Nishant Jindal

11th Week

5 Chapter

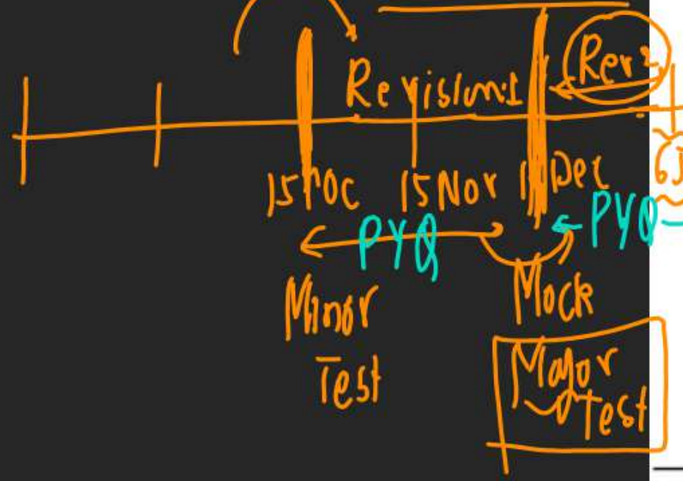
1) StL ② Circle

3) B.T. ④ Seqn

⑤ QuadEqn

Weak → Strong

15th October



राष्ट्रीय परीक्षा एजेंसी
National Testing Agency
Excellence in Assessment
(उच्चतर शिक्षा विभाग, शिक्षा मंत्रालय, भारत सरकार के तहत एक स्वायत्त संगठन)
(An Autonomous Organization under the Department of Higher Education, Ministry of Education, Government of India)

आज़ादी का अमृत महोत्सव

PRESS RELEASE

New Delhi, 14th September 2023

National Testing Agency Releases Examination Calendar for Academic Year 2024-25

The Ministry of Education (MoE), Government of India (GoI) has established the National Testing Agency (NTA) as an independent, autonomous, and self-sustained premier Testing Organization under the Societies Registration Act (1860) for conducting efficient, transparent, and international standardized tests in order to assess the competence of candidates for admission to premier Higher Educational Institutions.

For the Academic year 2024-25, following is the Calendar for some major examinations to be conducted by the NTA:

Sr. No.	Name of the Examination	Mode of Examination	Dates of Examination
1.	Joint Entrance Examination [JEE (Main)] – 2024 Session 1	Computer Based Test (CBT)	Between 24th January and 1st February, 2024.
2.	Joint Entrance Examination [JEE (Main)] – 2024 Session 2	Computer Based Test (CBT)	Between 1st April, 2024 and 15th April, 2024.
3.	National Eligibility cum Entrance Test [NEET (UG)] – 2024	Pen and Paper/OMR	5th May, 2024
4.	Common University Entrance Test -UG (CUET-UG) 2024	Computer Based Test (CBT)	Between 15th May, 2024 and 31st May, 2024.
5.	Common University Entrance Test -PG (CUET-PG) 2024	Computer Based Test (CBT)	Between 11th March, 2024 and 28th March, 2024.
6.	UGC-NET Session - I	Computer Based Test (CBT)	Between 10th June and 21st June, 2024

The Examination Specific details shall be informed to candidates through the Information Bulletin of respective examinations, which will be published at the time of launch of Registration Forms of these examinations. The results of all CBT Examinations shall be announced within three weeks of the conclusion of the examination. For NEET (UG) 2024, the results shall be declared by second week of June, 2024.

For further clarification related to the examination dates and other instructions, the Candidates are advised to visit the official website of NTA www.nta.ac.in for the latest updates.

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पहली मंजिल, एनएसआईसी-एमडीबीपी बिल्डिंग, ओखला इंडस्ट्रियल एस्टेट, नई दिल्ली -110020
First Floor, NSIC-MDBP Building, Okhla Industrial Estate, New Delhi -110020

