1. Angle between vectors $\vec{i}-\vec{j}+\vec{k}$ and $\vec{i}+2\vec{j}+\vec{k}$ is

(a) $\cos^{-1}\frac{1}{\sqrt{15}}$ (b) $\cos^{-1}\frac{4}{\sqrt{15}}$ (c) $\cos^{-1}\frac{4}{15}$ (d) $\frac{\pi}{2}$

2. The area of the parallelogram of which $\vec{i}$ and $\vec{i}+\vec{j}$ are adjacent is

(a) 2 (b) 1/2 (c) 1 (d) √2

3. The unit vector perpendicular to vectors $\vec{i}-\vec{j}$ and $\vec{i}+\vec{j}$ forming a right handed system is

(a) $\vec{k}$ (b) $-\vec{k}$ (c) $\frac{1}{\sqrt{2}}(\vec{i}-\vec{j})$ (d) $\frac{1}{2}(\vec{i}+\vec{j})$

4. Value of a for which $2\vec{i}-\vec{j}+\vec{k}$, $\vec{i}+2\vec{j}-3\vec{k}$ and $3\vec{i}+a\vec{j}+5\vec{k}$ are coplanar is

(a) 2 (b) 4 (c) – 4 (d) 3

5. If $\vec{a},\vec{b},\vec{c},\vec{d}$ are the vertices of a square, then

(a) $(\vec{b}-\vec{a})=(\vec{c}-\vec{b})$ (b) $\vec{a}+\vec{b}+\vec{c}=0$ (c) $(\vec{c}-\vec{a}).(\vec{d}-\vec{b})=0$ none of these

6. ABCD is a quadrilateral with AB = $\vec{a}$, $AD=\vec{b}$ and $AC=2\vec{a}+3\vec{b}$. If its are a is α times the area of the parallelogram with AB, AD as adjacent sides, then α is equal to

(a) 5 (b) 5/2 (c) 1 (d) ½

7. Two planes are perpendicular to one another. One of them contains vectors $\vec{a}$ and $\vec{b}$ and the other contains vectors $\vec{c}$ and $\vec{d}$, then $(\vec{a}\times\vec{b}).(\vec{c}\times\vec{d})$ is equal to

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(a) 1 (b) 0 (c) $[\vec{a}\vec{b}\vec{c}]\vec{d}$ (d) $[\vec{b}\ \vec{c}\ \vec{d}]\ \vec{a}$

8. If $\vec{a},\vec{b},\vec{c}$ are vectors such that $\vec{c}=\vec{a}+\vec{b}$ and $\vec{a}.\vec{b}=0$, then

(a) $a^2+b^2+c^2=0$ (b) $a^2-b^2=0$ (c) $a^2+b^2=c^2$ (d) $\vec{c}=\vec{a}\times\vec{b}$

9. $\begin{vmatrix}\vec{a}.\vec{a} & \vec{a}.\vec{b} & \vec{a}.\vec{c}\\ \vec{b}.\vec{a} & \vec{b}.\vec{b} & \vec{b}.\vec{c}\\ \vec{c}.\vec{a} & \vec{c}.\vec{b} & \vec{c}.\vec{c}\end{vmatrix}$ is equal to

(a) $[\vec{a}\vec{b}\vec{c}]^2$ (b) $[\vec{a}\vec{b}\vec{c}]$ (c) $[\vec{a}\vec{b}\vec{c}]^3$ (d) none of these

10. The vectors $\lambda\vec{i}+\vec{j}+2\vec{k}$, $\vec{i}+\lambda\vec{j}-\vec{k}$ and $2\vec{i}-\vec{j}+\lambda\vec{k}$

(a) λ = – 2 (b) λ = 0 (c) λ = 1 (d) λ = – 1

11. The vector $\vec{c}$, directed along the internal bi sec tor of the angle between the vectors $\vec{a}=7\vec{i}-4\vec{j}-4\vec{k}$ and $\vec{b}=-2\vec{i}-\vec{j}+2\vec{k}$ with $|\vec{c}|=5\sqrt{6}$, is

