CLASS - XI

SEMESTER – I

SUBJECT: MATHEMATICS (MATH)

FULL MARKS: 40 **CONTACT HOURS: 100 Hours**

COURSE CODE : THEORY

UNIT No.	TOPICS	CONTACT HOURS	MARKS
UNIT-I	**SETS AND FUNCTIONS**	**45**	**15**
	1. Sets Sets and their representations, Empty set, Finite and Infinite sets, Equal sets, Subsets, Subsets of the set of real numbers especially intervals (with notations). Power set. Universal set. Venn diagrams. Union and Intersection of sets. Difference of sets. Complement of a set. Properties of Complement sets.	**15**	**4**
	2. Relations and Functions Ordered pairs. Cartesian product of sets, Number of elements in the Cartesian product of two finite sets. Cartesian product of the set of reals with itself (up to $R \times R \times R$). Definition of relation, pictorial diagrams, domain, co-domain and range of a relation. Function as a special kind of relation from one set to another. Pictorial representation of a function, domain, co-domain and range of a function. Real valued functions, domain and range of these functions, constant, identity, polynomial, rational, modulus, exponential, logarithmic, signum and greatest integer functions with their graphs. sum, difference, product and quotients of functions.	**15**	**4**
	3. Trigonometric Functions Positive and negative angles, Measuring angles in radians and in degrees and conversion from one measure to another. Definition of trigonometric functions with the help of unit circle. Truth of the identity $\sin^2 x + \cos^2 x = 1$, for all x. Signs of trigonometric functions, domain, range and sketch their graphs. Expressing $\sin(x \pm y)$ and $\cos(x \pm y)$ in terms of $\sin x$, $\cos x$, $\sin y$ and $\cos y$.	**15**	**7**

UNIT No.	TOPICS	CONTACT HOURS	MARKS
	Deducing identities like the following: $\tan(x \pm y) = \frac{\tan x \pm \tan y}{1 \mp \tan x \tan y}$, $\cot(x \pm y) = \frac{\cot x \cot y \mp 1}{\cot y \pm \cot x}$ $\sin x + \sin y = 2 \sin \frac{x+y}{2} \cos \frac{x-y}{2}$ $\cos x + \cos y = 2 \cos \frac{x+y}{2} \cos \frac{x-y}{2}$, $\sin x - \sin y = 2 \cos \frac{x+y}{2} \sin \frac{x-y}{2}$, $\cos x - \cos y = -2 \sin \frac{x+y}{2} \sin \frac{x-y}{2}$ Identities related to sin2*x*, cos2*x*, tan2x, sin3*x*, cos3*x* and tan3*x*. General solutions of trigonometric equations of the type $\sin\theta = \sin\alpha$, $\cos\theta = \cos\alpha$ and $\tan\theta = \tan\alpha$.		
Unit-II	**ALGEBRA**	**30**	**15**
	1. Complex Numbers and Quadratic Equations Need for complex numbers, especially $\sqrt{-1}$, to be motivated by inability to solve some of the quadratic equations. Algebraic properties of complex numbers. Argand plane, polar representation of complex numbers, modulus, argument. solution of quadratic equation in complex number system. **2. Linear Inequalities** Linear inequalities. Algebraic solutions of linear inequalities in one variable and modulus function and their representation on the number line. Graphical solution of linear inequalities in two variables. **3. Permutations and Combinations** Fundamental principle of counting. Factorial n $(n!)$. Permutations and combinations, derivation of formulae for ${}^{n}P_{r}$ and ${}^{n}C_{r}$ and their connections, simple applications.	**13** **5** **12**	**6** **4** **5**
Unit-III	**CALCULUS**	**25**	**10**
	1. Limits and Derivatives Intuitive idea of limit. Limits of polynomials and rational functions, trigonometric, exponential and logarithmic functions. Derivative introduced as rate of change both as that of distance function and geometrically. Definition of derivative, relate it to scope of tangent of the curve, derivative of sum, difference, product and quotient of functions. Derivatives of polynomial and trigonometric functions.		

