doubtnut
India's Number 1 Education App

MATHS

BOOKS - JEE MAINS PREVIOUS YEAR ENGLISH

VECTOR ALGEBRA

Others

1. Let $\bar{a}=\hat{i}+\hat{j}+\hat{k}, b=\hat{i}-\hat{j}+2\hat{k}$ and $\bar{c}=x\hat{i}+(x-2)\hat{j}-\hat{k}$. If the vector c lies in the

plane of a and b , then x equals (1) 0 (2) 1 (3) -4 (4) -2

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2. If $\widehat{u}$ and $\hat{v}$ are unit vectors and θ is the acute angle between them, then $2\widehat{u} \times 3\hat{v}$ is a unit vector for (1) exactly two values of θ (2) more than two values of θ (3) no value of θ (4) exactly one value of θ

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3. The resultant of two forces P N and 3 N is a force of 7 N. If the direction of 3 N force were reversed, the resultant would be $\sqrt{19}$ N. The value of P is (1) 5 N (2) 6 N (3) 3N (4) 4N

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4. The non-zero vectors a,b and c are related by a=8b and c=-7b angle between a and c is

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5. The vector $\vec{a} = \alpha\hat{i} + 2\hat{j} + \beta\hat{k}$ lies in the plane of the vectors $\vec{b} = \hat{\text{i}} + \hat{j}$ and $\vec{c} = \hat{j} + \hat{k}$ and bisects the angle between $\vec{b}$ and $\vec{c}$. Then which one of the following gives possible values of α and β ? (1) $\alpha = 2, \beta = 2$ (2) $\alpha = 1, \beta = 2$ (3) $\alpha = 2, \beta = 1$ (4) $\alpha = 1, \beta = 1$

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6. If $\vec{u}, \vec{v}, \vec{w}$ are noncoplanar vectors and p, q are real numbers, then the equality $\left[3\vec{u}, p\vec{v}, p\vec{w}\right] - \left[p\vec{v}, \vec{w}, q\vec{u}\right] - \left[2\vec{w}, q\vec{v}, q\vec{u}\right] = 0$ holds for (A) exactly one value of (p, q) (B) exactly two values of (p, q) (C) more than two but not all values of (p, q) (D) all values of (p, q)

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7. The projections of a vector on the three coordinate axis are $6, 3, 2$ respectively. The direction cosines of the vector are (A) $6, -3, 2$ (B) $\frac{6}{5}, \frac{-3}{5}, \frac{2}{5}$ (C) $\frac{6}{7}, \frac{-3}{7}, \frac{2}{7}$ (D) $\frac{-6}{7}, \frac{-3}{7}, \frac{2}{7}$

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8. Let $\overrightarrow{a} = \hat{j} - \hat{k}$ and $\overrightarrow{c} = \hat{i} - \hat{j} - \hat{k}$. Then vector $\overrightarrow{b}$ satisfying $\overrightarrow{a} \times \overrightarrow{b} + \overrightarrow{c} = \overrightarrow{0}$ and $\overrightarrow{a}\dot{\overrightarrow{b}} = 3$ is (1) $2\overrightarrow{i} - \overrightarrow{j} + 2\overrightarrow{k}$ (2) $\hat{i} - \hat{j} - 2\hat{k}$ (3) $\hat{i} + j - 2\hat{k}$ (4) $-\hat{i} + \hat{j} - 2\hat{k}$

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9. The vectors $\overrightarrow{a}$ and $\overrightarrow{b}$ are not perpendicular and $\overrightarrow{c}$ and $\overrightarrow{d}$ are two vectors satisfying : $\overrightarrow{b} \times \overrightarrow{c} = \overrightarrow{b} \times \overrightarrow{d}, \overrightarrow{a} \cdot \overrightarrow{d} = 0$. Then the vector $\overrightarrow{d}$ is equal to : (1) $\overrightarrow{b} - \left(\frac{\overrightarrow{b}\dot{\overrightarrow{c}}}{\overrightarrow{a}\dot{\overrightarrow{d}}}\right)\overrightarrow{c}$ (2)