(a) $\pm\frac{5}{3}(\vec{i}-7\vec{j}+2\vec{k})$ (b) $\frac{5}{3}(5\vec{i}+5\vec{j}+2\vec{k})$ (c) $\frac{5}{3}(\vec{i}+7\vec{j}+2\vec{k})$ (d) $\frac{5}{3}(-5\vec{i}+5\vec{j}+2\vec{k})$

12. The value of $|\vec{a}\times\vec{i}|^2 + |\vec{a}\times\vec{j}|^2 + |\vec{a}\times\vec{k}|^2$ is
(a) a^2 (b) $2\,a^2$ (c) $3\,a^2$ (d) none of these

13. The position vector of three consecutive vertices of a parallelogram are $\vec{i}+\vec{j}+\vec{k}$ and $\vec{i}+3\vec{j}+5\vec{k}$ and $7\vec{i}+9\vec{j}+11\vec{k}$.
(a) $6(\vec{i}+\vec{j}+\vec{k})$ (b) $7(\vec{i}+\vec{j}+\vec{k})$ (c) $2\vec{j}-4\vec{k}$ (d) $6\vec{i}+8\vec{j}+10\vec{k}$

14. If the non-zero vectors $\vec{a}$ and $\vec{b}$ are perpendicular to each other, then the solution of the equation on $\vec{r}\times\vec{a}=\vec{b}$ is
(a) $\vec{r}=x\vec{a}+\frac{1}{\vec{a}.\vec{a}}(\vec{a}\times\vec{c})$ (c) $\vec{r}=x\vec{b}-\frac{1}{\vec{b}.\vec{b}}(\vec{a}\times\vec{b})$
(c) $\vec{r}=x\vec{a}\times\vec{b}$ (d) $\vec{r}=x\vec{b}\times\vec{a}$

15. $\vec{e}'_1,\vec{e}'_2,\vec{e}'_3$ are vectors reciprocal to the non-coplanar vectors $\vec{e}_1,\vec{e}_2,\vec{e}_3$, then $[\vec{e}'_1\,\vec{e}'_2\,\vec{e}'_3]\;[\vec{e}_1\vec{e}_2\vec{e}_3]$
(a) – 1/2 (b) 1 (c) 0 (d) 4

16. Let $\vec{F}=2\vec{i}+2\vec{j}+5\vec{k}$ and A = (1, 2, 5) B = (–1, –2, –3,) and BA × $\vec{F}=4\vec{i}+6\vec{j}+2\lambda\vec{k}$, then the value of λ is
(a) 0 (b) 1 (c) 2 (d) – 2

17. If $\vec{u}=\vec{a}-\vec{b}$ and $\vec{v}=\vec{a}+\vec{b}$, and $|\vec{a}|=|\vec{b}|=2$, then $|\vec{u}\times\vec{v}|$ is equal to
(a) $2\sqrt{16-(\vec{a}.\vec{b})^2}$ (b) $\sqrt{16-(\vec{a}.\vec{b})^2}$ (c) $2\sqrt{4-(\vec{a}.\vec{b})^2}$ (d) $\sqrt{4-(\vec{a}.\vec{b})^2}$

18. The three vectors $7\vec{i}-11\vec{j}+\vec{k}, 5\vec{i}+3\vec{j}-2\vec{k}$ and $12\vec{i}-8\vec{j}-\vec{k}$ form
(a) an equilateral triangle (b) a right angled triangle
(c) an isosceles triangle (d) collinear vectors

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19. Let $\vec{a}=x\vec{i}+y\vec{j}+z\vec{k}, \vec{b}=\vec{j}$. The value of $\vec{c}$, for which $\vec{a},\vec{b},\vec{c}$ form a right handed system is
(a) $z\vec{i}-x\vec{k}$ (b) $\vec{0}$ (c) $-z\vec{i}+x\vec{k}$ (d) $y\vec{j}$

