1. If the position vectors of the vertices A, B, C of a triangle ABC are $7\mathbf{j}+10\mathbf{k}$, $-\mathbf{i}+6\mathbf{j}+6\mathbf{k}$ and $-4\mathbf{i}+9\mathbf{j}+6\mathbf{k}$ respectively, the triangle is

(a) Equilateral
(b) Isosceles
(c) Scalene
(d) Right angled and isosceles also

2. $\mathbf{p}=2\mathbf{a}-3\mathbf{b}$, $\mathbf{q}=\mathbf{a}-2\mathbf{b}+\mathbf{c}$, $\mathbf{r}=-3\mathbf{a}+\mathbf{b}+2\mathbf{c}$; where $\mathbf{a}$, $\mathbf{b}$ and $\mathbf{c}$ being non-zero, non-coplanar vectors, then the vector $-2\mathbf{a}+3\mathbf{b}-\mathbf{c}$ is equal to

(a) $\mathbf{p}-4\mathbf{q}$ (b) $\frac{-7\mathbf{q}+\mathbf{r}}{5}$
(c) $2\mathbf{p}-3\mathbf{q}+\mathbf{r}$ (d) $4\mathbf{p}-2\mathbf{r}$

3. A, B, C, D, E are five coplanar points, then $\overrightarrow{DA}+\overrightarrow{DB}+\overrightarrow{DC}+\overrightarrow{AE}+\overrightarrow{BE}+\overrightarrow{CE}$ is equal to

(a) $\overrightarrow{DE}$ (b) $3\overrightarrow{DE}$
(c) $2\overrightarrow{DE}$ (d) $4\overrightarrow{ED}$

4. The unit vector parallel to the resultant vector of $2\mathbf{i}+4\mathbf{j}-5\mathbf{k}$ and $\mathbf{i}+2\mathbf{j}+3\mathbf{k}$ is

(a) $\frac{1}{7}(3\mathbf{i}+6\mathbf{j}-2\mathbf{k})$ (b) $\frac{\mathbf{i}+\mathbf{j}+\mathbf{k}}{\sqrt{3}}$
(c) $\frac{\mathbf{i}+\mathbf{j}+2\mathbf{k}}{\sqrt{6}}$ (d) $\frac{1}{\sqrt{69}}(-\mathbf{i}-\mathbf{j}+8\mathbf{k})$

5. If three points A, B, C are collinear, whose position vectors are $\mathbf{i}-2\mathbf{j}-8\mathbf{k}$, $5\mathbf{i}-2\mathbf{k}$ and $11\mathbf{i}+3\mathbf{j}+7\mathbf{k}$ respectively, then the ratio in which B divides AC is

(a) 1 : 2 (b) 2 : 3
(c) 2 : 1 (d) 1 : 1

6. If $|\mathbf{a}+\mathbf{b}|>|\mathbf{a}-\mathbf{b}|$, then the angle between $\mathbf{a}$ and $\mathbf{b}$ is

(a) Acute (b) Obtuse
(c) $\frac{\pi}{2}$ (d) π

7. If the angle between the vectors $\mathbf{a}$ and $\mathbf{b}$ be θ and $\mathbf{a}.\mathbf{b}=\cos\theta$, then the true statement is

(a) $\mathbf{a}$ and $\mathbf{b}$ are equal vectors
(b) $\mathbf{a}$ and $\mathbf{b}$ are like vectors
(c) $\mathbf{a}$ and $\mathbf{b}$ are unlike vectors
(d) $\mathbf{a}$ and $\mathbf{b}$ are unit vectors

8. If $\vec{\lambda}$ is a unit vector perpendicular to plane of vector $\mathbf{a}$ and $\mathbf{b}$ and angle between them is θ, then $\mathbf{a}\,.\,\mathbf{b}$ will be

(a) $|\mathbf{a}||\mathbf{b}|\sin\theta\,\vec{\lambda}$ (b) $|\mathbf{a}||\mathbf{b}|\cos\theta\,\vec{\lambda}$
(c) $|\mathbf{a}||\mathbf{b}|\cos\theta$ (d) $|\mathbf{a}||\mathbf{b}|\sin\theta$

