QB365 Question Bank Software Study Materials

Applications of Vector Algebra 50 Important 1Marks Questions With Answers (Book Back and Creative)

12th Standard

Maths

Total Marks : 50

50 x 1 = 50

1) If $\vec{a}$ and $\vec{b}$ are parallel vectors, then $[\vec{a}, \vec{c}, \vec{b}]$ is equal to

(a) 2 (b) -1 (c) 1 **(d) 0**

2) If a vector $\vec{\alpha}$ lies in the plane of $\vec{\beta}$ and $\vec{\gamma}$, then

(a) $[\vec{\alpha}, \vec{\beta}, \vec{\gamma}]$ = 1 (b) $[\vec{\alpha}, \vec{\beta}, \vec{\gamma}]$ = -1 **(c) $[\vec{\alpha}, \vec{\beta}, \vec{\gamma}]$ = 0** (d) $[\vec{\alpha}, \vec{\beta}, \vec{\gamma}]$ = 2

3) If $\vec{a}.\vec{b} = \vec{b}.\vec{c} = \vec{c}.\vec{a} = 0$, then the value of $[\vec{a}, \vec{b}, \vec{c}]$ is

(a) $|\vec{a}|\,|\vec{b}|\,|\vec{c}|$ (b) $\frac{1}{3}|\vec{a}|\,|\vec{b}|\,|\vec{c}|$ (c) 1 (d) -1

4) If $\vec{a}, \vec{b}, \vec{c}$ are three unit vectors such that $\vec{a}$ is perpendicular to $\vec{b}$ and is parallel to $\vec{c}$ then $\vec{a} \times (\vec{b} \times \vec{c})$ is equal to

(a) $\vec{a}$ **(b) $\vec{b}$** (c) $\vec{c}$ (d) $\vec{0}$

5) If $[\vec{a}, \vec{b}, \vec{c}] = 1$, then the value of $\frac{\vec{a}\cdot(\vec{b}\times\vec{c})}{(\vec{c}\times\vec{a})\cdot\vec{b}} + \frac{\vec{b}\cdot(\vec{c}\times\vec{a})}{(\vec{a}\times\vec{b})\cdot\vec{c}} + \frac{\vec{c}\cdot(\vec{a}\times\vec{b})}{(\vec{c}\times\vec{b})\cdot\vec{a}}$ is

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

6) The volume of the parallelepiped with its edges represented by the vectors $\hat{i} + \hat{j}, \hat{i} + 2\hat{j}, \hat{i} + \hat{j} + \pi\hat{k}$ is

(a) $\frac{\pi}{2}$ (b) $\frac{\pi}{3}$ **(c) π** (d) $\frac{\pi}{4}$

7) If $\vec{a}$ and $\vec{b}$ are unit vectors such that $[\vec{a}, \vec{b}, \vec{a} \times \vec{b}] = \frac{1}{4}$, then the angle between $\vec{a}$ and $\vec{b}$ is

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

8) If $\vec{a} = \hat{i} + \hat{j} + \hat{k}, \vec{b} = \hat{i} + \hat{j}, \vec{c} = \hat{i}$ and $(\vec{a} \times \vec{b}) \times \vec{c}$ = $\lambda\vec{a} + \mu\vec{b}$, then the value of $\lambda + \mu$ is

(a) 0 (b) 1 (c) 6 (d) 3

9) If $\vec{a}, \vec{b}, \vec{c}$ are non-coplanar, non-zero vectors such that $[\vec{a}, \vec{b}, \vec{c}]$ = 3, then $\{[\vec{a} \times \vec{b}, \vec{b} \times \vec{c}, \vec{c} \times \vec{a}]\}^2$ is equal to

(a) 81 (b) 9 (c) 27 (d) 18

10) If $\vec{a}, \vec{b}, \vec{c}$ are three non-coplanar vectors such that $\vec{a} \times (\vec{b} \times \vec{c}) = \frac{\vec{b}+\vec{c}}{\sqrt{2}}$, then the angle between $\vec{a}\ and\ \vec{b}$ is

