

ACADEMIC PLAN (2019-2020)

SUBJECT: MATHEMATICS

CLASS XII

One paper

Three Hours

Max.Marks:80

S.No.	Topic	Marks
1.	RELATIONS, FUNCTIONS AND INVERSE TRIGONOMETRIC FUNCTIONS	08
2.	ALGEBRA	10
3.	CALCULUS	35
4.	VECTORS AND THREE –DIMENSIONAL GEOMETRY	14
5.	LINEAR PROGRAMMING	05
6.	PROBABILITY	08
	TOTAL	80

UNIT - RELATIONS, FUNCTIONS AND INVERSE TRIGONOMETRIC FUNCTIONS		Weightage	No. of Periods
		08 Marks	16
Concept Note :	Trigonometry as the name implies, involves the study of measurement of triangles in relation to their sides and angles. It is interesting to note that trigonometry has a very significant relevance in real life hunting, travelling and is well applied in the field of sciences, engineering, and navigation of ships, aero planes and astronomy.		
Topics: MARCH – 2019	INVERSE TRIGONOMETRIC FUNCTIONS : Periods (08) Definition, range, domain, principal value branches. Graphs of inverse trigonometric functions. Elementary properties of inverse trigonometric functions.		
Reference books :	<ul style="list-style-type: none"> • Mathematics Part – I, Textbook for class XII, NCERT Publication • NCERT Mathematics Exemplar 		

UNIT – ALGEBRA		Weightage	No. of Periods
		10 Marks	18
Concept Note :	Matrices and determinants are used in different areas of business, science like budgeting, sales projection, cost estimation, analyzing the results of experiments etc. It is not only used in certain branches of science but also in genetic, economics, sociology, modern psychology and industrial management.		
Topics: APRIL – 2019	MATRICES : Periods (08) 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). Concept of elementary row and column operations. Invertible matrices and proof of the uniqueness of inverse, if it exists; (Here all matrices will have real entries).		
APRIL – 2019	DETERMINANTS: Periods (10) Determinant of a square matrix (up to 3×3 matrices), properties of determinants, 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.
Reference books :	<ul style="list-style-type: none"> • Mathematics Part – I, Textbook for class XII, NCERT Publication • NCERT Mathematics Exemplar
Common Errors :	<ul style="list-style-type: none"> ➤ While finding the determinant, students write [] instead of ➤ While finding the determinant using the properties, generally students forget to write the respective operations. ➤ While finding out the minors and cofactors students generally forget to consider the –ve sign, when sum of i and j is odd. ➤ While finding the inverse of a matrix using the elementary operations, students should apply row operations on pre factor and column operations on post factor.

UNIT - CALCULUS		Weightage	No. of Periods
		35 Marks	60
Concept Note :	Calculus is used in every branch of the physical sciences, actuarial science, computer science, statistics, engineering, economics, business, medicine, demography, and in other fields wherever a problem can be mathematically modeled and an optimal solution is desired. It allows one to go from (non-constant) rates of change to the total change or vice versa.		
Topics: APRIL - 2019	CONTINUITY AND DIFFERENTIABILITY:	Periods (10)	
	Continuity and differentiability, derivative of composite functions, chain rule, derivatives of inverse trigonometric functions, derivative of implicit function. Concepts of exponential, logarithmic functions and their derivative. Logarithmic differentiation. Derivative of functions expressed in parametric forms. Second order derivatives.		
MAY - 2019	APPLICATIONS OF DERIVATIVES:	Periods (6)	
	Rate of change, Approximation, Rolle's and Lagrange's Mean Value Theorems (without proof) and their geometric interpretations.		
	APPLICATIONS OF DERIVATIVES:	Periods (8)	
	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).		

