Syllabus of Mathematics Courses

in

Integrated Certificate Diploma (ICD) Programme

Integrated Certificate Diploma Programme

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

Theory

Unit	Main Topics	Course outlines	Lecture(s)
Unit-1	1. 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.	10
	2. Algebra	Arithmetic progression, geometric progression, arithmetico-geometric series. Special series: $\sum n$, $\sum n^2$, $\sum n^3$. Mathematical Induction- simple problems, Binomial theorem for positive integral index, general and particular terms. Binomial theorem for any index (without proof), first and second approximation, simple problems.	14
	3. 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, cube root of unity. De-Moivre's theorem (without proof) and simple problems.	8
Unit-2	4. Straight Line	Distance formula, 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 formula. Equations of straight lines bisecting angle between two lines.	10
	5. Circle	General equation of a circle, diameter form, centre and radius of a circle, circle through three non-collinear points, tangent and normal to a circle at a given point on it. Intersection of a straight line and a circle. Orthogonal circles.	8
	6. Conic Section	Parabola, ellipse and hyperbola. To find equation when directrix, focus and eccentricity are given. Finding focus, directrix, latus-rectum, axes, eccentricity, vertex etc. when equation of the conic is given.	10

Total = 60

Recommended Books:

1. Text books on Mathematics for XI, NCERT, New Delhi.
2. G. B. Thomas and R. L. Finney, Calculus and Analytic Geometry, Pearson Education (2010).
3. S. L. Loney, The elements of coordinate geometry, by Michigan Historical Reprint Series (2012).

Integrated Certificate Diploma Programme

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

Theory

Unit	Main Topics	Course outlines	Lecture(s)
Unit-1	1. Functions	Functions, types of functions, 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, tan x, sec x, cosec x, cot x, e^x, a^x and log 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 and hyperbolic functions. Logarithmic and parametric differentiation. Differentiation of implicit functions.	10
	3. Application of Differentiation	Expansion of functions using Taylor and Maclaurin's series. Maxima and minima of a function. Equations of tangent and normal (for explicit function only). Indeterminate forms, L'Hospital's Rule	12
Unit-2	4. Integration	Integration as an 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. Four standard cases.	16
	5. Definite Integration	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. Text books on Mathematics for XII, NCERT, New Delhi.
2. Shanti Narayan, Differential Calculus, S. Chand & Co (2005).
3. Shanti Narayan, Integral Calculus, S. Chand & Co (2005).

Integrated Certificate Diploma Programme

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

Theory

Unit	Main Topics	Course outlines	Lecture(s)
Unit-1	1. Determinants	Determinants**,** minors, cofactors, expansion of a determinant, properties of determinants, solution of linear simultaneous equations upto three variables by Cramer's rule.	7
	2. Matrices	Introduction to matrices; addition; subtraction and multiplication of matrices. Inverse of a matrix by adjoint method. Solution of linear simultaneous equations upto three variables.	7
	3.Statistics	Measures of dispersion: Range, Mean Deviation, Variance and standard deviation, Analysis of frequency distributions.	8
Unit-2	4. Three Dimensional Geometry-1	Cartesian co-ordinate system. Distance formula. Section formulae. Direction ratios and direction cosines, Equation of a plane. Equations of a straight line. Condition for a line to lie in a plane. Coplanar lines.	7
	5. Three Dimensional Geometry-II	Shortest distance between two lines. Intersection of three planes. Equation of a sphere. Tangent plane to a sphere.	7
	6. Differential equations	Ordinary differential equations, its order and degree. Linear and non-linear differential equations. 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 linear differential equation.	9

Total = 45

Recommended Books:

1. E. Kreyszig, Advanced Engineering Mathematics, Wiley Eastern Ltd (2010).
2. G. B. Thomas and R. L. Finney, Calculus and Analytic Geometry, Pearson Education (2010).
3. B.V. Ramana, Higher Engineering Mathematics, Tata McGraw-Hill (2006).
4. Text books on Mathematics for XI, NCERT, New Delhi