20. $\vec{i}\,x(\vec{x}\times\vec{i})+\vec{j}x(\vec{x}\times\vec{j})+\vec{k}\times(\vec{x}\times\vec{k})$ is
(a) 0 (b) $\vec{0}$ (c) $2\vec{x}$ (d) $-\vec{x}$

21. The position vectors of the points A and B are $\vec{a}$ and $\vec{b}$ respectively. P divides AB in the ratio 3 : 1. Q is the mid point of AP. The position vector of Q is
(a) $\frac{5\vec{a}+3\vec{b}}{8}$ (b) $\frac{\vec{a}+3\vec{b}}{4}$ (c) $\frac{3\vec{a}+5\vec{b}}{8}$ (d) $\frac{3\vec{a}+\vec{b}}{4}$

22. Let G be the centroid of a triangle ABc and O be any other point, then OA + OB + OC is equal to
(a) $\vec{0}$ (b) OG (c) 3OG (d) none of thes

23. Let $\vec{a},\vec{b}$ and $\vec{c}$ be vectors of magnitudes 3, 4 and 5 respectively. If $\vec{a}$ is perpendicular to $(\vec{b}+\vec{c}),\vec{b}$ is perpendicular to $(\vec{c}+\vec{a})$, and $\vec{c}$ is perpendicular to $(\vec{a}+\vec{b})$, then the magnitude of the vector $\vec{a}+\vec{b}+\vec{c}$ is
(a) 5 (b) $5\sqrt{2}$ (c) $5\sqrt{3}$ (c) 12

24. For a non-zero vector $\vec{a}$, the set of real number satisfying the inequality, $|(5-x)\vec{a}| < |2\vec{a}|$ consists of all x such that

(a) $0 < x < 3$ (b) $3 < x < 7$ (c) $-7 < x < -3$ (d) $-7 < x < 3$

25. If ABCDEF is a regular hexagon inscribed in a circle with centre O, then (AB + AC + AD + AE + AF) equals :

(a) 4 AO (b) 5 AO (c) 6 AO (d) 8 AO

26. If the point with position vectors $10\vec{i}+3\vec{j}, 12\vec{i}-5\vec{j}$ and $\lambda\vec{i}+11\vec{j}$ are collinear, then λ is equal to

(a) 4 (b) 8 (c) 12 (d) 22

27. The projection of the vector $\vec{a} = 3\vec{i} - j - 2\vec{k}$ on the vector $\vec{b} = \vec{i} + 2\vec{j} - 2\vec{k}$ is

(a) $\frac{\sqrt{14}}{2}$ (b) $\frac{14}{\sqrt{2}}$ (c) $\sqrt{14}$ (d) 7

28. If $\vec{a} = 4\vec{i} + 6\vec{j}$ and $\vec{b} = 3\vec{j} + 4\vec{k}$, the vector form of the component of $\vec{a}$ along $\vec{b}$ is

(a) $\frac{18}{5}(3\vec{i}+4\vec{k})$ (b) $\frac{18}{25}(3\vec{j}+4\vec{k})$ (c) $\frac{36}{25}(3\vec{i}+4\vec{k})$ (d) $\frac{9}{18}(2\vec{i}+3\vec{j})$

29. A unit vector n xy plane that makes an angle of 45° with the vector $\vec{i} + \vec{j}$ and an angle of 60° with the vector $3\vec{i} - 4\vec{j}$ **is**

(a) $\vec{i}$ (b) $\frac{1}{\sqrt{2}}(\vec{i}+\vec{j})$ (c) $\frac{1}{2}(\vec{i}+\vec{j})$ (d)none of these

30. If $\vec{a}$ and $\vec{b}$ are two unit vectors inclined to x-axis at angle 30° and 120°, then $|\vec{a}+\vec{b}|$ equals

(a) $\sqrt{\frac{2}{3}}$ (b) $\sqrt{2}$ (c) $\sqrt{3}$ (d) 2

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