KENDRIYA VIDYALAYA BALLYGUNGE (KOLKATA REGION)

SPLIT UP SYLLABUS(2022-2023) CLASS XII –MATHEMATICS

MONTHS	CHAPTERS/TOPICS	NO.OF PERIODS	Suggested Activities and Projects to be conducted (ANY TEN) (Please refer NCERT Site)
APRIL	UNIT 1 – RELATIONS AND FUNCTIONS **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 branch. **Graphs of inverse trigonometric functions.** **UNIT 2 - ALGEBRA** **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 ,. Invertible matrices. (Here all matrices will have real entries).	15 15 20	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. 2. To verify that the relation R in the set L of all lines in a plane, defined by R = {(l, m) : l || m} is an equivalence relation 3. To demonstrate a function which is one-one but not onto and vice versa
MAY & JUNE	**1.Matrices (contd)** **Existence of non-zero matrices whose product is the zero matrix (restrict to square matrices of order 2).** Invertible matrices. (Here all matrices will have real entries). **2. 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.	5 20	**Projects suggested for summer vacation(any one)** but teachers can take more innovative projects 1. Study the nature of Mathematics and make a project where three aspect of nature of Mathematics – formalism, logic, intuition is applied for the development of mathematics. 2. History of foreign Mathematicians such as Cantor, Pythagoras, Thales, Euclid, Appollonius, Descartes, Fermat, Leibnitz, Euler, Fibonac, Gauss, Newton. 3. Mathematics and Chemistry: Study structure of organic compounds. 4. Mathematics and Biology: Study of science of heredity etc. 5. Mathematics and Music

			6. Mathematics and Environment
JULY	UNIT 3 - CALCULUS **1.Continuity and Differentiability**: Continuity and differentiability, derivative of composite functions, chain rule, derivatives 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: **Rate of change of bodies** , 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).	20 10	1. 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. 2. To understand the concepts of decreasing and increasing functions. 3. To understand the concepts of local maxima, local minima absolute maximum and minimum values of a function and point of inflection. 4. Different application based problem on Maxima And Minima.
AUGUST	**3. Integrals**: Integration as inverse process of differentiation. Integration of a variety of functions by substitution, Integration of rational function by partial fractions, Integration by parts, Integration of standard forms $\int \frac{dx}{x^2 \pm a^2}, \quad \int \frac{dx}{a^2 - x^2}, \quad \int \frac{dx}{\sqrt{x^2 \pm a^2}},$ $\int \frac{dx}{\sqrt{a^2 - x^2}}$, and its application on the following special types $\int \frac{dx}{ax^2 + bx + c}, \int \frac{dx}{\sqrt{ax^2 + bx + c}}$ $, \int \frac{px+q}{\sqrt{ax^2+bx+c}}\, dx$ Integration of standard forms $\int \sqrt{x^2 \pm a^2}\, dx$, $\int \sqrt{a^2 - x^2}\, dx$, $\int \sqrt{\boldsymbol{ax^2 + bx + c}}$ **dx**	20	

	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.	15	
SEPTEMBER	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 form $\frac{dy}{dx} + Py = Q$ where P and Q are constant or functions of x. $\frac{dx}{dy} + Px = Q$ where P and Q are constant or functions of x. UNIT – 4,(VECTORS AND THRE DIMENSIONAL GEOMETRY) **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. Definition, Geometrical Interpretation, properties and application of scalar (dot) product of vectors, vector (cross) product of vectors.	15 15	1. To verify geometrically $\vec{a} \times (\vec{b} + \vec{c}) = \vec{a} \times \vec{b} + \vec{a} \times \vec{c}$ 2. To verify that angle in a semi-circle is a right angle, using vector method.
OCTOBER	**2. Three - dimensional Geometry**: Direction cosines and direction ratios of a line joining two points . Cartesian equation and vector equation of a line,	15	1. To demonstrate the equation of a plane in normal form.

	coplanar and skew lines, shortest distance between two lines. Cartesian and vector equation of a plane. **<u>Angle between two lines</u>** **<u>UNIT -5 (LINEAR PROGRAMMING)</u>** 1. **Linear Programming** : 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), feasible and infeasible solutions, optimal feasible solutions (up to three non-trivial constraints).	15	2. To locate points to a given coordinates in space and then verify the distance using distance formula. 3. To measure the shortest distance between two skew lines and verify it analytically. Project 1.To minimise the cost of the food, meeting the dietary requirements of the staple food of the adolescent students of your school.
NOVEMBER	**UNIT – 6 (PROBABILITY)** **Probability** : Conditional probability, multiplication theorem on probability, independent events, total probability, Bayes' theorem, Random variable and its probability distribution. Mean of random variable **REVISION should start preferably from 11th November , 2022**	15	Project 1. 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.
DECEMBER	REVISION	**15**	
JANUUARY	REVISION	**15**	
FEBRUARY	REVISION	**15**	