Target 180 – 220 Wall

24 Jan – 1st Feb

1st April – 15th April

Neet - 5 May

(uet → 15th May – 31 May

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Q $\vec{v}\times\vec{b}=\vec{a}\times\vec{b}$ & $\vec{v}\cdot\vec{c}=0$

find $\vec{v}=?$

① $\vec{v}\times\vec{b}-\vec{a}\times\vec{b}=0$

$(\vec{v}-\vec{a})\times\vec{b}=0$

$\vec{v}-\vec{a} \parallel \vec{b}$

$\vec{v}-\vec{a}=\lambda\vec{b}$

$\vec{v}=\vec{a}+\lambda\vec{b}$

② $\vec{v}\cdot\vec{c}=0$

$(\vec{a}+\lambda\vec{b})\cdot\vec{c}=0$

$\vec{a}\cdot\vec{c}+\lambda(\vec{b}\cdot\vec{c})=0$

$\lambda(\vec{b}\cdot\vec{c})=-\vec{a}\cdot\vec{c}$

$\lambda=-\left(\frac{\vec{a}\cdot\vec{c}}{\vec{b}\cdot\vec{c}}\right)$

$$\vec{v}=\vec{a}-\left(\frac{\vec{a}\cdot\vec{c}}{\vec{b}\cdot\vec{c}}\right)\vec{b}$$

Q $|a|=1,\ |b|=4$ $\vec{a}\cdot\vec{b}=2$

$\vec{c}=2(\vec{a}\times\vec{b})-3\vec{b}$ find angle between $\vec{b}$ & $\vec{c}$. $\cos\theta=\frac{\vec{b}\cdot\vec{c}}{|b||c|}=\frac{-48}{4}$

$\vec{b}\{\vec{c}+3\vec{b}=2(a\times b)\}$

$\vec{b}\cdot\vec{c}+3|b|^2=0$

$\vec{b}\cdot\vec{c}=-3|b|^2$

$=-48$

$(\vec{c}+3\vec{b})^2=(2(a\times b))^2$

$|c|^2+9|b|^2+6\,\vec{b}\cdot\vec{c}=4(a\times b)^2$

$|c|^2+144-288=4\{|a|^2|b|^2-(a\cdot b)^2\}$

$=4\{1\times16-4\}$

$|c|^2=144+48=192$

$\cos\theta=\frac{-48}{4\times\sqrt{192}}=\frac{-48}{4\times8\sqrt{3}}=-\frac{\sqrt{3}}{2}$

$\theta=\frac{5\pi}{6}$

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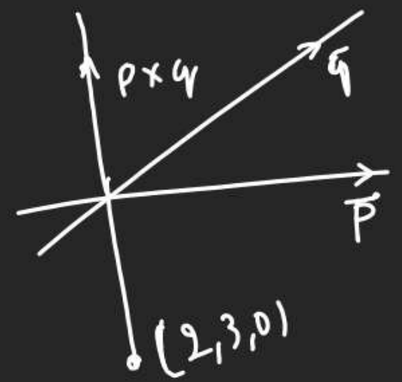
Q EOL P.T. Pt. $(2,3,0)$

& $\perp^{rt}$ to $\vec{P} = \hat{i}+2\hat{j}+3\hat{k}$

& $\vec{q} = 3\hat{i}+4\hat{j}+5\hat{k}$



$\vec{r} = \langle 2,3,0\rangle + \lambda\langle -1,2,-1\rangle$

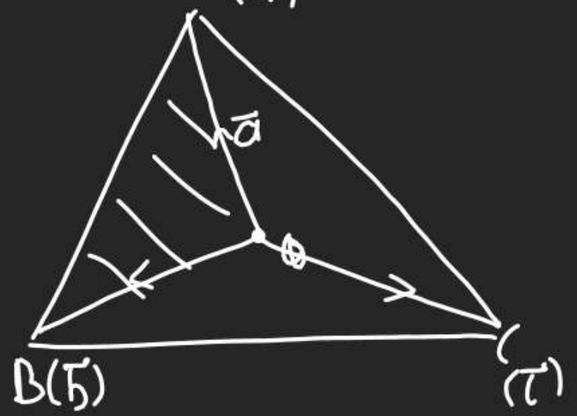
$$\vec{p}\times\vec{q} = \begin{vmatrix} i & j & k \\ 1 & 2 & 3 \\ 3 & 4 & 5 \end{vmatrix}$$