<p>MAY – 2019</p>	<p>INDEFINITE INTEGRALS : Periods (14)</p> <p>Integration as inverse process of differentiation. Integration of a variety of functions by substitution, Integration by parts.</p> <p>Special integrals of the type</p> $\int \frac{dx}{x^2 \pm a^2}, \int \frac{dx}{\sqrt{x^2 \pm a^2}}, \int \frac{dx}{\sqrt{a^2 - x^2}}, \int \frac{dx}{ax^2 + bx + c}, \int \frac{dx}{\sqrt{ax^2 + bx + c}},$ $\int \frac{(px+q)}{ax^2+bx+c} dx, \int \frac{(px+q)}{\sqrt{ax^2+bx+c}} dx, \int \sqrt{a^2 \pm x^2} dx, \int \sqrt{x^2 - a^2} dx,$ $\int \sqrt{ax^2 + bx + c} dx \text{ and } \int (px + q)\sqrt{ax^2 + bx + c} dx \text{ to be evaluated.}$ <p>Integration by partial fractions.</p>
<p>JULY - 2019</p>	<p style="text-align: center;">TERM I EXAM (80 MARKS)</p> <p style="text-align: center;">Discussion on errors committed by students in the term exam</p>
<p>JULY - 2019</p>	<p>DEFINITE INTEGRALS : Periods (08)</p> <p>Definite integrals as a limit of a sum. Fundamental Theorem of Calculus (without proof). Basic properties of definite integrals and evaluation of definite integrals.</p>
<p>JULY – 2019</p>	<p>APPLICATIONS OF INTEGRALS : Periods (06)</p> <p>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).</p>
<p>AUGUST - 2019</p> <p>Reference books :</p>	<p>DIFFERENTIAL EQUATIONS : Periods (08)</p> <p>Definition, order and degree, general and particular solutions of a differential equation. Formation of differential equation whose general solution is given. 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 –</p> $\frac{dy}{dx} + Py = Q, \text{ where } P \text{ and } Q \text{ are functions of } x \text{ or constant}$ $\frac{dx}{dy} + Px = Q, \text{ where } P \text{ and } Q \text{ are functions of } y \text{ or constant}$ <ul style="list-style-type: none"> • Mathematics Part – I, Textbook for class XII, NCERT Publication • Mathematics Part – II, Textbook for class XII, NCERT Publication • NCERT Mathematics Exemplar

Common Errors :	<ul style="list-style-type: none"> ➤ Dropping the limit notation. ➤ Dropping the integration constant C. ➤ Dropping the absolute value when integrating $\int \frac{1}{x} dx$. ➤ While finding the intervals on which given function is increasing or decreasing, firstly factorize the $f'(x)$ into linear factors. When –ve sign is there, generally students forget to take that –ve sign while finding out the sign of $f'(x)$. ➤ While finding the degree of a differential equation involving the radical sign as $\frac{1}{2}$ or $\frac{1}{3}$, students should not square or cube both the sides of the differential equation to get the degree, as it changes the parent differential equation.
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UNIT – LINEAR PROGRAMMING		Weightage	No. of Periods
		05 Marks	06
Concept Note :	<p>Linear programming is the process of taking various linear inequalities relating to some situation, and finding the "best" value obtainable under those conditions. A typical example would be taking the limitations of materials and labor, and then determining the "best" production levels for maximal profits under those conditions. In "real life", linear programming is part of a very important area of mathematics called "optimization techniques". This field of study is used every day in the organization and allocation of resources. These "real life" systems can have dozens or hundreds of variables, or more. In algebra, though, you'll only work with the simple two-variable linear case.</p>		
AUGUST – 2019	<p>LINEAR PROGRAMMING:</p> <p>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, feasible and infeasible solutions, optimal feasible solutions (up to three non-trivial constraints).</p>	Periods (06)	
Reference books :	<ul style="list-style-type: none"> • Mathematics Part – II, Textbook for class XII, NCERT Publication • NCERT Mathematics Exemplar 		
Common Errors :	<ul style="list-style-type: none"> ➤ Students forget to shade required portion according to less than or greater than inequality per line. ➤ Students forget to shade final solution set of all the inequalities. 		

