TERMWISE SYLLABUS AS PER CIRCULAR NO 53- APPLICABLE FROM 26 JULY 2021

CLASS XII

SUBJECT: MATHEMATICS (041)

SESSION 2021-22

The Syllabus in the subject of Mathematics has undergone changes from time to time in accordance with growth of the subject and emerging needs of the society. Senior Secondary stage is a launching stage from where the students go either for higher academic education in Mathematics or for professional courses like Engineering, Physical and Biological science, Commerce or Computer Applications. The present revised syllabus has been designed in accordance with National Curriculum Framework 2005 and as per guidelines given in Focus Group on Teaching of Mathematics 2005 which is to meet the emerging needs of all categories of students. Motivating the topics from real life situations and other subject areas, greater emphasis has been laid on application of various concepts.

Objectives

The broad objectives of teaching Mathematics at senior school stage intend to help the students:

- to acquire knowledge and critical understanding, particularly by way of motivation and visualization, of basic concepts, terms, principles, symbols and mastery of underlying processes and skills.
- to feel the flow of reasons while proving a result or solving a problem.
- to apply the knowledge and skills acquired to solve problems and wherever possible, by more than one method.
- to develop positive attitude to think, analyse and articulate logically.
- to develop interest in the subject by participating in related competitions.
- to acquaint students with different aspects of Mathematics used in daily life.
- to develop an interest in students to study Mathematics as a discipline.
- to develop awareness of the need for national integration, protection of environment, observance of small family norms, removal of social barriers, elimination of gender biases.
- to develop reverence and respect towards great Mathematicians for their contributions to the field of Mathematics.

UNIT WISE MARKS DIVISION OF SYLLABUS TO BE FOLLOWED IN SCHOOL

TERM I

ONE PAPER OF 90 MINUTES	**MAX MARKS 40**	
UNIT NO	**UNITS**	
I	CH-1-RELATIONS AND FUNCTIONS	
II	CH 2- INVERSE TRIGONOMETRIC FUNCTIONS	
	CH 3- MATRICES	
III	CH 4- DETERMINANTS	
IV	CH 5- CONTINUITY AND DIFFERENTIABILITY	
	CH 6- APPLICATIONS OF DERIVATIVES	
V	LINEAR PROGRAMMING	
TOTAL MARKS THEORY	**40 MARKS**	
INTERNAL ASSESSMENT	**10 MARKS**	**5 MARKS- PERIODIC TEST**
		3 MARKS- ACTIVITY FILE + **2 MARKS -TERM END ASSESSMENT OF ONE ACTIVITY & VIVA**
TOTAL	**50 MARKS**	

DETAILED SYLLABUS UNIT WISE-TERM I

UNIT I	
CHAPTER 1	**Relations and Functions** Types of relations: reflexive, symmetric, transitive and equivalence relations. One to one and onto functions.
ACTIVITY 1	To verify that the relation R in the set L of all lines in a plane, defined by R = $\{(l, m) : l \perp m\}$ is symmetric but neither reflexive nor transitive.
UNIT II	
CHAPTER 2	**Inverse Trigonometric Functions** Definition, range, domain, principal value branch.
ACTIVITY 2	To draw the graph of $\sin^{-1} x$, using the graph of $\sin x$ and demonstrate the concept of mirror reflection (about the line $y = x$).
CHAPTER 3	**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, Invertible matrices; (Here all matrices will have real entries).
ACTIVITY 3	**Quiz on matrices from quizizz.com**
UNIT III	
CHAPTER 4	**DETERMINANTS** Determinant of a square matrix (up to 3 x 3 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 IV	
CHAPTER 5	**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.
ACTIVITY 4	To find analytically the limit of a function $f(x)$ at $x = c$ and also to check the continuity of the function at that point.
CHAPTER 6	**Applications of Derivatives**

	Applications of derivatives: increasing/decreasing functions, tangents and normals, 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).
ACTIVITY 5	To understand the concepts of local maxima, local minima and point of inflection.
UNIT V	
CHAPTER 12	**Linear Programming** 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 (bounded), feasible and infeasible solutions, optimal feasible solutions (up to three non-trivial constraints).
ACTIVITY 6	Make an art integrated activity using a problem of linear programming.