(a) $\frac{\pi}{2}$ **(b) $\frac{3\pi}{4}$** (c) $\frac{\pi}{4}$ (d) π

11) If the volume of the parallelepiped with $\vec{a} \times \vec{b}, \vec{b} \times \vec{c}, \vec{c} \times \vec{a}$ as coterminous edges is 8 cubic units, then the volume of the parallelepiped with $(\vec{a} \times \vec{b}) \times (\vec{b} \times \vec{c}), (\vec{b} \times \vec{c}) \times (\vec{c} \times \vec{a})$ and $(\vec{c} \times \vec{a}) \times (\vec{a} \times \vec{b})$as coterminous edges is,

(a) 8 cubic units (b) 512 cubic units **(c) 64 cubic units** (d) 24 cubic units

12) Consider the vectors $\vec{a}, \vec{b}, \vec{c}, \vec{d}$ such that $(\vec{a} \times \vec{b}) \times (\vec{c} \times \vec{d})$ = $\vec{0}$ Let P_1 and P_2 be the planes determined by the pairs of vectors $\vec{a}, \vec{b}$ and $\vec{c}, \vec{d}$ respectively. Then the angle between P_1 and P_2 is

(a) 0° (b) 45° (c) 60° (d) 90°

13) If $\vec{a} \times (\vec{b} \times \vec{c}) = (\vec{a} \times \vec{b}) \times \vec{c}$ where $\vec{a}, \vec{b}, \vec{c}$ are any three vectors such that $\vec{b} \cdot \vec{c} \neq 0$ and $\vec{a} \cdot \vec{b} \neq 0$, then $\vec{a}$ and $\vec{c}$ are

(a) perpendicular **(b) parallel** (c) inclined at an angle $\frac{\pi}{3}$ (d) inclined at an angle $\frac{\pi}{6}$

14) If $\vec{a} = 2\hat{i} + 3\hat{j} - \hat{k}, \vec{b} = \hat{i} + 2\hat{j} - 5\hat{k}, \vec{c} = 3\hat{i} + 5\hat{j} - \hat{k}$, then a vector perpendicular to $\vec{a}$ and lies in the plane containing $\vec{b}$ and $\vec{c}$ is

(a) $-17\hat{i}+21\hat{j}-97\hat{k}$ (b) $17\hat{i}+21\hat{j}-123\hat{k}$ (c) $-17\hat{i}-21\hat{j}+97\hat{k}$ **(d)** $-17\hat{i}-21\hat{j}-97\hat{k}$

15) The angle between the lines $\frac{x-2}{3}=\frac{y+1}{-2}, z=2$ and $\frac{x-1}{1}=\frac{2y+3}{3}=\frac{z+5}{2}$ is

(a) $\frac{\pi}{6}$ (b) $\frac{\pi}{4}$ (c) $\frac{\pi}{3}$ **(d)** $\frac{\pi}{2}$

16) If the line $\frac{x-2}{3}=\frac{y-1}{-5}=\frac{z+2}{2}$ lies in the plane x + 3y - αz + β = 0, then (α, β) is

(a) (-5, 5) **(b) (-6, 7)** (c) (5, -5) (d) (6, -7)

17) The angle between the line $\vec{r}=(\hat{i}+2\hat{j}-3\hat{k})+t(2\hat{i}+\hat{j}-2\hat{k})$ and the plane $\vec{r}.(\hat{i}+\hat{j})+4=0$ is

(a) 0° (b) 30° **(c) 45°** (d) 90°

18) The coordinates of the point where the line $\vec{r}=(6\hat{i}-\hat{j}-3\hat{k})+t(-\hat{i}+4\hat{j})$ meets the plane $\vec{r}.(\hat{i}+\hat{j}-\hat{k})$ = 3 are