$\vec{c} + \left(\frac{\vec{a} \cdot \vec{c}}{\vec{a} \cdot \vec{b}}\right)\vec{b}$ (3) $\vec{b} + \left(\frac{\vec{b} \cdot \vec{c}}{\vec{a} \cdot \vec{b}}\right)\vec{c}$ (4) $\vec{c} - \left(\frac{\vec{a} \cdot \vec{c}}{\vec{a} \cdot \vec{b}}\right)\vec{b}$

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10. If $a = \frac{1}{\sqrt{10}}\left(3\hat{i} + \hat{k}\right) \text{and} \vec{b} = \frac{1}{7}\left(2\hat{i} + 3\hat{j} - 6\hat{k}\right)$, then the value of $\left(2\vec{a} - \vec{b}\right)\left(\vec{a} \times \vec{b}\right) \cdot \times \left(\vec{a} + 2\vec{b}\right)$ is: (1) -5 (2) -3 (3) 5 (4) 3

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11. Let $\widehat{a}$ and $\hat{b}$ be two unit vectors. If the vectors $\overrightarrow{c} = \widehat{a} + 2\hat{b} and \overrightarrow{d} = 5\widehat{a} - 4\hat{b}$ are perpendicular to each other, then the angle between $\widehat{a}$ and $\hat{b}$ is (1) $\frac{\pi}{6}$ (2) $\frac{\pi}{2}$ (3) $\frac{\pi}{3}$ (4) $\frac{\pi}{4}$

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12. Let ABCD be a parallelogram such that $\overrightarrow{A}B = \overrightarrow{q}, \overrightarrow{A}D = \overrightarrow{p} and \angle BAD$ be an acute angle. If $\overrightarrow{r}$ is the vector that coincides with the altitude directed from the vertex B to the side AD, then $\overrightarrow{r}$ is given by (1) $\overrightarrow{r} = 3\overrightarrow{q} - \frac{3\left(\overrightarrow{p}\dot{\overrightarrow{q}}\right)}{\left(\overrightarrow{p}\dot{\overrightarrow{p}}\right)}\overrightarrow{p}$ (2)

$$\vec{r} = -\vec{q} + \left(\frac{\vec{p}\cdot\vec{q}}{\vec{p}\cdot\vec{p}}\right)\vec{p} \quad (3)$$

$$\vec{r} = \vec{q} + \left(\frac{\vec{p}\cdot\vec{q}}{\vec{p}\cdot\vec{p}}\right)\vec{p} \quad (4)$$

$$\vec{r} = -3\vec{q} + \frac{3\left(\vec{p}\cdot\vec{q}\right)}{\left(\vec{p}\cdot\vec{p}\right)}\vec{p}$$

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13. If the vectors $\overline{A}B = 3\hat{i} + 4\hat{k}$ and $\overline{A}C = 5\hat{i} - 2\hat{j} + 4\hat{k}$ are the sides of a triangle ABC, then the length of the median through A is (1) $\sqrt{72}$ (2) $\sqrt{33}$ (3) $\sqrt{45}$ (4) $\sqrt{18}$

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14. If $\left[\vec{a}\times\vec{b}\,\vec{b}\times\vec{c}\,\vec{c}\times\vec{a}\right]=\lambda\left[\vec{a}\,\vec{b}\,\vec{c}\right]^2$,

then l is equal to (1) 2 (2) 3 (3) 0 (4) 1

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15. If $\vec{a}$, $\vec{b}$, and $\vec{c}$ be non-zero vectors such that no two are collinear or $\left(\vec{a}\times\vec{b}\right)\times\vec{c}=\frac{1}{3}\left|\vec{b}\right|\left|\vec{c}\right|\vec{a}\cdot$ If θ is the acute angle between vectors $\vec{b}$ and $\vec{c}$, then find the value of $\sin\theta\cdot$

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16. Let $\overrightarrow{a}$, $\overrightarrow{b}$ and $\overrightarrow{c}$ be there unit vectors such that $\overrightarrow{a} \times \left(\overrightarrow{b} \times \overrightarrow{c}\right) = \frac{\sqrt{3}}{2}\left(\overrightarrow{b} + \overrightarrow{c}\right)$. If $\overrightarrow{b}$ is not parallel to $\overrightarrow{c}$, then the angle between $\overrightarrow{a}$ and $\overrightarrow{b}$ is:

(1) $\frac{3\pi}{4}$ (2) $\frac{\pi}{2}$ (3) $\frac{2\pi}{3}$ (4) $\frac{5\pi}{6}$

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