$$= \langle -2, +4, -2\rangle$$

Q $2\vec{OA}+3\vec{OB}+6\vec{OC}=0 \Rightarrow 6\vec{c} = -2\vec{a}-3\vec{b}$

$\vec{c} = -\frac{2\vec{a}-3\vec{b}}{6}$

then $\frac{\text{Area of } \Delta ABC}{\text{Area of } \Delta AOB} = ?$



$$\frac{\Delta ABC}{\Delta AOB} = \frac{\frac{1}{2}|a\times b + b\times c + c\times a|}{\frac{1}{2}|a\times b|}$$

$$= \frac{|a\times b + (b-a)\times c|}{|a\times b|}$$

$$= \frac{\left|a\times b + (b-a)\times\left(-\frac{2\vec{a}-3\vec{b}}{6}\right)\right|}{|a\times b|}$$

$$= \frac{\left|a\times b - \frac{1}{3}\vec{b}\times\vec{a} + \frac{\vec{a}\times\vec{b}}{2}\right|}{|a\times b|}$$

$$= \frac{|(a\times b)(1+\frac{1}{3}+\frac{1}{2})|}{|a\times b|} = \frac{11}{6}$$

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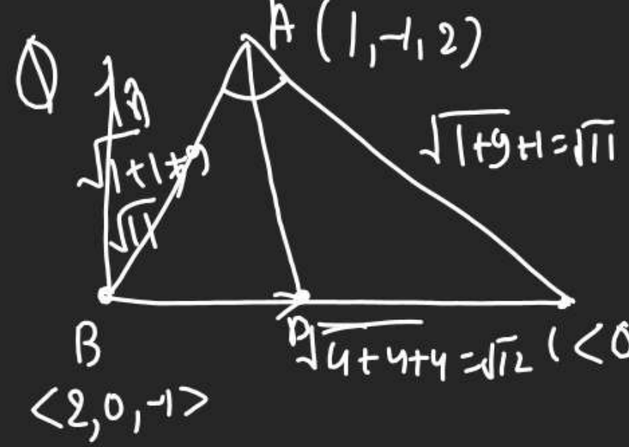
Q



(1) Area of △ ABC

$= \frac{1}{2}|\vec{BC}\times\vec{BA}|$

$= \frac{1}{2}|BC||BA|\sin\theta = \frac{1}{2}\sqrt{12}\sqrt{11}\times\frac{2\sqrt{2}}{\sqrt{11}} = \sqrt{24}$

$= 2\sqrt{6}$

$\cos\theta = \frac{\vec{BC}\cdot\vec{BA}}{|BC||BA|} = \frac{2+-2+6}{\sqrt{12}\sqrt{11}} = \frac{6}{2\sqrt{3}\sqrt{11}}$

$\vec{BC} = \langle -2,2,2\rangle$

$\vec{BA} = \langle -1,-1,3\rangle$

$\sin\theta = \sqrt{1-\frac{3}{11}} = \frac{2\sqrt{2}}{\sqrt{11}}$

(5) Circum Radius of △ ABC

$R = \frac{abc}{4\Delta}$

$= \frac{\sqrt{12}\times\sqrt{11}\times\sqrt{11}}{4\times 2\sqrt{6}}$

$= \frac{11}{4\sqrt{2}}$

(2) Vector of Mag $\sqrt{6}$ ⊥r to Plane ABC

Vector ⊥r to Plane ABC

$\hat{n} = \frac{\vec{BC}\times\vec{BA}}{|\vec{BC}\times\vec{BA}|}$

$\vec{BC}\times\vec{BA} = \begin{vmatrix} i & j & k \\ -2 & 2 & 2 \\ -1 & -1 & 3 \end{vmatrix}$

$= \langle 8,4,4\rangle$

$\hat{n} = \frac{\langle 8,4,4\rangle}{\sqrt{64+16+16}} = \frac{\langle 8,4,4\rangle}{4\sqrt{6}}$

$\hat{n} = \frac{\langle 2,1,1\rangle}{\sqrt{6}}$ → It is ⊥r to Plane ABC

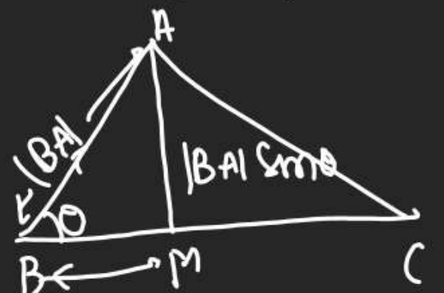
But Mag is 1

∴ Vector of Mag $\sqrt{6}$ will be $\vec{P} = \sqrt{6}\times\frac{\langle 2,1,1\rangle}{\sqrt{6}} = 2\hat{i}+\hat{j}+\hat{k}$