9. If in a right angled triangle ABC, the hypotenuse $AB=p$, then $\overrightarrow{AB}\,.\,\overrightarrow{AC}+\overrightarrow{BC}.\overrightarrow{BA}+\overrightarrow{CA}\,.\,\overrightarrow{CB}$ is equal to

(a) $2p^2$ (b) $\frac{p^2}{2}$
(c) p^2 (d) None of these

10. If $\mathbf{x}$ and $\mathbf{y}$ are two unit vectors and π is the angle between them, then $\frac{1}{2}|\mathbf{x}-\mathbf{y}|$ is equal to

(a) 0 (b) $\pi/2$
(c) 1 (d) $\pi/4$

11. If the angle between $\mathbf{a}$ and $\mathbf{b}$ be 30^o, then the angle between 3 $\mathbf{a}$ and -4 $\mathbf{b}$ will be

(a) 150^o (b) 90^o
(c) 120^o (d) 30^o

12. $(2\mathbf{a}+3\mathbf{b})\times(5\mathbf{a}+7\mathbf{b})=$

(a) $\mathbf{a}\times\mathbf{b}$ (b) $\mathbf{b}\times\mathbf{a}$
(c) $\mathbf{a}+\mathbf{b}$ (d) $7\mathbf{a}+10\mathbf{b}$

13. Let $\mathbf{a},\mathbf{b},\mathbf{c}$ be three vectors such that $\mathbf{a}\neq 0$, and $\mathbf{a}\times\mathbf{b}=2\mathbf{a}\times\mathbf{c}$, $|\mathbf{a}|=|\mathbf{c}|=1$, $|\mathbf{b}|=4$ and $|\mathbf{b}\times\mathbf{c}|=15$. If $\mathbf{b}-2\mathbf{c}=\lambda\mathbf{a}$, then λ equals to

(a) 1 (b) ± 4
(c) 3 (d) -2

14. If vertices of a triangle are $A(1,-1,2), B(2,0,-1)$ and $C(0,2,1)$, then the area of a triangle is

(a) $\sqrt{6}$ (b) $2\sqrt{6}$
(c) $3\sqrt{6}$ (d) $4\sqrt{6}$

15. The area of a parallelogram whose adjacent sides are $\mathbf{i}-2\mathbf{j}+3\mathbf{k}$ and $2\mathbf{i}+\mathbf{j}-4\mathbf{k}$, is

(a) $5\sqrt{3}$ (b) $10\sqrt{3}$
(c) $5\sqrt{6}$ (d) $10\sqrt{6}$

16. If $\mathbf{a}.\mathbf{i}=4$, then $(\mathbf{a}\times\mathbf{j}).(2\mathbf{j}-3\mathbf{k})=$

(a) 12 (b) 2
(c) 0 (d) -12

17. Vector coplanar with vectors $\mathbf{i}+\mathbf{j}$ and $\mathbf{j}+\mathbf{k}$ and parallel to the vector $2\mathbf{i}-2\mathbf{j}-4\mathbf{k}$, is

(a) $\mathbf{i}-\mathbf{k}$ (b) $\mathbf{i}-\mathbf{j}-2\mathbf{k}$
(c) $\mathbf{i}+\mathbf{j}-\mathbf{k}$ (d) $3\mathbf{i}+3\mathbf{j}-6\mathbf{k}$

18. If $\mathbf{a}=\mathbf{i}+\mathbf{j}-\mathbf{k}$, $\mathbf{b}=2\mathbf{i}+3\mathbf{j}+\mathbf{k}$ and $\mathbf{c}=\mathbf{i}+\alpha\mathbf{j}$ are coplanar vectors, the value of α is

