

ACADEMIC PLAN (2019-2020)

SUBJECT: MATHEMATICS

CLASS XI

One paper

Three Hours

Max.Marks:80

S.No.	Topic	Marks
1.	SETS AND FUNCTIONS	23
2.	ALGEBRA	30
3.	COORDINATE GEOMETRY	10
4.	CALCULUS	05
5.	MATHEMATICAL REASONING	02
6.	STATISTICS AND PROBABILITY	10
	TOTAL	80
	INTERNAL ASSESSMENT	20

APRIL-2019

➤ SETS

(12 Periods)

TEACHING OBJECTIVES: The students will be

- i. Familiar with the terminology used with sets and venn diagrams.
- ii. Able to perform various operations on sets such as union, intersection, difference etc.
- iii. Able to apply the various operations to practical problems.

SYLLABUS:

- Sets and their representations.
- Empty set, Finite & Infinite sets, Equal sets.
- Subsets. Subsets of the set of real numbers. Intervals as subsets of \mathbb{R} . Power set. Universal set.
- Venn diagrams. Operation on sets such as union, intersection, difference and complement of sets, Properties of complement.

MAY-2019

➤ **RELATIONS AND FUNCTIONS** (10 Periods)

TEACHING OBJECTIVES: The students will be able to

- i. Compute the Cartesian product of sets.
- ii. Define a relation.
- iii. Understand that function is a special type of relation.
- iv. Find the domain, co-domain and range of a function.
- v. Draw the graphs of various important functions.
- vi. Perform the algebraic operations on real functions.

SYLLABUS:

- Ordered pairs, Cartesian product of sets.
- Number of elements in the Cartesian product of two finite sets.
- Cartesian product of the reals with itself (upto $\mathbb{R} \times \mathbb{R} \times \mathbb{R}$).
- Definition of relation, pictorial diagrams, domain, co-domain and range of a relation.
- Definition of function, pictorial representation, domain, co-domain and range of a function.
- Real valued function of the real variable, domain and range of these functions, constant, identity, polynomial, rational, modulus, signum and greatest integer functions with their graphs, exponential and logarithmic functions.
- Sum, difference, product and quotients of these functions.

➤ TRIGONOMETRIC FUNCTIONS

(15 Periods)

TEACHING OBJECTIVES: Upon successful completion of the chapter, a student will be able to:

a) Angles

- i. Measure angles in degrees and radians and convert from one system to the other.
- ii. Tell the exact radian and degree measures of the special angles.
- iii. Solve applied problems involving angles, arc length and radius of the circle.

b) Trigonometric circle

- i. State the definitions of sine & cosine of any angle on the unit circle.
- ii. Give the values of sine and cosine at specific angles on the unit circle.
- iii. Define tangent, cotangent, secant & cosecant in terms of sine and cosine.
- iv. Determine which quadrants have positive and negative trigonometric values.
- v. State and use the fundamental identities relating the trigonometric functions.
- vi. Graph the six trigonometric functions.

c) Analytical trigonometry

- i. State and use various trigonometric identities: addition, difference, double angle, half angle, product-to-sum, sum-to-product, etc.
- ii. Solve trigonometric equations.

SYLLABUS:

- Positive and negative angles.
- Measuring angles in radians & in degrees and conversion from one measure to another.
- Definition of trigonometric functions with the help of unit circle.
- Signs of trigonometric functions and sketching their graphs.
- Trigonometric functions of sum and difference of two angles.
- Deducing double angle, triple angle, half angle, product-to-sum and sum-to-product identities.
- Principal and general solutions of trigonometric equations.

UT-I (JULY)

JULY-2019

➤ **PRINCIPLE OF MATHEMATICAL INDUCTION** (06 Periods)

TEACHING OBJECTIVES: The students will be able to

- i. Appraise the principle of mathematical induction.
- ii. Prove the given statement using mathematical induction.

SYLLABUS:

- Processes of the proof by induction.
- Motivating the application of the method by looking at natural numbers as the least inductive subset of real numbers.
- The principle of mathematical induction and simple applications.

➤ **COMPLEX NUMBERS AND QUADRATIC EQUATIONS** (06 Periods)

TEACHING OBJECTIVES: The students will be able to

- i. Perform basic algebraic manipulation with complex numbers.
- ii. Understand the geometric interpretation of complex numbers.
- iii. Know methods of finding the n^{th} roots of complex numbers and the solutions of simple polynomial equations.