UNIT – PROBABILITY		Weightage	No. of Periods
		08 Marks	15
Concept Note :	Probability is ordinarily used to describe an attitude of mind towards some proposition of whose truth we are not certain. The proposition of interest is usually of the form "Will a specific event occur?" The attitude of mind is of the form "How certain are we that the event will occur?" The certainty we adopt can be described in terms of a numerical measure and this number, between 0 and 1. The concept has been given an axiomatic mathematical derivation in probability theory, which is used widely in such areas of study as mathematics, statistics, finance, gambling, science, artificial intelligence/machine learning and philosophy to, for example, draw inferences about the likeliness of events. Probability is used to describe the underlying mechanics and regularities of complex systems.		
AUGUST – 2019	PROBABILITY:	Periods (15)	
	Multiplications 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.		
Reference books :	<ul style="list-style-type: none"> • Mathematics Part – II, Textbook for class XII, NCERT Publication • NCERT Mathematics Exemplar 		
Common Errors :	<ul style="list-style-type: none"> ➤ Generally, students confuse in evaluating $P(A/E)$ or $P(E/A)$ in Baye's theorem. ➤ In various problems, students are unable to understand whether they have to apply combinations or not. ➤ In various question of probability distributions, students fails to decide whether binomial distribution can be used or not. ➤ In Baye's theorem, students are not able to define and describe the events properly. 		
SEPTEMBER – 2019	REVISION TERM II EXAM (80 MARKS) Discussion on errors committed by students in the term exam		

UNIT – VECTORS AND THREE – DIMENSIONAL GEOMETRY		Weightage	No. of Periods
		14 Marks	20
Concept Note :	<p>Vectors are drawn usually to determine the resultant force. This application is used in the construction of buildings, such as houses. The different forces acting on the house are calculated. In this case, vectors are applied, so as to ensure that there isn't a resultant force, and ensure that the building will be stable and not collapse. Three-dimensional geometry is used to create 3-D models that can be created by hand, algorithmically or scanned. Many computer games used pre-rendered images of 3-D models as sprites before computers could render them in real-time. 3-D models are used in the medical industry, video game industry. The architecture industry uses them to demonstrate proposed buildings and landscapes through Software Architectural Models. The engineering community uses them as designs of new devices, vehicles and structures as well as a host of other uses. In recent decades the earth science community has started to construct 3-D geological models as a standard practice.</p>		
OCTOBER– 2019	<p>VECTORS: Periods (08) Vectors and scalars, magnitude and direction of a vector. Direction cosines/ratios of vectors. 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, projection of a vector on a line. Vector (cross) product of vectors, scalar triple product.</p> <p>THREE – DIMENSIONAL GEOMETRY: (LINES) Periods (06) 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,</p> <p>THREE – DIMENSIONAL GEOMETRY: (PLANES) Periods (06) 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.</p>		
Common Errors :	<ul style="list-style-type: none"> ➤ Dropping the vector notation. ➤ Dropping the n in the cross product ➤ Generally students forget to put the dot sign in the dot product of two vectors. 		
TOPIC : NOVEMBER - 2019	<p>RELATIONS AND FUNCTIONS: Periods (08) Types of relations: Reflexive, symmetric, transitive and equivalence relations. One to one and onto functions, composite functions, inverse of a function. Binary operations.</p>		
Common Errors :	<ul style="list-style-type: none"> ➤ In the questions of equivalence relation, while proving the symmetric relation, they actually prove the reflexivity & vice-versa. ➤ In onto function, generally students find the value of x in terms of y 		

	<p>but they forget to show that the value of x (in terms of y) belongs to domain of given function.</p> <p>➤ In binary operation, while finding the identity & inverse elements, they do not ensure that the identity & inverse elements belonging to the given set.</p>
Reference books :	<ul style="list-style-type: none"> • Mathematics Part – I, II Textbook for class XII, NCERT Publication • NCERT Mathematics Exemplar

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