



ASSIGNMENT NO 01

DEPARTMENT OF CIVIL ENGINEERING

SUBJECT: APPLIED CALCULAS

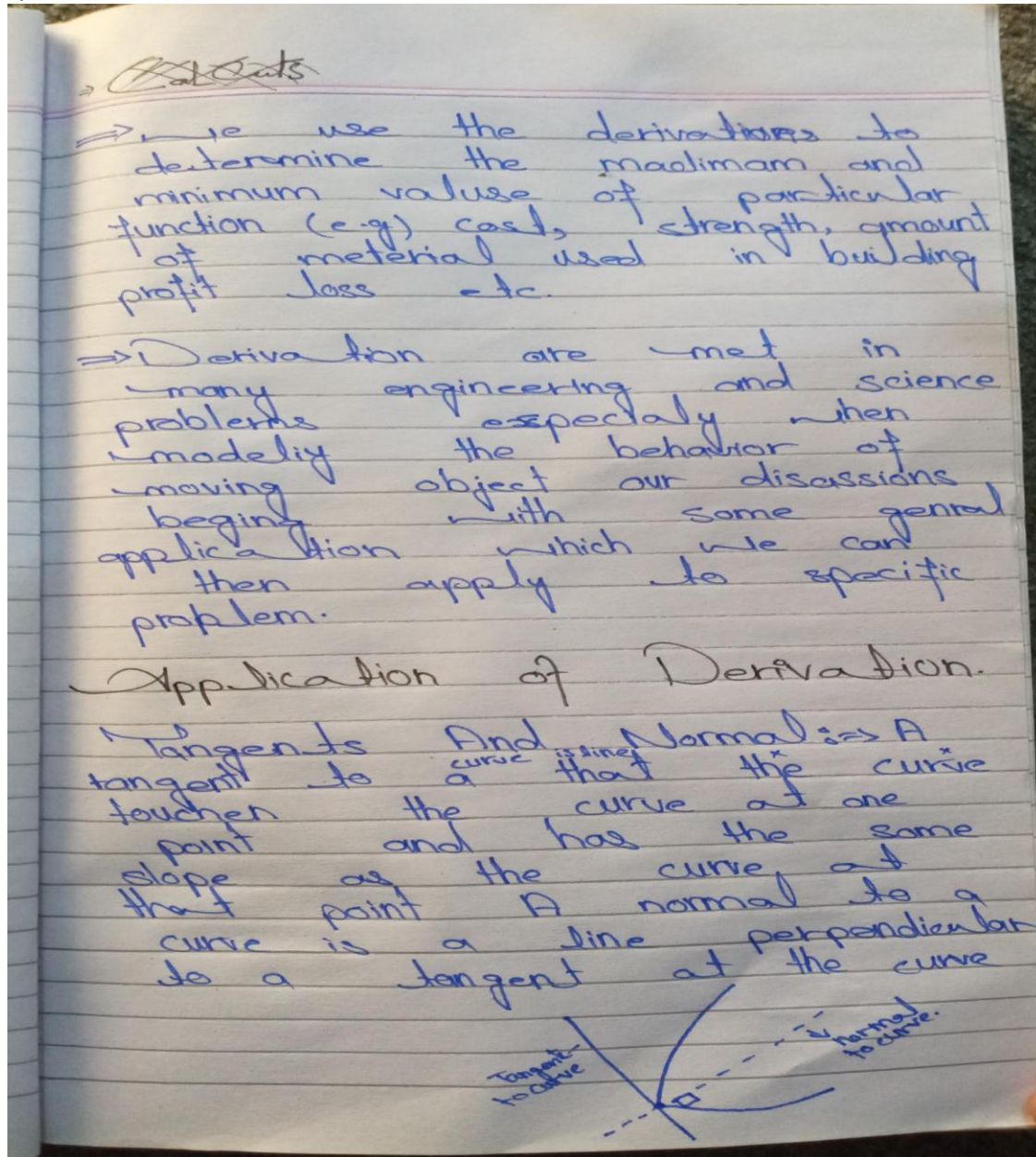
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Q NO 01: ANSWER



Notes we find the slope of a tangent at any point (x, y) using dy/dx

Tangents: If we are travelling in a car around a corner and we drive over some thing slippery on the road like oil, water and our car starts to slide it will continue in a direction tangent to the curve.

Normals: The spokes of a wheel are placed normal to the circular shape of the wheel at each point where the spoke connects with the center.

Newton Method: The process

involves making a guess at the true solution and then applying a formula to get a better guess and so on until we arrive at an acceptable approximation for

the solution and then
applying a formula to get

if we wish to find x
so that $f(x) = 0$ then we
guess some initial value
 x_0 which is close to desired
solution and then we get a
better approximation using
Newton Method

$$x_1 = x_0 - \frac{f(x_0)}{f'(x_0)}$$

Related Rates:

If two variables both vary with respect to time and have a relation between them, we can express the rate of change of one in terms of the other.

That is well be finding $\frac{df}{dt}$ for some function $f(t)$.

$$\text{Curvilinear Motion} \Rightarrow v = \frac{ds}{dt}, a = \frac{dv}{dt} = \frac{d^2s}{dt^2}$$

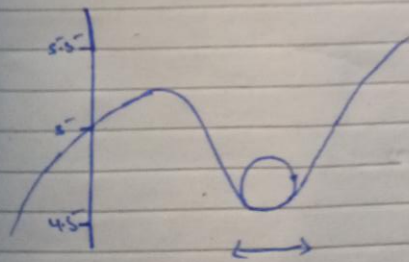
These formulae are only appropriate for rectilinear motion (velocity and acceleration in a straight line). This is inadequate for most real situations so we introduce here the concept of curvilinear motion where an object is moving in a plane along a specified curved path. We generally express the x and y components of the motion.

as function of time this form
is called parametric form.

Radius of curvature

$$\text{Radius of curvature} = \frac{1}{\left[1 + \left(\frac{dy}{dx}\right)^2\right]^{3/2}}$$

The radius of curvature of the curve at the particular point is defined as the radius of the approximating circle. This radius changes as we move along the curve. The formula for the radius of curvature of any point or for the curve $y = f(x)$



Load is applied at the centre with application of load the beam will bend.

⇒ Some force will develop inside the rod which will try to break the rod in direction of force that force is called shear force and product of that force with distance from either end is bending moment.

2) Length of curve ⇒

Iron sheeting ⇒

⇒ Corrugated iron is used extensively throughout the world as a versatile building material.

Bending the material into a regular sine wave pattern gives is greater strength than if a flat sheet is used

⇒ So integration is used to find out how wide should the flat sheet be to give us a corrugated sheet of required width.

3) Area under a curve by Integration:

In civil engineering when we are dealing with curve or structure having curve then may need to find the area under the curve which is to be constructed so we use integration for this purpose.

$$\text{Area} = \int_a^b f(x) dx$$

4) Moment of Inertia by Integration

Moment of inertia is a geometrical property of a section of a structural member which is required to measure its resistance to bending and buckling.

⇒ 2nd moment of Inertia about x-axis

$$I_{xx} = \int A y^2 dA$$

where y is the y coordinate of the differential element

of area dA

\Rightarrow moment of inertia about y -axis

$$I_y = \int A x^2 dA$$

where x is the x -coordinate
of element dA

Centroid of an Area By Integrations

In tilt-slab construction we have a cut out concrete wall (with doors and windows cut out) which we need to raise in to position we don't want the wall to crack as we raise it so we need to know the centre of mass of the wall we can find the centroid of an area with straight sides then we will give sides where will use integration.