(a) (2, 1, 0) (b) (7, -1, -7) (c) (1, 2, -6) **(d) (5, -1, 1)**

19) Distance from the origin to the plane 3x − 6y + 2z + 7 = 0 is

(a) 0 **(b) 1** (c) 2 (d) 3

20) The distance between the planes x + 2y + 3z + 7 = 0 and 2x + 4y + 6z + 7 = 0

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

21) If the direction cosines of a line are $\frac{1}{c},\frac{1}{c},\frac{1}{c}$, then

(a) $c=\pm3$ **(b)** $c=\pm\sqrt{3}$ (c) c > 0 (d) 0 < c < 1

22) The vector equation $\vec{r}=(\hat{i}-2\hat{j}-\hat{k})+t(6\hat{j}-\hat{k})$ represents a straight line passing through the points

(a) (0, 6, −1) and (1, −2, −1) (b) (0, 6, −1) and (-1, −4, −2) **(c) (1, -2, -1) and (1, 4, -2)** (d) (1, -2, -1) and (0, -6, 1)

23) If the distance of the point (1, 1, 1) from the origin is half of its distance from the plane x + y + z + k = 0, then the values of k are

(a) ±3 (b) ±6 (c) -3, 9 **(d) 3, -9**

24) If the planes $\vec{r}.(2\hat{i}-\lambda\hat{j}+\hat{k})=3$ and $\vec{r}.(4\hat{i}+\hat{j}-\mu\hat{k})=5$ are parallel, then the value of λ and μ are

(a) $\frac{1}{2},-2$ (b) $-\frac{1}{2},2$ **(c)** $-\frac{1}{2},-2$ (d) $\frac{1}{2},2$

25) If the length of the perpendicular from the origin to the plane 2x + 3y + λz =1, λ > 0 is $\frac{1}{5}$, then the value of λ is

(a) $2\sqrt{3}$ (b) $3\sqrt{2}$ (c) 0 (d) 1

26) The vector, $d\hat{i}+\hat{j}+2\hat{k}, \hat{i}+\lambda\hat{j}-\hat{k}$ t and $2\hat{i}-\hat{j}+\lambda\hat{k}$ are co-planar if ___________

(a) λ = -2 (b) λ = 1+$\sqrt{3}$ (c) λ = 1 - $\sqrt{3}$ **(d) λ = -2,1±** $\sqrt{3}$

27) Let $\vec{a}$, $\vec{b}$and $\vec{c}$be three non- coplanar vectors and let $\vec{p},\vec{q},\vec{r}$ be the vectors defined by the relations $\vec{P}=\frac{\vec{b}\times\vec{c}}{[\vec{a}\vec{b}\vec{c}]},\vec{q}=\frac{\vec{c}\times\vec{a}}{[\vec{a}\vec{b}\vec{c}]},\vec{r}=\frac{\vec{a}\times\vec{b}}{[\vec{a}\vec{b}\vec{c}]}$ Then the value of $\left(\vec{a}+\vec{b}\right).\vec{p}+\left(\vec{b}+\vec{c}\right).\vec{q}+(\vec{c}+\vec{a}).\vec{r}$= ___________

(a) 0 (b) 1 (c) 2 **(d) 3**

28) The number of vectors of unit length perpendicular to the vectors $\left(\hat{i}+\hat{j}\right)$ and $\left(\hat{j}+\hat{k}\right)$ is _________

(a) 1 **(b) 2** (c) 3 (d) ∞

29) If $\vec{d}=\vec{a}\times\left(\vec{b}\times\vec{c}\right)+\vec{b}\times(\vec{c}\times\vec{a})+\vec{c}\times\left(\vec{a}+\vec{b}\right)$, then _________

(a) $\left|\vec{d}\right|$ (b) $\vec{d}=\vec{a}+\vec{b}+\vec{c}$ **(c)** $\vec{d}=\vec{0}$ (d) a, b, c are coplanar

30) If $\vec{a}$ and $\vec{b}$ are two unit vectors, then the vectors $\left(\vec{a}+\vec{b}\right)\times\left(\vec{a}\times\vec{b}\right)$ is parallel to the vector __________