SYLLABUS:

- Need for complex numbers.
- Algebraic properties of complex numbers.
- Argand plane and polar representation of complex numbers.
- Statement of fundamental theorem of Algebra.
- Solution of quadratic equations in the complex number system.
- Square root of a complex number.

➤ **LINEAR INEQUALITIES**

(06 Periods)

TEACHING OBJECTIVES: The students will be able to

- i. Give examples for inequalities.
- ii. Solve linear inequalities in one variable.
- iii. Find the graphical solution of linear inequalities in two variables.
- iv. Solve the system of linear inequalities in two variables.

SYLLABUS:

- Linear inequalities.
- Algebraic solutions of linear inequalities in one variable and their representation on the number line.
- Graphical solutions of linear inequalities in two variables.
- Solution of system of linear inequalities in two variables.

AUGUST-2019

➤ **PERMUTATIONS AND COMBINATIONS**

(10 Periods)

TEACHING OBJECTIVES: The students will be able to

- i. Explain the fundamental principle of counting.
- ii. Compute factorials and derive the formula for ${}^n P_r$.
- iii. Understand the difference between permutation and combination.
- iv. Relation between ${}^n P_r$ and ${}^n C_r$.
- v. Solve practical problems based on arrangement and selection.

SYLLABUS:

- Fundamental principle of counting
- Factorial n ($n!$)
- Permutations and combinations; derivation of formulae and their connections, simple applications.

➤ **BINOMIAL THEOREM**

(06 Periods)

TEACHING OBJECTIVES: The students will be able to

- i. State and prove the Binomial Theorem for positive integral values.
- ii. Explain the pascal's triangle.
- iii. Compute the value of a given number using Binomial theorem.
- iv. Find the general and middle terms in a binomial expansion.

SYLLABUS:

- History, statement and proof of the binomial theorem for positive integral indices.
- Pascal's triangle, General and middle term in binomial expansion.
- Simple applications.

➤ **PROBABILITY**

(08 Periods)

TEACHING OBJECTIVES: The students will be able to

- i. Explain random experiments.
- ii. Find the sample space.
- iii. Define an event.
- iv. Cite examples for the various types of events.
- v. Describe the following events:
 - a. Complementary event,
 - b. The event 'A or B',
 - c. The event 'A but not B'.
- vi. Identify mutually exclusive events.
- vii. Give the exhaustive events of a random experiment.
- viii. Explain the axiomatic approach to probability.
- ix. Find probability of an event.

SYLLABUS:

- Random experiments: outcomes, sample spaces(set representation)
- Events: occurrence of events, 'not', 'and' & 'or' events, exhaustive events, mutually exclusive and exhaustive events
- Axiomatic probability
- Probability of an event, probability of 'not', 'and' & 'or' events

SEPTEMBER-2019

TERM I EXAMS

OCTOBER-2019

➤ **LIMITS AND DERIVATIVES**

(15 Periods)

TEACHING OBJECTIVES: The students will be able to

- i. Understand and accept the intuitive idea of limits.
- ii. Find the limits of polynomial, rational and trigonometric functions.
- iii. Understand the idea of derivatives of a function.
- iv. Find the derivatives of simple functions from first principle.
- v. Find derivatives using algebra of derivatives.

SYLLABUS:

- Derivatives introduced as rate of change both as that of distance function and geometrically.
- Intuitive idea of limit.
- Algebra of limits and evaluating limits of polynomial, rational and trigonometric functions.
- Sandwich theorem and related problems.
- Definition of derivative, its relation to slope of tangent of the curve.
- Derivative of sum, difference, product and quotient of functions.
- Derivative of polynomial and trigonometric functions.

NOVEMBER-2019

➤ **SEQUENCES AND SERIES**

(12 Periods)

TEACHING OBJECTIVES: The students will be able to

- i. Form a sequence.
- ii. Obtain the series corresponding to a sequence.
- iii. Recognize an arithmetic progression (A.P).
- iv. Find the general term and the sum of n terms of an A.P.

- v. Apply arithmetic mean in forming an arithmetic progression.
- vi. Recognize a geometric progression.
- vii. Find the general term and the sum to n terms of a G.P.
- viii. Find the geometric mean between two numbers.
- ix. Derive the relation between A.M and G.M.
- x. Deduce the sum to n terms of some special series.

