

Subject :	Mathematics I	Units :	3
Code	E111		
Level	1st level	Theoretical :	3 Hr/wk
Pre-requisite:	None	Practical :	

Algebraic Preliminaries

Numbers, Sets, Inequalities, Absolute value.

Functions

Domain, Range, graphs, Symmetry, Asymptotes.

Limits

Definition of Limit, Theorems, Continuity, One-Sided Limits, Limits at Infinity, L Hopital's rule.

Derivatives

Definition, Power and Sum Rules, Product and Quotient Rules, Chain rule, High-Order derivatives, Implicit differentiation.

Applications of Derivative

Maximum and minimum, mean value theorem, Increasing and Decreasing Functions, Concavity and Points of inflection, Second Derivative Test.

Definite Integration

Definition, Integral Theorems, Length of a Curve, Areas, Volume of Solids, Surface Area, Indefinite Integrals.

Transcendental Functions

Trigonometric Functions, Graphs, Derivatives of trigonometric functions, Inverse trigonometric functions, Graphs, Derivatives of Inverse trigonometric functions, Natural Logarithm Functions, Exponential Functions, Functions a^u and $\log_a u$.

Subject :	Mathematics II	Units :	3
Code	E112		
Level	1st level	Theoretical :	3 Hr/wk
Pre-requisite:	E111	Practical :	

Complex Number

Invented number systems, The Argand diagram. Addition, Subtraction, product, Quotient, Power and Roots. Demoivers theorem.

Hyperbolic Functions

Definition, Derivatives, Integrals, Inverse Hyperbolic Functions.

Plane Analytic Geometry

Circle, Parabola, Ellipse, Hyperbola.

Methods of Integrations

integration by substitution, Trigonometric Integrals, Quadratic Functions, Integration by Parts, Integration by partial fractions, Integration of Rational Functions, improper integrals.

Matrices and Determinates

Definition, Properties of Matrices, Operations on Matrices, Determinants, Matrix Inverse, Solution of Linear Simultaneous Equations (Gramer's Rule).

Subject :	Mathematics III	Units :	3
Code	E211		
Level	2nd level	Theoretical :	3 Hr/wk
Pre-requisite:	E112	Practical :	

Polar Coordinates:

Polar coordinate system, Point representation in polar coordinates, Relationship between polar and Cartesian coordinate systems, Graphs in polar coordinates, Areas in polar coordinates, Derivatives in polar coordinates.

Vectors

Scalars and vectors, component of a vector, rules of vector arithmetic, norm of a vector, normalizing of vectors, dot product, cross product, product of three or more vectors, equations of lines in space, planes in 3-space.

Vector-valued functions

Limits and continuity, derivatives, forms of a curve equation in space, parametric representation, unit tangent and normal vectors, curvature, radius of curvature, motion along a curve, velocity, acceleration and speed, normal and tangential components of acceleration.

Sequences and Series:

Sequences, Infinite series, Tests for convergence of series nonnegative terms, Comparison test, Integral test, Ratio test, Root test, Absolute convergence, Alternating series, Power series, Maclaurin's series, Taylor's series, Applications of Power Series.

Subject :	Mathematics IV	Units :	3
Code	E212		
Level	2nd level	Theoretical :	3 Hr/wk
Pre-requisite:	E211	Practical :	

Partial differentiation:

Function of two or more variables, limits and continuity, partial derivatives, partial derivatives of functions of two variables, partial derivatives of functions with more than two variables, the chain rule, the chain rule for derivatives, the chain rule for partial derivatives, directional derivatives and gradients, directional derivatives, the gradient, tangent plans and normal vectors, maxima and minima of functions of two variables, Lagrange multipliers.

Multiple integrals:

Double integral, areas and volumes, double integral in polar coordinates, parametric surfaces, surface area, surface integrals, evaluation of volume and triple integral.

Differential Equations

Fundamental Definitions

- (i) First Order: variable separable, exact, linear, Bernoulli.
- (ii) second and Higher Order: Linear equation with constant coefficients, linear homogeneous equations with constant coefficients, non-homogenous equations, solving of non-homogenous equations, variation of parameters, higher order linear equations with constant coefficients, D-operator, Cauchy equation.

Laplace Transformation

Laplace Transformation Definition, Basic Properties of The Laplace Transformation, The Laplace Transformation of Elementary Functions, The Laplace Transform of $e^{at} f(t)$, The Laplace Transform of $t^n f(t)$, Laplace Transform of Periodic Function, Inverse Laplace transforms, The Solution of Differential Equations Using Laplace Transforms.