as inverse process of differentiation. Integration of a variety of functions by substitution, by partial fractions and by parts, Evaluation of simple integrals of the following types and problems based on them.

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

Fundamental Theorem of Calculus (without proof). Basic properties of definite integrals and evaluation of definite integrals.

4. Applications of the Integrals

Applications in finding the area under simple curves, especially lines, circles/parabolas/ellipses (in standard form only),

5. Differential Equations

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

$$\frac{dy}{dx} + Py = Q, \text{ where P and Q are functions of } x \text{ or constant.}$$

Unit-IV: VECTORS AND THREE-DIMENSIONAL GEOMETRY **14 Marks**

1. Vectors

Vectors and scalars, magnitude and direction of a vector. Direction cosines and direction ratios of a vector. Types of vectors (equal, unit, zero, parallel and collinear 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, vector (cross) product of vectors.

2. Three –dimensional Geometry

Direction cosines and direction ratios of a line joining two points. Cartesian equation and vector equation of a line, coplanar and skew lines, shortest distance between two lines. Cartesian and vector equation of a plane.

Unit-V: LINEAR PROGRAMMING **6 Marks**

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

Unit-VI: PROBABILITY **08 Marks**

Conditional probability, multiplication theorem on probability, independent events, total probability, Bayes' theorem, Random variable and its probability distribution.

Sample Blue Print : Mathematics - 12

Forms of Question/ Topic	Knowledge			Understanding			Application			HOTS			Evaluation			Total
	Obj	SAI	SAII	LA	SAI	SAII	LA	Obj	SAI	SAII	LA	Obj	SAI	SAII	LA	
Matrices and Determinants	1(1)		4(1)			4(1)						1(1)				10(4)
Relations and Functions	1(1)			1(1)	4(1)								2(1)			8(4)
Differential Calculus	1(1)		4(1)	1(1)	2(1)						6(1)					14(5)
Integral Calculus	3(3)	2(1)	4(1)	1(1)							6(1)					20(8)
Vectors and 3-D	3(3)				4(1)	5(1)						1(1)				14(6)
Linear programming															6(1)	6(1)
Probability	1(1)			1(1)					4(1)							8(4)
Sub- Total	10(10)	2(1)	12(3)	4(4)	2(1)	12(3)	6(1)		4(1)	12(2)	2(1)	2(2)	2(1)	4(1)	6(1)	80(32)
Total	24(14)			24(9)			16(3)			8(4)			8(2)			

Note : 1) The figures in the bracket denotes the number of questions

2) This is only a sample Blue Print. The question setter may develop his/her own Blue Print as per the question design