

## Mathematics

### 1-Revision and Basic Concepts:-

Function, trigonometric functions and their graphs ,trigonometric relation ,radian measures, even and odd functions, composite function, one-one and onto functions, the inverse of a function.

### 2- The circle and the conics:-

Equation ,graphs ,translation of axis.

### 3-Limits and continuity:-

Definition of limits by neighborhood and  $\delta$  and  $\epsilon$ , theorems on limits, limits from left and right, continuity , limits at infinity, using  $\lim_{x \rightarrow 0} \sin x / x$ .

Derivative as a limit, derivative of algebraic function(review),properties of differentiation, the chain rule, parametric forms, derivative of trigonometric functions Roll`s theorm, the mean value theorem, l`Hopital rule, approximation and differentiation ,higher order derivative, curve sketching, implicit differentiation.

### 4-Integration:-

Definite integrals, area by sums, properties of definite integral, fundamental theorem of calculus, intermediate value theorem , change of variable integration of some trigonometric function.

### 5- The logarithmic and exponential functions:-

Properties, graphs , differentiation. and integration.

### 6- The hyperbolic function:-

Definitions properties, graphs , differentiation. and integration.

### 7- The inverse of trigonometric and hyperbolic functions:-

Definition, graphs , differentiation, some integrals leading to inverse trigonometric and hyperbolic functions.

### 8- Methods of integration and improper integrals:-

Integration by parts integration of certain trigonometric functions, trigonometric substitution, integration of rational function, partial fractions other substitution, using the integral tables , improper integrals.

### 9-Application of definite integrals:-

Area under the curve, area between two curves ,volumes, arc length, surface area, center of mass and the first moment, the centroid at plane region.

### 10- polar coordinates:-

the polar coordinate system graphing in polar coordinate, point of intersection of graphs, derivative and tangent lines , areas in polar coordinates.

### 11- Complex numbers:-

Definitions, Argand`s diagram, product and quotient of two numbers , polar form, Euler form, roots of an equation, some important complex functions.