UNIT WISE MARKS DIVISION OF SYLLABUS TO BE FOLLOWED IN SCHOOL

TERM II

ONE PAPER	**MAX MARKS 40**	
UNIT NO	**UNITS**	
VI	CH 7- INTEGRALS	
	CH 8- APPLICATIONS OF INTEGRALS	
VII	CH 9- DIFFERENTIAL EQUATIONS	
VIII	CH 10- VECTORS	
IX	CH 11- THREE DIMENSIONAL GEOMETRY	
X	CH 13- PROBABILITY	
TOTAL MARKS THEORY	**40 MARKS**	
INTERNAL ASSESSMENT	**10 MARKS**	**5 MARKS- PERIODIC TEST**
		3 MARKS- ACTIVITY FILE + **2 MARKS -TERM END ASSESSMENT OF ONE ACTIVITY & VIVA**
TOTAL	**50 MARKS**	

DETAILED SYLLABUS UNIT WISE-TERM II

UNIT VI	
CHAPTER 7	**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. $\int \frac{dx}{x^2 \pm a^2}$, $\int \frac{dx}{\sqrt{x^2 \pm a^2}}$, $\int \frac{dx}{\sqrt{a^2 - x^2}}$, $\int \frac{dx}{ax^2 + bx + c}$, $\int \frac{dx}{\sqrt{ax^2 + bx + c}}$, $\int \frac{px + q}{ax^2 + bx + c}\, dx$, $\int \frac{px + q}{\sqrt{ax^2 + bx + c}}\, dx$, $\int \sqrt{a^2 \pm x^2}\, dx$, $\int \sqrt{x^2 - a^2}\, dx$ Fundamental Theorem of Calculus (without proof). Basic properties of definite integrals and evaluation of definite integrals.
CHAPTER 8	**Applications of the Integrals** Applications in finding the area under simple curves, especially lines, parabolas; area of circles /ellipses (in standard form only) (the region should be clearly identifiable).
ACTIVITY 7	Make an art integrated activity using a problem on area under simple curves.
UNIT VII	
CHAPTER 9	**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 of the type: $\frac{dy}{dx} = f\left(\frac{y}{x}\right)$. Solutions of linear differential equation of the type: $\frac{dy}{dx} + py = q$, where p and q are functions of x or constants.
UNIT VIII	
CHAPTER 10	**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. Definition, Geometrical Interpretation, properties and application of scalar (dot) product of vectors, vector (cross) product of vectors.
ACTIVITY 8	To verify geometrically that $c \times (a + b) = c \times a + c \times b$
UNIT IX	

CHAPTER 11	**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. Distance of a point from a plane.
UNIT X	
CHAPTER 13	**Probability** Conditional probability, multiplication theorem on probability, independent events, total probability, Bayes' theorem, Random variable and its probability distribution.
ACTIVITY 9	To explain the computation of conditional probability of a given event A, when event B has already occurred, through an example of throwing a pair of dice.

Assessment of Activity Work:

In **first term** any **4 activities** and in **second term** any **4 activities** shall be performed by the student from the activities given in the NCERT Laboratory Manual for the respective class (XI or XII) which is available on the link : http://www.ncert.nic.in/exemplar/labmanuals.htmla record of the same may be kept by the student. A term end test on the activity is to be conducted.

The weightage are as under:

- The activities performed by the student in each term and record keeping : 3 marks
- Assessment of the activity performed during the term end test and Viva-voce : 2 marks

Prescribed Books:

1) Mathematics Part I - Textbook for Class XII, NCERT Publication

2) Mathematics Part II - Textbook for Class XII, NCERT Publication

3) Mathematics Exemplar Problem for Class XII, Published by NCERT

4) Mathematics Lab Manual class XII, published by NCERT