(a) $\vec{a}-\vec{b}$ (b) $\vec{a}+\vec{b}$ (c) $2\vec{a}-\vec{b}$ (d) $2\vec{a}+\vec{b}$

31) The area of the parallelogram having diagonals $\vec{a} = 3\hat{i} + \hat{j} - 2\hat{k}$ and $\vec{b} = \hat{i} - 3\hat{j} + 4\hat{k}$ is ___________

(a) 4 (b) $2\sqrt{3}$ (c) $4\sqrt{3}$ **(d) $5\sqrt{3}$**

32) The p.v, OP of a point P make angles 60° and 45° with X and Y axis respectively. The angle of inclination of $\vec{OP}$ with z-axis is ___________

(a) 75° **(b) 60°** (c) 45° (d) 3

33) If the work done by a force $\vec{F} = \hat{i} + m\hat{j} - \hat{k}$ in moving the point of application from(1, 1, 1) to (3, 3, 3) along a straight line is 12 units, then m is ___________

(a) 5 (b) 2 (c) 3 **(d) 6**

34) The two planes 3x + 3y - 3z - 1 = 0 and x + y - z + 5 = 0 are ___________

(a) mutually perpendicular **(b) parallel** (c) inclined at 45° (d) inclined at 30

35) If $\left[\vec{a}, \vec{b}, \vec{c}\right]$ = 3 and $|\vec{c}| = 1$ then $\left|\left(\vec{b} \times \vec{c}\right) \times (\vec{c} \times \vec{a})\right|$ is ___________

(a) 1 **(b) 3** (c) 6 (d) 9

36) For any three vectors $\vec{a}, \vec{b}$ and $\vec{c}$, $\left(\vec{a} + \vec{b}\right) . \left(\vec{b} + \vec{c}\right) \times (\vec{c} + \vec{a})$ is ___________

(a) 0 (b) $\left[\vec{a}, \vec{b}, \vec{c}\right]$ **(c) $2\left[\vec{a}, \vec{b}, \vec{c}\right]$** (d) $\left[\vec{a}, \vec{b}, \vec{c}\right]^2$

37) If the vectors $a\hat{i} + \hat{j} + \hat{k}$, $\hat{i} + b\hat{j} + \hat{k}$ and $\hat{i} + \hat{j} + c\hat{k}$ (a ≠ b ≠ c ≠ 1) are coplaner, then $\frac{1}{1-a} + \frac{1}{1-b} + \frac{1}{1-c} =$ ___________

(a) 0 **(b) 1** (c) 2 (d) $\frac{abc}{(1-a)(1-b)(1-c)}$

38) The unit normal vector to the plane 2x + 3y + 4z = 5 is ___________

(a) $\frac{2}{\sqrt{29}}\hat{i} + \frac{3}{\sqrt{29}}\hat{j} + \frac{4}{\sqrt{29}}\hat{k}$ (b) $\frac{2}{\sqrt{29}}\hat{i} - \frac{3}{\sqrt{29}}\hat{j} + \frac{4}{\sqrt{29}}\hat{k}$ (c) $\frac{2}{\sqrt{29}}\hat{i} - \frac{3}{\sqrt{29}}\hat{j} - \frac{4}{\sqrt{29}}\hat{k}$ (d) $\frac{2}{5}\hat{i} + \frac{3}{5}\hat{j} + \frac{4}{5}\hat{k}$

39) The angle between the vectors $\hat{i} - \hat{j}$ and $\hat{j} - \hat{k}$ is ___________

(a) $\frac{\pi}{3}$ (b) $\frac{-2\pi}{3}$ (c) $\frac{-\pi}{3}$ **(d) $\frac{2\pi}{3}$**

40) The distance from the origin to the plane $\vec{r}.\left(2\hat{i} - \hat{j} + 5\hat{k}\right) = 7$ is ___________

(a) $\frac{7}{\sqrt{30}}$ (b) $\frac{\sqrt{30}}{7}$ (c) $\frac{30}{7}$ (d) $\frac{7}{30}$