(6) Eq^n of Plane ABC ⇒ $(\vec{r}-\langle 2,0,-1\rangle)\cdot\frac{\langle 2,1,1\rangle}{\sqrt{6}} = 0$

$2x+y+z=3$

(3) Length of Altitude from A to BC



$AM = |BA|\sin\theta$

$= \sqrt{1+1+9}\times\frac{2\sqrt{2}}{\sqrt{11}}$

$= 2\sqrt{2}$

(4) Length of Angle Bisector.

Dist^n MP.

$D = \langle 1,1,0\rangle$

$AD = \sqrt{0+4+4} = 2\sqrt{2}$

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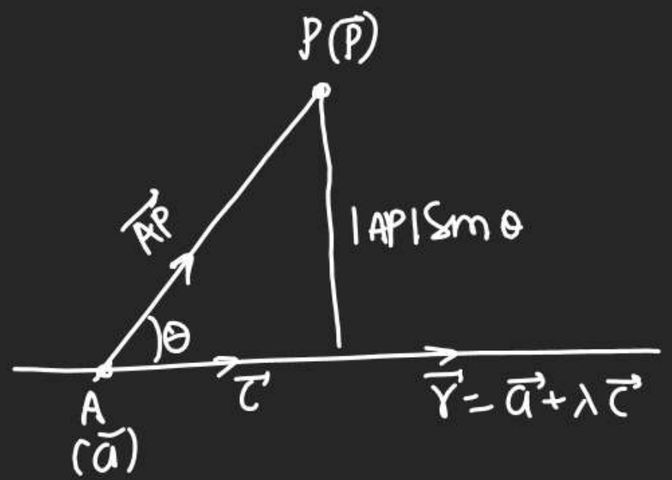
Distance of a Pt. from a Line.



$d = |AP| \sin\theta$

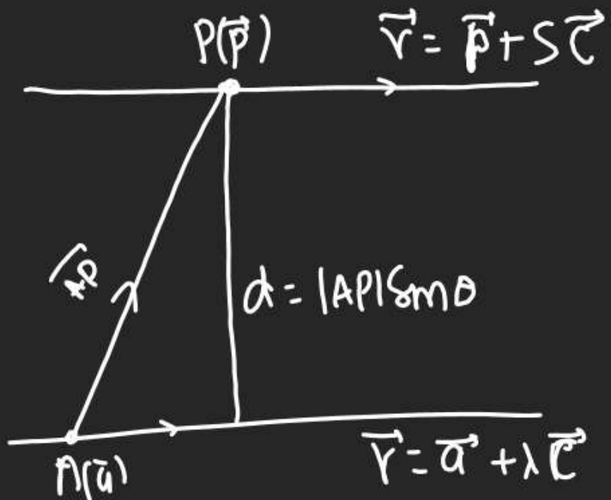
$= |\overrightarrow{AP}| \cdot \frac{|\overrightarrow{AP} \times \vec{c}|}{|\overrightarrow{AP}||\vec{c}|}$

$d = \frac{|\vec{c} \times (\vec{p} - \vec{a})|}{|\vec{c}|}$

$\sin\theta = \frac{|a \times b|}{|a||b|}$

$d = \frac{|DR \times (Fixpt - Fixpt)|}{|DR|}$

Distance bet^n 2 ||^{el} Lines



$d = |\overrightarrow{AP}| \frac{|\overrightarrow{AP} \times \vec{c}|}{|\overrightarrow{AP}||\vec{c}|}$

$= \frac{|\vec{c} \times (\vec{p} - \vec{a})|}{|\vec{c}|}$

$\begin{vmatrix} i & j & k \\ 2 & 3 & 6 \\ 2 & 1 & -1 \end{vmatrix} - (-2 - 12)$

$= \langle -9, +14, -4 \rangle$

Q Find dist. bet^n Lines.

$\vec{r} = \langle 1,2,-4 \rangle + \lambda \langle 2,3,6 \rangle$

& $\vec{r} = \langle 3,3,-5 \rangle + t \langle 2,3,6 \rangle$

Lines ||^{el}.

