WEST BENGAL COUNCIL OF HIGHER SECONDARY EDUCATION

SYLLABUS FOR CLASS XI AND XII

SUBJECT : MATHEMATICS (MATH)

Course Objectives

The Mathematics curriculum has undergone periodic revisions in response to the field's expansion and the changing demands of society. The senior secondary stage serves as a springboard for students to pursue professional programs in engineering, physical and biological science, commerce, or computer applications, or to pursue higher education in mathematics. In order to address the evolving demands of all student categories, the current revised syllabus has been created. More focus has been placed on the application of certain principles, drawing inspiration for the issues from real-world scenarios and other academic disciplines.

The following are the main goals of teaching mathematics to senior school students:

- To develop general interest in Mathematics as a discipline.
- To gain critical insight and knowledge of fundamental terminology, concepts, principles, symbols, and skills, especially through motivation and visualization, as well as mastery of underlying procedures and abilities.
- To experience the logic flowing while demonstrating an outcome or resolving an issue.
- To use the gained information and abilities to solve issues, using many approaches where feasible.
- To familiarize students with the various applications of mathematics in everyday life.
- Developing a sense of appreciation and respect for notable mathematicians and their contributions to mathematics is important.
- To cultivate an optimistic outlook in order to reason, evaluate, and speak coherently.
- To cultivate curiosity for the topic by taking part in competitions related to it.

Course Outcomes

At the end of the course the students are expected to develop expertise in various areas of the subject and gain critical insights into the background dynamics of the problem solving process.

The following are the major course outcomes. A student is expected to:

- Develop problem solving skills and apply mathematical concepts to real life situations.
- Cultivate critical thinking and analytical skills in mathematical context.
- Collaborate with peers to solve complex mathematical problems.
- Make predictions and draw conclusions based on statistical data.
- Get a preliminary idea of using technology, like calculators in problem solving.
- Effectively communicate mathematical ideas and solutions both verbally and in writing.
- Present mathematical arguments and justifications.
- Prepare for standardized examinations based on the curriculum.
- Understand the relevance of mathematics in real-world applications.

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.	**13**	**6**
	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.	**5**	**4**
	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.	**12**	**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.		