41) Let $\vec{u}, \vec{v}, \vec{w}$ be vectors such that $\vec{u} + \vec{v} + \vec{w} = \vec{0}$. If $|\vec{u}|$ = 3, $|\vec{v}|$ = 4, $|\vec{w}|$ = 5 then $\vec{u}.\vec{v} + \vec{v}.\vec{w} + \vec{w}.\vec{u}$ is ___________

(a) 25 **(b) -25** (c) 5 (d) $\sqrt{5}$

42) The length of the $\perp^r$ from the origin to plane $\vec{r}.\left(3\hat{i} + 4\hat{j} + 12\hat{k}\right)$ = 26 is ___________

(a) 2 (b) $\frac{1}{2}$ (c) 26 (d) $\frac{26}{169}$

43) If $\vec{a}, \vec{b}, \vec{c}$ are three non - coplanar vectors, then $\frac{\vec{a}.\vec{b}\times\vec{c}}{\vec{c}\times\vec{a}.\vec{b}} + \frac{\vec{b}.\vec{a}\times\vec{c}}{\vec{c}.\vec{a}\times\vec{b}}$ = ___________

(a) 0 (b) 1 (c) -1 (d) $\frac{\vec{a}.\vec{b}\times\vec{c}}{\vec{b}\times\vec{c}.\vec{c}}$

44) If $\vec{a}$ is a non-zero vector and m is a non-zero scalar then $m\vec{a}$ is a unit vector if ___________

(a) $m = \pm 1$ (b) $a = |\vec{m}|$ **(c) $a = \frac{1}{|m|}$** (d) a = 1

45) If $|\vec{a} + \vec{b}| = |\vec{a} - \vec{b}|$ then ___________

(a) $\vec{a}$ is parallel to $\vec{b}$ **(b) $\vec{a}$ is perpendicular to $\vec{b}$** (c) $|\vec{a}| = |\vec{b}|$ (d) $\vec{a}$ and $\vec{b}$ are unit vectors

46) The projection of $\overrightarrow{OP}$ on a unit vector $\overrightarrow{OQ}$ equals thrice the area of parallelogram OPRQ Then ∠POQ is ___________

(a) $\tan^{-1}\frac{1}{3}$ (b) $\cos^{-1}\left(\frac{3}{10}\right)$ (c) $\sin^{-1}\left(\frac{3}{\sqrt{10}}\right)$ (d) $\sin^{-1}\left(\frac{1}{3}\right)$

47) If $[\vec{a}+\vec{b}, \vec{b}+\vec{c}, \vec{c}+\vec{a}] = 8$ then $[\vec{a}, \vec{b}, \vec{c}]$ is ___________

(a) 4 (b) 8 (c) 32 (d) -4

48) The shortest distance of the point (2, 10, 1) from the plane $\vec{r}\cdot(3\hat{i}-\hat{j}+4\hat{k}) = 2\sqrt{26}$ is ___________

(a) $2\sqrt{26}$ (b) $\sqrt{26}$ **(c) 2** (d) $\frac{1}{\sqrt{26}}$

49) The vector $(\vec{a}\times\vec{b})\times(\vec{c}\times\vec{a})$ is ___________

(a) perpendicular to $\vec{a}, \vec{b}, \vec{c}$ and $\vec{d}$ (b) parallel to the vectors $(\vec{a}\times\vec{b})$ and $(\vec{c}\times\vec{d})$

(c) parallel to the line of intersection of the plane containing $\vec{a}$ and $\vec{b}$ and the plane containing $\vec{c}$ and $\vec{d}$

(d) perpendicular to the line of intersection of the plane containing $\vec{a}$ and $\vec{b}$ and the plane containing $\vec{c}$ and $\vec{d}$

50) If $\vec{a}, \vec{b}, \vec{c}$ are a right handed triad, of mutually perpendicular vectors of magnitude a, b, c then the value of $[\vec{a}, \vec{b}, \vec{c}]$ is ___________

(a) $a^2b^2c^2$ (b) 0 (c) $\frac{1}{2}abc$ **(d) abc**