$d = \frac{|\langle 2,3,6 \rangle \times \langle 3-1, 3-2, -5+4 \rangle|}{|\langle 2,3,6 \rangle|}$

$= \frac{|\langle 2,3,1 \rangle \times \langle 2,1,-1 \rangle|}{\sqrt{4+9+36}}$

$= \frac{\sqrt{81+196+16}}{7}$

$= \frac{\sqrt{293}}{7}$

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Qns if Lines are given.

(1) Check DR if DR Same then Lines can be $\parallel^{el}$ or Coincident

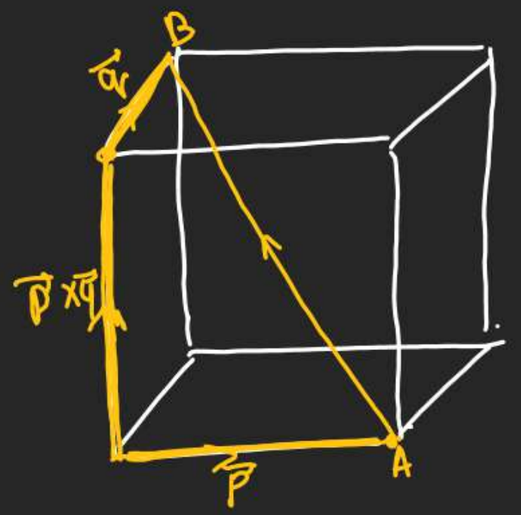
(2) If $\parallel^{el}$ & distance = 0 then Lines are Coincident

(3) If $\parallel^{el}$ & dist $\neq$ 0 then Lines are $\parallel^{el}$ only.

(4) If DR not Same then Lines can be Intersecting or Skew.

(5) If Lines are Intersecting then dist = 0

(6) If Lines are not $\parallel^{el}$ & distance $\neq$ 0 then Lines are skew lines.



$\vec{p}$ & $\vec{q}$ are Representing Skew Lines

Shortest distance bet^{n} 2 Skew Lines.

SD = Proj of $\overrightarrow{AB}$ on $\vec{p}\times\vec{q}$

$$= \left|\frac{\overrightarrow{AB}\cdot(\vec{p}\times\vec{q})}{|\vec{p}\times\vec{q}|}\right|$$

$$= \left|\frac{(\vec{p}\times\vec{q})\cdot(\vec{r}-\vec{a})}{|\vec{p}\times\vec{q}|}\right| = \left|\frac{(DR\times DR)\cdot(FP-FP)}{|DR\times DR|}\right|$$

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Q If $\vec{r} = \langle 1,2,1\rangle + \lambda\langle 1,-1,1\rangle$

$\vec{r} = \langle 2,-1,-1\rangle + s\langle 2,1,2\rangle$

find distance?

1) $\vec{p} = \langle 1,-1,1\rangle$

$\vec{q} = \langle 2,1,2\rangle$

$$p \times q = \begin{vmatrix} i & j & k \\ 1 & -1 & 1 \\ 2 & 1 & 2 \end{vmatrix}$$

$DR \times DR = \langle -3, 0, 3\rangle$

(2) $FP - FP = \langle 1, -3, -2\rangle$

(3) $d = \left|\frac{(DR \times DR) \cdot (FP - FP)}{|DR \times DR|}\right| = \frac{|-3+0+-6|}{\sqrt{9+0+9}} = \frac{9}{3\sqrt{2}} = \frac{3}{\sqrt{2}}$

Find S.D bet^n Lines

$L_1: \vec{r} = (1-t)\hat{i} + (t-2)\hat{j} + (3-2t)\hat{k}$

$L_2: \vec{r} = (s+1)\hat{i} + (2s-1)\hat{j} - (2s+1)\hat{k}$

$L_1: \vec{r} = (\hat{i} - 2\hat{j} + 3\hat{k}) + t(-\hat{i} + \hat{j} - 2\hat{k})$

