Integrated Certificate Diploma Programme

SYLLABUS

(From the Academic Year 2023 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

The Board of Study meeting of Integrated Certificate and Diploma Program for the subject Mathematics was held in the Department of Mathematics on 15/05/2023. Following members were present:

Chairman

- Dr. V.K. Kukreja, Head, Department of Mathematics, SLIET Longowal

External Members

- Dr. Gauree Shankar, Department of Mathematics, Central University of Punjab, Bathinda

Members

- Dr. S.S. Dhaliwal
- Dr. Mandeep Singh
- Dr. Vinod Mishra
- Dr. Sushma Gupta
- Dr. J.R. Sharma
- Dr. R.K. Mishra
- Dr. R.K. Guha
- Dr. Yogesh Kapil
- Dr. Sudhir Kumar

Alumni Member

- Ms. Anju, Research Scholar, Department of Mathematics, SLIET Longowal

Title of the course : Mathematics - I
Subject Code : BSMA - 101
Weekly load : 4 Hrs. L T P 3-1-0
Credit : 4 (Lecture 3; Tutorial 1; Practical 0)

Objective: The objective of this course is to familiarize diploma students with basic tools of Algebra, Complex number, Trigonometry, Co-ordinate geometry, Matrices & Determinants. It aims to enable the students to apply these tools in their branch of study, so that they are at ease to tackle day to day problems which they will come across in their chosen area of work.

Unit	Main Topics	Course outlines	Lecture(s)
Unit-1	1. Algebra	Fundamental principle of counting, Permutations: with distinct and non-distinct objects, Combinations, simple problems. Binomial theorem for positive integral index (without proof), general and particular terms. Binomial theorem for any index (without proof), simple problems.	10
	2. 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.	5
	3. Trigonometry	Trigonometric formulae (A, B & C, D). Solutions of simple trigonometric equations, Inverse trigonometric functions and their properties.	7
Unit-2	4.Coordinate Geometry	Equation of straight line in various standard forms angle between two lines, condition for two lines to be parallel and perpendicular, perpendicular distance of a point from a line. General equation of a circle, parabola, ellipse and hyperbola (standard equations only) and their properties.	10
	5.Matrices and Determinants	Introduction to matrices, types of matrices, algebra of matrices, transpose of a matrix, symmetric and skew-symmetric matrices. Determinants, minors, cofactors, expansion of a determinant, properties of determinants.	8
	6. Applications ofMatrices and Determinants	Adjoint of a matrix, Inverse of a matrix. Solution of linear simultaneous equations up to three variables by Cramer's rule and by matrix method.	5

Recommended Books:

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

After completion of this course students will learn:

1. Basic concepts of fundamental of counting, Permutations, Combinations and Binomial theorems.
2. Complex number and its properties.
3. Formulae of Trigonometric and Inverse Trigonometric functions.
4. Mathematical formulations of straight line, circle and conic sections.
5. Basic operations on matrices and determinants and their applications.

Title of the course : Mathematics - II
Subject Code : BSMA - 102
Weekly load : 4 Hrs. L T P 3-1-0
Credit : 4 (Lecture 3; Tutorial 1; Practical 0)

Objective: The objective of this course is to familiarize diploma students with basic knowledge of limit and continuity, differentiation, integration and differential equations. It aims to enable the students to apply these mathematical tools in their branch of study, so that they are at ease to tackle day to day problems which they will come across in their chosen area of work.

Unit	Main Topics	Course outlines	Lecture(s)
Unit-1	1. Limit and Continuity	Functions, types of functions, composite function, invertible function. Concept of limit, Standard limits. Continuity of a function at a point and in an interval.	7
	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.	9
	3. Application of Differentiation	Rolle's theorem and Lagrange's mean value theorem (without proof). tangent and normal, Maxima and Minima of a function second derivative test.	6
Unit-2	4. Integration	Integration as anti-derivative, fundamental integrals involving algebraic, trigonometric, exponential and logarithmic functions. Integration by substitution and by parts. integration using partial fractions. Integration of rational and irrational functions.	10
	5. Definite Integral	Definite integral, evaluation of definite integral by substitution. Properties of definite integral and simple problems. Area under a curve (involving line, circle, parabola and ellipse only).	6
	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

Recommended Books:

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

After completion of this course students will learn:

1. Definition of function and its properties, and concept of limit and continuity.
2. Differentiation of various type of functions and applications of differentiations.
3. Rules of Integration
4. Definite integration and its applications.
5. Basic methods of solving first order differential equations.