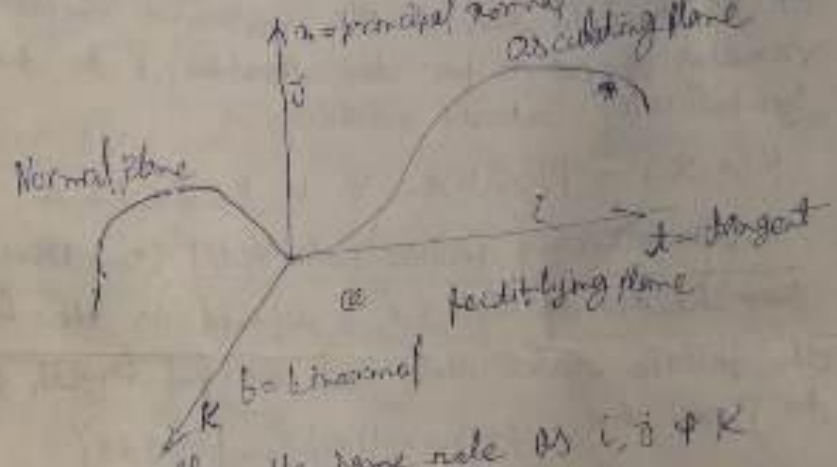
Equation of normal plane :- (rectifying plane)

where R = Position vector of current point
r = Position vector of any point
And t = tangent vector of any point

$t = \frac{dr}{dt} = \frac{dr}{ds}$ or $v = ds/dt$

$\Rightarrow \boxed{(R - r) \cdot t = 0}$



t, n, b play the same role as i, j, k

$t \cdot t = n \cdot n = b \cdot b = 1$

$t \cdot n = n \cdot b = b \cdot t = 0$

And $t \times n = b$, $n \times b = t$, $b \times t = n$.

$t \times t = t \times b = n \times n = 0$

Principal Normal :- The plane which is $\perp$ to tangent is called principal normal
or, The plane which is lying in osculating plane is called principal normal.

Binormal :- The normal which is perpendicular to principal normal is called binormal, it is denoted by b
or, The normal which lying in normal plane is called binormal
or, The normal which is perpendicular to osculating plane is called binormal.

Osculating Plane:— The Plane which contain n & t is called osculating plane. (2)

or, The Plane which is ⊥ to binormal is called osculating Plane whose eqⁿ is

$$(R - r) \cdot b = 0$$

Normal plane:- The Plane which contain n & b is called normal plane.

or, The Plane which is ⊥ to tangent is called normal plane. whose eqⁿ is

$$(R - r) \cdot t = 0$$

Rectifying Plane:- The Plane which is contain b & t is called rectifying Plane.

or, The plane which is ⊥ to principal normal is called rectifying plane. whose eqⁿ is

$$(R - r) \cdot n = 0$$

Note:- (i) Eqⁿ of tangent Plane is

$$R = r + \lambda t$$

(ii) Eqⁿ of normal Plane is

$$R = r + \lambda n$$

(iii) Eqⁿ of binormal Plane

$$R = r + \lambda b$$

Curvature and Torsion:-

Curvature:- Differentiation of t w.r.t 's' is called curvature vector whose magnitude is denoted by K i.e $K = \left|\frac{dt}{ds}\right|$

The reciprocal of curvature is called radius of curvature which is denoted by ρ

i.e $\rho = \frac{1}{K}$

$$\Rightarrow \rho K = 1$$

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