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DEPT: COMPUTER ENGINEERING

MATRIC NO: 19/ENG 02/067

MAT102 ASSIGNMENT

S.N: 32

1.) Find a unit vector tangent to the space curve
 $x=t, y=t^2, z=t^3$ at the point where $t=1$.

$$r = xi + yj + zk$$

$$r = ti + t^2j + t^3k$$

$$\frac{dr}{dt} = i + 2tj + 3t^2k$$

When $t=1$

$$\frac{dr}{dt} = i + 2j + 3k$$

$$\left| \frac{dr}{dt} \right| = \sqrt{(1)^2 + (2)^2 + (3)^2}$$

$$= \sqrt{1+4+9}$$

$$= \sqrt{14}$$

$$= 3.74$$

$$T = \frac{dr/dt}{|dr/dt|}$$

$$= \frac{i + 2j + 3k}{3.74}$$

$$= \frac{i}{3.74} + \frac{2j}{3.74} + \frac{3k}{3.74}$$

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2.) Given that $A = 4t^3j + 5k$ and $B = 2t^2i + 4tj$, if $G = A \times B$. Find the integral of G from (0 to 1)

$$G = \begin{vmatrix} i & j & k \\ 0 & 4t^3 & 5 \\ 2t^2 & 4t & 0 \end{vmatrix}$$

$$G = i \begin{vmatrix} 4t^3 & 5 \\ 4t & 0 \end{vmatrix} - j \begin{vmatrix} 0 & 5 \\ 2t^2 & 0 \end{vmatrix} + k \begin{vmatrix} 0 & 4t^3 \\ 2t^2 & 4t \end{vmatrix}$$

$$G = i(0 - 20t) - j(0 - 10t^2) + k(0 - 8t^5)$$

$$G = -20ti + 10t^2j - 8t^5k$$

$$\int G = \int -20ti + 10t^2j - 8t^5k \, dt$$

$$= \left[\frac{-20t^2i}{2} + \frac{10t^3j}{3} - \frac{8t^6k}{6} \right]_0^1$$

$$= \left[-10t^2i + \frac{10t^3j}{3} - \frac{4t^6k}{3} \right]_0^1$$

$$= \left[-10(1)^2i + \frac{10(1)^3j}{3} - \frac{4(1)^6k}{3} \right] - [0]$$

$$= -10i + \frac{10j}{3} - \frac{4k}{3}$$

$$= -10i + 3.33j - 1.33k$$