MATHS

BOOKS - CENGAGE

SCALER TRIPLE PRODUCTS

Dpp 2 3

1. Number of integral value(s) of λ for which vectors $x^2\hat{i} - \hat{j} + x\hat{k}$, $(\lambda - 1)\hat{i} - 2\lambda\hat{j} + \hat{k}$ and $\hat{i} - \hat{j} + \hat{k}$, in the order from right-handed system $\forall x \in$ R, is

A. 0

B. 2

C. 4

D. 6

Answer: A

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2. Let $\vec{a}, \vec{b}, \vec{c}$ be three linearly independent vectors, then

$$\frac{\left[\vec{a} + 2\vec{b} - \vec{c}\,2\vec{a} + \vec{b} + \vec{c}\,4\vec{a} - \vec{b} + 5\vec{c}\right]}{\left[\vec{a}\vec{b}\vec{c}\right]}$$

A. 0

B. 1

C. 2

D. -1

Answer: A

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3. If $\vec{a}, \vec{b}$ are two unit vectors such that $\vec{a} + \left(\vec{a} \times \vec{b}\right) = \vec{c}$, where $\left|\vec{c}\right| = 2$, then value of $\left[\vec{a}\vec{b}\vec{c}\right]$ is

A. 0

B. ± 1

C. -3

D. 3

Answer: D

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4. Let $\vec{a}$ and $\vec{b}$ be unit vectors that are perpendicular to each other I. then $\left[\vec{a}+\left(\vec{a}\times\vec{b}\right)\vec{b}+\left(\vec{a}\times\vec{b}\right)\vec{a}\times\vec{b}\right]$ will always be equal to

A. 1

B. zero

C. -1

D. 3

Answer: A

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5. If V is the volume of the parallelepiped having three coterminous edges as $\vec{a}$, $\vec{b}$ and $\vec{c}$, then the volume of the parallelepiped having three coterminous edges as

$$\vec{\alpha} = \left(\vec{a}.\vec{a}\right)\vec{a} + \left(\vec{a}.\vec{b}\right)\vec{b} + \left(\vec{a}.\vec{c}\right)\vec{c},$$

$$\vec{\beta} = \left(\vec{b}.\vec{a}\right)\vec{a} + \left(\vec{b}.\vec{b}\right) + \left(\vec{b}.\vec{c}\right)\vec{c}$$

and $\vec{\lambda} = \left(\vec{c}.\vec{a}\right)\vec{a} + \left(\vec{c}.\vec{b}\right)\vec{b} + \left(\vec{c}.\vec{c}\right)\vec{c}$ is

A. 3V

B. 4V

C. V^2

D. V^3

Answer: D

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6. A parallelepiped is formed by planes drawn parallel to coordinate axes through the points A=(1,2,3) and B=(9,8,5). The volume of that parallelepiped is equal to (in cubic units)

A. 192

B. 48

C. 32

D. 96

Answer: D

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7. If $\vec{a}, \vec{b}$ and $\vec{c}$ are any three vectors forming a linearly independent system, then $\forall \theta \in R$

$$\vec{p} = \vec{a}\cos\theta + \vec{b}\sin\theta + \vec{c}(\cos 2\theta)$$

$$\vec{q} = \vec{a}\cos\left(\frac{2\pi}{3} + \theta\right) + \vec{b}\sin\left(\frac{2\pi}{3} + \theta\right) + \vec{c}(\cos 2)\left(\frac{2\pi}{3} + \theta\right)$$

and

$$\vec{r} = \vec{a}\cos\left(\theta - \frac{2\pi}{3}\right) + \vec{b}\sin\left(\theta - \frac{2\pi}{3}\right) + \vec{c}\cos 2\left(\theta - \frac{2\pi}{3}\right)$$

then $\left[\vec{p}\,\vec{q}\,\vec{r}\right]$

A. $\left[\vec{a}\,\vec{b}\,\vec{c}\right]\cos\theta$

B. $\left[\vec{a}\,\vec{b}\,\vec{c}\right]\cos 2\theta$

C. $\left[\vec{a}\,\vec{b}\,\vec{c}\right]\cos 3\theta$

D. None of these

Answer: D

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8. Let $\vec{r}=\left(\vec{a}\times\vec{b}\right)\sin x+\left(\vec{b}\times\vec{c}\right)\cos y+\left(\vec{c}\times\vec{a}\right)$, where $\vec{a}$, $\vec{b}$ and $\vec{c}$ are non-zero non-coplanar vectors, If $\vec{r}$ is orthogonal to $3\vec{a}+5\vec{b}+2\vec{c}$, then the value of $\sec^2 y+\text{cosec}^2 x+\sec y\ \text{cosec}\ x$ is

A. 3

B. 4

C. 5

D. 6

Answer: A

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9. In a regular tetrahedron, prove that angle θ between any edge and the face not containing that edge is given by $\cos\theta = \frac{1}{\sqrt{3}}$.

A. $1/6$

B. $1/9$

C. $1/3$

D. None of these

Answer: C

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10. DABC be a tetrahedron such that AD is perpendicular to the base ABC and $\angle ABC = 30^{\circ}$. The volume of tetrahedron is 18. If value of AB+BC+AD is minimum, then the length of AC is

A. $6\sqrt{2-\sqrt{3}}$

B. $3(\sqrt{6}-\sqrt{2})$

C. $6\sqrt{2+\sqrt{3}}$

D. $3(\sqrt{6}+\sqrt{2})$

Answer: A

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11. If $\alpha\left(\vec{a}\times\vec{b}\right)+\beta\left(\vec{b}\times\vec{c}\right)+\gamma\left(\vec{c}\times\vec{a}\right)=0$, then

A. $\vec{a}, \vec{b}, \vec{c}$ are coplanar is all $\alpha, \beta, \gamma \neq 0$

B. $\vec{a}, \vec{b}, \vec{}$ are coplanar if any one of $\alpha, \beta, \gamma \neq 0$

C. $\vec{a}, \vec{b}, \vec{c}$ are non-coplanar for any $\alpha, \beta, \gamma \neq 0$

D. None of these

Answer: A::B

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