# MATHS

## BOOKS - RESONANCE DPP ENGLISH

## VECTOR ALGEBRA

**Others**

**1.** The length of the shortest distance between the lines, $\vec{r}_1 = -2\hat{i} + 7\hat{k} + \lambda\left(-4\hat{i} + 3\hat{j} + 2\hat{k}\right)$ and $\vec{r}_2 = -3\hat{i} + 6\hat{j} + \mu\left(-4\hat{i} + \hat{j} + \hat{k}\right)$ is 9 (b) 6 (c) 3 (d) None of these

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**2.** Let $\vec{V} = 2\hat{i} + \hat{j} - \hat{k} and \vec{W} = \hat{i} + 3\hat{k}$. If $\vec{U}$ is a unit vector, then the maximum value of the scalar triple product $[UVW]$ is a.$-1$ b. $\sqrt{10} + \sqrt{6}$ c. $\sqrt{59}$ d. $\sqrt{60}$

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**3.** Let $\vec{a}, \vec{b}, \vec{c}$ be three unit vectors such that $\left|\vec{a} + \vec{b} + \vec{c}\right|$ = 1 and $\vec{a} \perp \vec{b}$. If $\vec{c}$ makes angles $\alpha, \beta$ with $\vec{a}, \vec{b}$ respectively then $\cos\alpha + \cos\beta$ is equal to (a) $\frac{3}{2}$ (b) 1 (c) $-1$ (d) None of these

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**4.** The magnitudes of vectors $\vec{a}, \vec{b}$ and $\vec{c}$ are respectively $1, 1$ and 2. If $\vec{a}$ x ( $\vec{a}$ x $\vec{c}$ )+ $\vec{b} = \vec{0}$ , then the acute angle between $\vec{a} \& \vec{c}$ is (a)$\frac{\pi}{3}$ (b) $\frac{\pi}{6}$ (c) $\frac{\pi}{4}$ (d) None of these

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**5.** If $aandb$ are nonzero non-collinear vectors, then $\left[\vec{a}\ \vec{b}\ \hat{i}\right]\hat{i}+\left[\vec{a}\ \vec{b}\ \hat{j}\right]\hat{j}+\left[\vec{a}\ \vec{b}\ \hat{k}\right]\hat{k}$ is equal to a. $\vec{a}\times\vec{b}$ b. $\vec{a}+\vec{b}$ c. $\vec{a}-\vec{b}$ d. $\vec{b}\times\vec{a}$

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**6.** Let $\vec{a}=\hat{i}-\hat{k},\ \vec{b}=x\hat{i}+\hat{j}+(1-x)\hat{k}$ and $\vec{c}=y\hat{i}+x\hat{j}+(1+x-y)\hat{k}$. Then $\left[\vec{a}\ \vec{b}\ \vec{c}\right]$ depends on

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**7.** $\vec{u}$, $\vec{v}$ and $\vec{w}$ are three non-coplanar unit vecrtors and $\alpha$, $\beta$ and $\gamma$ are the angles between $\vec{u}$ and $\vec{v}$, $\vec{v}$ and $\vec{w}$, $and\vec{w}$ and $\vec{u}$, respectively, and $\vec{x}$, $\vec{y}$ and $\vec{z}$ are unit vectors along the bisectors of the angles $\alpha,\beta and\gamma$, respectively. Prove that

$$\left[\vec{x}\times\vec{y}\,\vec{y}\times\vec{z}\,\vec{z}\times\vec{x}\right]=\frac{1}{16}\left[\vec{u}\,\vec{v}\,\vec{w}\right]^2\sec^2\left(\frac{\alpha}{2}\right)\sec^2\left(\frac{\beta}{2}\right)\sec^2\left(\frac{\gamma}{2}\right)$$

.

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**8.** The minimum value of $x^2+y^2+z^2$ if $ax+by+cz=p$, is :

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**9.** Let $a,b,c,d,e,f\in R$ such that $ad+be+cf=\sqrt{\left(a^2+b^2+c^2\right)\left(d^2+e^2+f^2\right)}$ Use vector to prove that $\frac{a+b+c}{\sqrt{b^2+b^2+c^2}}=\frac{d+e+f}{\sqrt{d^2+e^2+f^2}}$

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