$L_2: \vec{r} = \hat{i} - \hat{j} - \hat{k}) + s(\hat{i} + 2\hat{j} - 2\hat{k})$

$\vec{p} = \langle -1, 1, -2\rangle, \vec{q} = \langle 1, 2, -2\rangle$

$$DR \times DR = \vec{p} \times \vec{q} = \begin{vmatrix} i & j & k \\ -1 & 1 & -2 \\ 1 & 2 & -2 \end{vmatrix} = \langle 2, -4, -3\rangle$$

$$S.D = \left|\frac{\langle 0,1,-4\rangle \cdot \langle 2,-4,-3\rangle}{\sqrt{4+16+9}}\right| = \frac{|0+-4+12|}{\sqrt{29}} = \frac{8}{\sqrt{29}}$$

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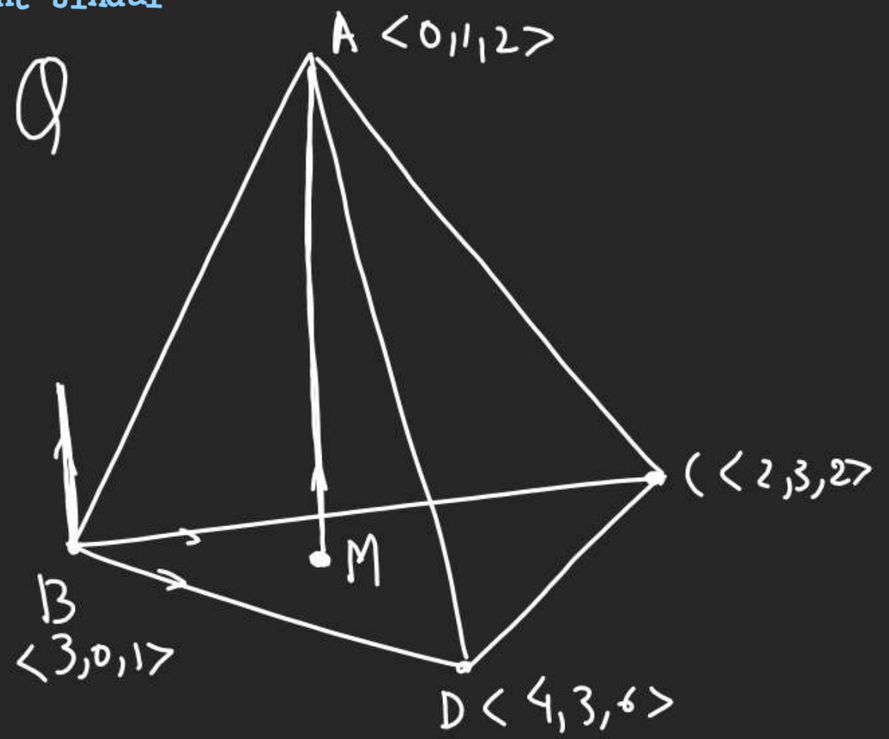
Q



① Centre of tetrahedron:

$$\left\langle \frac{0+3+4+2}{4}, \frac{1+0+3+3}{4}, \frac{2+1+6+2}{4} \right\rangle$$

$$\left\langle \frac{9}{4}, \frac{7}{4}, \frac{11}{4} \right\rangle$$

② Unit vector ⊥r to plane BCD

$$\hat{n} = \frac{\vec{BD} \times \vec{BC}}{|\vec{BD} \times \vec{BC}|}$$

$\vec{BD} = \langle 1,3,5 \rangle$

$\vec{BC} = \langle -1,3,1 \rangle$

$$\vec{BD} \times \vec{BC} = \begin{vmatrix} i & j & k \\ 1 & 3 & 5 \\ -1 & 3 & 1 \end{vmatrix}$$

$$= \langle -12, -6, 6 \rangle$$

$$|\vec{BD} \times \vec{BC}| = \sqrt{144+36+36}$$

$$= \sqrt{216}$$

$$\hat{n} = \frac{\langle -12, -6, 6 \rangle}{6\sqrt{6}}$$

$$\boxed{\hat{n} = \frac{\langle -2, -1, 1 \rangle}{\sqrt{6}}}$$

(3) Eqn of Line ⊥r to BCD & P.T.A

Line's DR same as $\hat{n}$'s DR

EOL → $\vec{r} = \langle 0,1,2 \rangle + \lambda \langle -2,1,1 \rangle$

④ Foot of ⊥r from A to BCD.

↓

Pt. M lying on previous Line