

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

$$\rightarrow X \quad 0$$

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

## 5-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.

## 6- The logarithmic and exponential functions:-

Properties, graphs , differentiation. and integration.

## 7- The hyperbolic function:-

Definitions properties, graphs , differentiation. and integration.

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

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

## 9- 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.

**10-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 of plane region.

**11- polar coordinates:-**

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

**12- Complex numbers:-**

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