SYLLABUS:

- Definition of a sequence and series
- Arithmetic progression (A.P); general term and sum to n terms of an A.P.
- Arithmetic mean(A.M.)
- Geometric progression; general term and sum to n term of a G.P.
- Geometric mean (G.M.)
- Relation between A.M. and G.M.
- Sum to n terms of the special series Σn , Σn^2 and Σn^3 .

➤ STRAIGHT LINES

(12 Periods)

TEACHING OBJECTIVES: The students will be able to

- i. Find the slope of a line.
- ii. Test the parallelism and perpendicularity of lines in terms of their slopes.
- iii. Estimate the angle between two lines.
- iv. Examine the collinearity of three points.
- v. Express the equation of a line in various forms such as point slope, intercept, normal form etc.
- vi. Find the distance of a point from a line.
- vii. Compute distance between two parallel lines.

SYLLABUS:

- Slope of a line and angle between two lines.
- Various forms of equations of a line: parallel to axes, point-slope form, slope-intercept form, two-point form, intercepts form and normal form.
- General equation of a line.
- Distance of a point from a line.
- Distance between two parallel lines.

DECEMBER - 2019

➤ CONIC SECTIONS

(14 Periods)

TEACHING OBJECTIVES: The students will be able to

- i. Explain how circle, parabola, ellipse and hyperbola form the sections of a cone.
- ii. Find the standard equations of circle, parabola, ellipse and hyperbola.
- iii. Find the length of the latus rectum of a parabola, ellipse and hyperbola.
- iv. Find the eccentricity of an ellipse and hyperbola.
- v. Solve the practical problems based on conic sections.

SYLLABUS:

- Sections of a cone: circle, parabola, ellipse, hyperbola, a point, a straight line and pair of intersecting lines as degenerated case of a conic section.
- Standard equation of a circle.
- Standard equations and simple properties of parabola, ellipse and a hyperbola.

➤ INTRODUCTION TO THREE-DIMENSIONAL GEOMETRY (08 Periods)

TEACHING OBJECTIVES: The students will be able to

- i. Explain coordinate axes and coordinate planes in three-dimensional space.
- ii. Find the coordinates of a point in a space.
- iii. Compute the distance between two points.
- iv. Apply the section formula in solving the problem.
- v. Find the mid-point of the line segment joining two points.

SYLLABUS:

- Coordinate axes and coordinate planes in three dimensions.
- Coordinates of a point in space.
- Distance between two points and section formula.

JANUARY - 2019

➤ STATISTICS

(08 Periods)

TEACHING OBJECTIVES: The students will be able to

- i. Find the range for a given data.
- ii. Compute the mean deviation for ungrouped data.
- iii. Calculate the mean deviation about mean and median for discrete and continuous frequency distributions.
- iv. Discuss the limitations of mean deviation.
- v. Find the variance and standard deviation for discrete and continuous frequency distributions.
- vi. Analyse a frequency distribution.
- vii. Compare two frequency distributions with same mean.

SYLLABUS:

- Measure of dispersion; mean deviation, variance and standard deviation of grouped/ungrouped data
- Analysis of frequency distributions with equal means but different variances.

➤ MATHEMATICAL REASONING

(03 Periods)

TEACHING OBJECTIVES: The students will be able to

- i. Cite examples for logical statements.
- ii. Form new statements from old.
- iii. Write the negation of a statement.
- iv. Identify compound statements.
- v. Write the contra positive and converse of a statement.
- vi. Rewrite the statement with “if-then”.
- vii. Validate a statement using the rules.
- viii. Verify a statement by the method of contradiction.
- ix. Show that a statement is false by giving counter examples.

SYLLABUS:

- Mathematically acceptable statements.
- Connected words/phrases- consolidating the understanding of “if and only if condition”, “implies”, “and/or”, “implied by”, “and”, “or”, “there exists” and their use through variety of examples related to real life and Mathematics.
- Validating the statements involving the connecting words difference between contradiction, converse and contra positive.

FEBRUARY-2019

REVISION AND DISCUSSION OF SAMPLE PAPERS.

FINAL TERM EXAMS.

DAVPS, SECTOR-49, GURUGRAM