

Assignment Submission || **Start Date:** 14-04-2020 - **End Date:** 19-04-2020

Assignment Title: ASSIGNMENT FOR MR OKUNLOLA AND DR OYELAMI'S GROUPS

Course Title: General Mathematics II

Course Code: MAT 102

Question

QUESTIONS

1. If $A=5i-7j-6k$, $B=j+4k$, $C=9i-4j+k$, find $-8(A+B).(C-A)$
2. Find a unit vector tangent to the space curve $x = -3t$, $y = t^2$, $z=4t^3$ at the point where $t=1$.
3. A particle moves along a curve, $x=-8t^2$, $y= t^2 -4t$, $z=t+1$, where t is time. Find its acceleration
4. If $A=i+2j-4k$, $B=2i-3j+k$, $C=4j-3k$, Find $(AXB)XC$
5. Given $R=4\sin 3t i+4e^{3t} j+7t^3 k$, find the integral of R with respect to t from 0 to 1

Answer (Max 10mb)

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RIZKHA OLUMBARANTI EBERECTHUKUN
17120051020

MECHATRONICS ENGINEERING
Group 2

1. $A = 5i - 7j - 6k$ $B = j + 4k$ $C = 9i - 4j + k$

$$(A+B) = 6i - 7j - 2k$$

$$8(A+B) = -48i + 56j + 16k$$

$$(C-A) = 4i + 3j + 7k$$

$$8(A+B) \cdot (C-A) = -192 + 168 + 112 = 88.$$

Position vector = $x i + y j + z k$

where $x = -3t$ $y = t^2$ $z = 4t^3$

Position vector (P) = $-3t i + t^2 j + 4t^3 k$

Unit vector $T = \frac{dp}{dt}$

$$T = \frac{dp}{dt} = -3i + 2tj + 12t^2k$$

where $t = 1$

$$T = -3i + 2(1)j + 12(1^2)k$$

$$T = -3i + 2j + 12k$$

where $x = -8t^2$ $y = t^2 - 4t$, $z = t + 1$

position vector $\rho = xi + yj + zk$

$\rho = -8t^2 i + (t^2 - 4t)j + (t + 1)k$

velocity = $\frac{d\rho}{dt} = 16ti + (2t - 4)j + k$

acceleration = $\frac{d^2\rho}{dt^2} = 16i + 2j$

$A = i + 2j - 4k$ $B = 2i - 3j + k$ $C = 4j - 3k$

$(A \times B) = \begin{vmatrix} i & j & k \\ 1 & 2 & -4 \\ 2 & -3 & 1 \end{vmatrix} = i(2 - 12) - j(1 - -8) + k(-3 - 4)$
 $= -10i - 9j - 7k$

$(A \times B) \times C = \begin{vmatrix} i & j & k \\ -10 & -9 & -7 \\ 0 & 4 & -3 \end{vmatrix} = i(27 - -28) - j(30 - 21) + k(40 - 0)$
 $= i(55) - j(9) + 40k$
 $= 55i - 9j + 40k$

$R = 4 \sin 3t i + 4e^{3t} j + 7t^3 k$

$= \int 4 \sin 3t dt + \int 4e^{3t} dt + \int 7t^3 dt$

$= -\frac{4}{3} \cos 3t i + \frac{4}{3} e^{3t} j + \frac{7}{4} t^4 k$