

# **Integrated Certificate Diploma Programme**

## **SYLLABUS & SCHEME**

(From the Academic Year 2021-22 Onwards)

### **BOARD OF STUDY**



**DEPARTMENT OF MATHEMATICS**  
**SANT LONGOWAL INSTITUTE OF ENGINEERING & TECHNOLOGY**  
(Deemed to be University under Ministry of Education, Govt. of India)  
**Longowal – 148106 (Punjab) INDIA**

**Integrated Certificate Diploma Programme**

Title of the course : **Mathematics - I**  
 Subject Code : **AM - 111**  
 Weekly load : 5 Hrs.  
 Credit : 5 (Lecture 4; Tutorial 1; Practical 0)

L T P 4-1-0

Unit	Main Topics	Course outlines	Lecture(s)
<b>Unit-1</b>	1. Algebra	Arithmetic and Geometric Progression, to find $\sum n, \sum n^2, \sum n^3$ Mathematical Induction- simple problems. Fundamental principle of counting, Permutations: with distinct and non-distinct objects, Combinations, simple problems.	10
	2. Binomial Theorem	Binomial theorem for positive integral index (without proof), general and particular terms. Binomial theorem for any index (without proof), simple problems.	8
	3. Trigonometry	Introduction to trigonometric formulae, Trigonometric ratios of multiple and sub-multiple angles (2A, 3A, A/2), Product formulae, conversion from sum or difference to product and vice-versa (without proof), Solutions of simple trigonometric equations, Inverse trigonometric functions and their properties.	12
<b>Unit-2</b>	4. Complex Numbers	Complex number in the form of $a + ib$ , Argand diagram, algebra of complex numbers, modulus and argument of a complex number, polar form and exponential form, square root of a complex number.	6
	5. Straight Line	Distance and section formulae. Equation of straight line in various standard forms, intersection of two straight lines, angle between two lines, condition for two lines to be parallel and perpendicular, perpendicular distance of a point from a line.	12
	6. Conic Section	General equation of a circle, diameter form, centre and radius of a circle, circle through three non-collinear points. Parabola, ellipse and hyperbola (standard equations only) and their properties.	12

**Total = 60**

**Recommended Books:**

1. Mathematics - Text books for class XI, NCERT, New Delhi.
2. Mathematics for class XI, Kalyani Publishers.

**Integrated Certificate Diploma Programme**

Title of the course : **Mathematics - II**  
Subject Code : **AM - 121**  
Weekly load : 5 Hrs.  
Credit : 5 (Lecture 4; Tutorial 1; Practical 0)

L T P 4-1-0

Unit	Main Topics	Course outlines	Lecture(s)
<b>Unit-1</b>	1. Limit and Continuity	Functions, types of functions, composite function, invertible function, domain and range. Concept of limit, Standard limits. Continuity of a function at a point and in an interval.	8
	2. Differentiation	Physical & geometrical meaning of derivative of a function, differentiation of $x^n$ , $\sin x$ , $\cos x$ , and $a^x$ from the first principle. Differentiation of sum, difference, product and quotient of functions. Differentiation of function of a function (Chain rule), differentiation of inverse trigonometric functions, Logarithmic and parametric differentiation, Differentiation of implicit functions, Second order derivative.	10
	3. Application of Differentiation	Rolle's theorem and Lagrange's mean value theorem (without proof). Rate of change of quantities, increasing and decreasing functions, tangent and normal, Maxima and Minima of a function second derivative test, maximum and minimum values of a function in a closed interval.	12
<b>Unit-2</b>	4. Integration	Integration as anti-derivative, fundamental integrals involving algebraic, trigonometric, exponential and logarithmic functions. Integration by substitution and by parts. Partial fractions and integration using partial fractions. Integration of rational and irrational functions.	16
	5. Definite Integral	Definite integral, evaluation of definite integral by substitution. Properties of definite integral and simple problems.	7
	6. Application of Integration	Area under a curve. Area between two curves (involving line, circle, parabola and ellipse only).	7

**Total=60****Recommended Books:**

1. Mathematics - Text books for class XII, Part I and II, NCERT, New Delhi.

**Integrated Certificate Diploma Programme**

Title of the course : **Applied Mathematics**  
 Subject Code : **AM – 211/ AM - 221**  
 Weekly load : 4 Hrs.  
 Credit : 4 (Lecture 3; Tutorial 1; Practical 0)

L T P 3-1-0

Unit	Main Topics	Course outlines	Lecture(s)
	1. Matrices and Determinants	Introduction to matrices, types of matrices, operations on matrices, transpose of a matrix, symmetric and skew-symmetric matrices, elementary operations (transformation) on a matrix. Determinants, minors, cofactors, expansion of a determinant, properties of determinants. Adjoint of a matrix.	7
	2. Applications of Matrices and Determinants	Inverse of a matrix. Solution of linear simultaneous equations up to three variables by Cramer’s rule and by matrix method.	6
	3. Three Dimensional Geometry	Introduction, Direction Cosine and Direction Ratios of a line, Plane, Equations of plane in various forms, Angle between two planes, Distance of a point from a plane, Angle between line and plane. Equation of line in space, Coplanarity of Two Lines, Angle between two lines, Shortest distance between two skew lines.	10
<b>Unit-2</b>	4. Statistics	Measures of dispersion: Range, Mean Deviation, Standard Deviation, Coefficient of Variation, Analysis of frequency distributions using coefficient of variation.	7
	5. Probability	Introduction, Random experiment, Event, Axiomatic approach to probability, Conditional Probability, Independent Events.	8
	6. Differential Equations	Ordinary differential equations, order and degree. Formation of a differential equation. General and particular solution of a differential equation. Solution of a differential equation of first order and first degree - variable separable method, homogeneous differential equation, solution of first order linear differential equation.	7

**Total = 45**

**Recommended Books:**

1. Mathematics - Text books for class XII, Part I and II, NCERT, New Delhi.