SEMESTER – II

SUBJECT: MATHEMATICS (MATH)

FULL MARKS: 40 **CONTACT HOURS: 80 HOURS**

COURSE CODE : THEORY

UNIT No.	TOPICS	CONTACT HOURS	MARKS
Unit-I	**ALGEBRA**	**35**	**15**
	1. Principle of Mathematical Induction Process of the proof by induction motivating the application of method by looking at natural numbers as the least inductive subset of real numbers. The principle of mathematical induction and simple applications.	**7**	**3**
	2. Binomial theorem History, Statement and proof of the binomial theorem for positive integral indices. Pascal's Triangle, General and middle term in Binomial expansion, Simple applications.	**13**	**6**
	3. Sequence and series Sequence and series. Arithmetic Progression (A.P.), Arithmetic Mean (A.M.), Geometric Progression (G.P.), Geometric Mean (G.M,) relation between A.M. & G.M., Arithmetic-Geometric Progression Series (AGP series), infinite G.P. and its sum, sum to *n* terms of the special series $\sum x, \sum x^2$ and $\sum x^3$	**15**	**6**
Unit-II	**COORDINATE GEOMETRY (2D)**	**30**	**15**
	1. Straight lines Brief recall of two dimensional geometry from earlier classes. Slope of a line and angle between two lines. Various forms of equations of a line: Parallel to Axis, Point–slope form, slope intercept form, two point form, intercept form, distance of a point from a line.	**10**	**5**
	2. Conic sections Sections of a Cone: circle, ellipse, parabola, hyperbola, a point, a straight line and a pair of intersecting lines as a degenerated case of conic section; Standard equation of circle, general equation of circle, Standard equations and simple properties of Parabola, Ellipse and Hyperbola.	**20**	**10**

UNIT No.	TOPICS	CONTACT HOURS	MARKS
Unit-III	**STATISTICS AND PROBABILITY**	**15**	**10**
	1. Statistics Measures of dispersion: Range, mean deviation, variance and standard deviation of ungrouped/ grouped data	**5**	**3**
	2. Probability Random experiments, outcomes, Sample spaces (set representation), Events: Occurrence of events, 'not', 'and' and 'or' events, exhaustive events, mutually exclusive events, Axiomatic (set theoretic) probability, connections with other theories of earlier classes. Probability of an event, probability of 'not', 'and' and 'or' events.	**10**	**7**

[Note:20 Hours reserved for Remedial classes, Tutorials and Home Assignments.]

Course: Project for Class XI

Full Marks: 20

Projects should be conducted regularly throughout the year. A project notebook is to be prepared by each and every student where all the below mentioned activities should be recorded. There should be a project assessment once a year (once in Class XI and once in Class XII) where the student will be asked to do one of the activities and write it in his/her script provided for the purpose. The student should carry his/her project notebook during the assessment. A viva should also be conducted during the assessment to test the knowledge of the student regarding the project activity.

List of Projects for Class XI

Sl. No.	Topics	Activities
1	Sequence and Series	To illustrate that the arithmetic mean of two different positive numbers is always greater than the geometric mean.
2	Complex Number	To interpret geometrically the meaning of $i = \sqrt{-1}$ and its integral powers.
3	Trigonometric Functions	To illustrate the values of sine and cosine functions for different angles which are multiples of $\frac{\pi}{2}$ and π.
4	Theory of Sets	To show that the total number of subsets of a given set with 'n' number of elements is 2^n .
5	Theory of Sets	Theoretic Operations using Venn Diagrams.
6	Relations and Functions	To verify that for two sets A and B, $n(A \times B) = pq$ and the total number of relations from A and B is 2^{pq}, where $n(A) = p$ and $n(B) = q$.
7	Limits and Derivatives	To find analytically $\lim_{x \to c} f(x) = \frac{x^2 - c^2}{x - c}$
8	Probability	To write the sample space, when a coin is tossed once, two times, three times.
9	Conic Sections	To recognize different types of conics and its parts.
10	Permutations and Combinations	To find out the number of permutations and combinations from a set of 3 different objects taking 2 at a time.

Marks Division for the Project Assessment

Sl. No.	Item	Marks
1	Project Notebook	10
2	Doing and writing a project during the project assessment	5
3	Viva	5
	Total	**20**