(a) $-\frac{4}{3}$ (b) $\frac{3}{4}$

(c) $\frac{4}{3}$ (d) 2

19. If the vectors $\mathbf{a}$ and $\mathbf{b}$ are mutually perpendicular, then $\mathbf{a}\times\{\mathbf{a}\times\{\mathbf{a}\times(\mathbf{a}\times\mathbf{b})\}\}$ is equal to

(a) $|\mathbf{a}|^2\,\mathbf{b}$ (b) $|\mathbf{a}|^3\,\mathbf{b}$

(c) $|\mathbf{a}|^4\,\mathbf{b}$ (d) None of these

20. The distance between the line $\mathbf{r}=2\mathbf{i}-2\mathbf{j}+3\mathbf{k}+\lambda(\mathbf{i}-\mathbf{j}+4\mathbf{k})$ and the plane $\mathbf{r}.(\mathbf{i}+5\mathbf{j}+\mathbf{k})=5$ is

(a) $\frac{3}{10}$ (b) $\frac{10}{3}$

(c) $\frac{10}{9}$ (d) $\frac{10}{3\sqrt{3}}$

21. If $\mathbf{a}$, $\mathbf{b}$ and $\mathbf{c}$ are unit vectors, then $|\mathbf{a}-\mathbf{b}|^2+|\mathbf{b}-\mathbf{c}|^2+|\mathbf{c}-\mathbf{a}|^2$ does not exceed

(a) 4 (b) 9

(c) 8 (d) 6

22. If $\mathbf{u}=2\mathbf{i}+2\mathbf{j}-\mathbf{k}$ and $\mathbf{v}=6\mathbf{i}-3\mathbf{j}+2\mathbf{k}$, then a unit vector perpendicular to both $\mathbf{u}$ and $\mathbf{v}$ is

(a) $\mathbf{i}-10\mathbf{j}-18\mathbf{k}$ (b) $\frac{1}{\sqrt{17}}\left(\frac{1}{5}\mathbf{i}-2\mathbf{j}-\frac{18}{5}\mathbf{k}\right)$

(c) $\frac{1}{\sqrt{473}}(7\mathbf{i}-10\mathbf{j}-18\mathbf{k})$ (d) None of these

23. The position vectors of the vertices of a quadrilateral *ABCD* are $\mathbf{a},\mathbf{b},\mathbf{c}$ and $\mathbf{d}$ respectively. Area of the quadrilateral formed by joining the middle points of its sides is

(a) $\frac{1}{4}|\mathbf{a}\times\mathbf{b}+\mathbf{b}\times\mathbf{d}+\mathbf{d}\times\mathbf{a}|$

(b) $\frac{1}{4}|\mathbf{b}\times\mathbf{c}+\mathbf{c}\times\mathbf{d}+\mathbf{a}\times\mathbf{d}+\mathbf{b}\times\mathbf{a}|$

(c) $\frac{1}{4}|\mathbf{a}\times\mathbf{b}+\mathbf{b}\times\mathbf{c}+\mathbf{c}\times\mathbf{d}+\mathbf{d}\times\mathbf{a}|$

(d) $\frac{1}{4}|\mathbf{b}\times\mathbf{c}+\mathbf{c}\times\mathbf{d}+\mathbf{d}\times\mathbf{b}|$

24. $[(\mathbf{a}\times\mathbf{b})\times(\mathbf{b}\times\mathbf{c})(\mathbf{b}\times\mathbf{c})\times(\mathbf{c}\times\mathbf{a})(\mathbf{c}\times\mathbf{a})\times(\mathbf{a}\times\mathbf{b})]=$

(a) $[\mathbf{a}\ \mathbf{b}\ \mathbf{c}]^2$ (b) $[\mathbf{a}\ \mathbf{b}\ \mathbf{c}]^3$

(c) $[\mathbf{a}\ \mathbf{b}\ \mathbf{c}]^4$ (d) None of these

25. The radius of the circular section of the sphere $|\mathbf{r}|=5$ by the plane $\mathbf{r}.(\mathbf{i}+\mathbf{j}+\mathbf{k})=3\sqrt{3}$ is

(a) 1 (b) 2

(c) 3 (d) 4