Chapter 01

Vector

TOPIC WISE QUESTIONS

KINDS OF VECTORS

Q.1 If $\vec{a} = \vec{b}$, then
(1) both have equal magnitude and collinear
(2) both have equal magnitude and like vectors
(3) both have equal magnitude
(4) they have unequal magnitude but like vectors

Q.2 Which of the following is unit vectors-
(1) $\hat{i}+\hat{j}$ (2) $\frac{(\hat{i}+\hat{j}+\hat{k})}{\sqrt{2}}$
(3) $\hat{i}+\hat{j}+\hat{k}$ (4) $\frac{(\hat{i}+\hat{j}+\hat{k})}{\sqrt{3}}$

Q.3 Unit vector in the direction of $\vec{a}$ is represented by
(1) 1. $\vec{a}$ (2) $\frac{\vec{a}}{|\vec{a}|}$ (3) $\vec{a}\,|\vec{a}|$ (4) $\frac{\vec{a}}{\hat{i}}$

Q.4 The zero vector has-
(1) no direction
(2) direction towards a particular point
(3) direction towards the origin
(4) indeterminate direction

ADDITION & SUBTRACTION OF VECTORS

Q.5 If ABCDE is a pentagon, then $\overrightarrow{AB}+\overrightarrow{AE}+\overrightarrow{BC}+\overrightarrow{DC}+\overrightarrow{ED}+\overrightarrow{AC}$ equals-
(1) $3\overrightarrow{AD}$ (2) $3\overrightarrow{AC}$ (3) $3\overrightarrow{BE}$ (4) $3\overrightarrow{CE}$

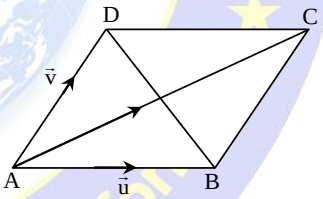
Q.6 If $\vec{a}$ and $\vec{b}$ are two unit vectors then vector $(\vec{a}+\vec{b})$
(1) is a unit vector
(2) is not a unit vector
(3) can be a unit vector or not
(4) is a unit vector when both $\vec{a}$ and $\vec{b}$ are parallel

Q.7 If $\vec{a}$ and $\vec{b}$ represent vectors of two adjacent sides $\overrightarrow{AB}$ and $\overrightarrow{BC}$ of a regular hexagon ABCDEF, then $\overrightarrow{AE}$ equals-
(1) $\vec{a}+\vec{b}$ (2) $\vec{a}-\vec{b}$
(3) $2\vec{b}$ (4) $2\vec{b}-\vec{a}$

Q.8 If ABCD is a quadrilateral, then the resultant of the forces represented by $\overrightarrow{BA}$, $\overrightarrow{BC}$, $\overrightarrow{CD}$ and $\overrightarrow{DA}$ is
(1) $2\overrightarrow{BA}$ (2) $2\overrightarrow{AC}$ (3) $2\overrightarrow{AD}$ (4) $2\overrightarrow{AB}$

Q.9 If vector $\vec{a}$, $\vec{b}$ represent two consecutive sides of regular hexagon then the vectors representing remaining four sides in sequence are-
(1) $\vec{a}-\vec{b}$, $\vec{a}-\vec{b}$, $\vec{a}+\vec{b}$, $\vec{a}+\vec{b}$
(2) $\vec{a}-\vec{b}$, $\vec{a}$, $\vec{b}-\vec{a}$, $\vec{b}$
(3) $\vec{a}+\vec{b}$, $-\vec{a}$, $-\vec{b}$, $\vec{a}-\vec{b}$
(4) $\vec{b}-\vec{a}$, $-\vec{a}$, $-\vec{b}$, $\vec{a}-\vec{b}$

Q.10 In the adjoining diagram vector $\vec{u}-\vec{v}$ is represented by the directed line segment-



(1) $\overrightarrow{BD}$ (2) $\overrightarrow{AC}$ (3) $\overrightarrow{DB}$ (4) $\overrightarrow{CA}$

Q.11 If $\vec{a}=3\hat{i}-2\hat{j}+\hat{k}$ and $\vec{b}=-\hat{i}+\hat{j}+\hat{k}$, then unit vector parallel to $\vec{a}+\vec{b}$ is-
(1) $\frac{1}{3}(2\hat{i}-\hat{j}+2\hat{k})$ (2) $\frac{1}{5}(2\hat{i}-\hat{j}+2\hat{k})$
(3) $\frac{1}{\sqrt{3}}(2\hat{i}-\hat{j}+2\hat{k})$ (4) None of these

VECTORS IN TERMS OF POSITION VECTORS OF END POINTS

Q.12 The position vector of a point C with respect to B is $\hat{i}+\hat{j}$ and that of B with respect to A is $\hat{i}-\hat{j}$. The position vector of C with respect to A is-
(1) $2\hat{i}$ (2) $-2\hat{i}$ (3) $2\hat{j}$ (4) $-2\hat{j}$

Q.13 If the position vector of the point A and B with respect to point O are respectively $\hat{i}+2\hat{j}-3\hat{k}$ and $-2\hat{i}+3\hat{j}-4\hat{k}$, then $\overrightarrow{BA}$ equals-
(1) $3\hat{i}-\hat{j}+\hat{k}$ (2) $3\hat{i}+\hat{j}-\hat{k}$
(3) $-3\hat{i}+\hat{j}+\hat{k}$ (4) None of these

DISTANCE BETWEEN TWO POINTS

Q.14 If the end points of $\overrightarrow{AB}$ are (3, –7) and (– 1, – 4), then magnitude of $\overrightarrow{AB}$ is-
(1) 2 (2) 3 (3) 4 (4) 5

Q.15 Find the distance between the points A(2,3,1), B(-1,2,3), using vector method
(1) $2\sqrt{14}$ (2) $2\sqrt{2}$ (3) $\sqrt{14}$ (4) $14\sqrt{2}$

Q.16 If position vectors of the vertices of a triangle are $4\hat{i}+5\hat{j}+6\hat{k}$, $5\hat{i}+6\hat{j}+4\hat{k}$ and $6\hat{i}+4\hat{j}+5\hat{k}$ then this triangle is-
(1) right angled (2) equilateral
(3) isosceles (4) None of these

Q.17 If A = (1, 0, 3), B = (3, 1, 5), then 3 kg. wt. along $\overrightarrow{AB}$ is represented by the vector-
(1) $2\hat{i}+2\hat{j}+\hat{k}$ (2) $2\hat{i}+\hat{j}+2\hat{k}$
(3) $\hat{i}+2\hat{j}+2\hat{k}$ (4) $\hat{i}+\hat{j}+\hat{k}$

Q.18 If $\vec{a}=\hat{i}+\lambda\hat{j}+2\hat{k}$ and $\vec{b}=2\hat{i}+\hat{j}+\sqrt{\lambda}\hat{k}$ are of equal magnitudes, then value of λ is-
(1) 1 (2) 0 (3) 2 (4) 0 or 1

POSITION VECTOR OF DIVIDING POINT

Q.19 If the position vector of points A and B with respect to point P are respectively $\vec{a}$ and $\vec{b}$ then the position vector of middle point of $\overrightarrow{AB}$ is -
(1) $\frac{\vec{b}-\vec{a}}{2}$ (2) $\frac{\vec{a}+\vec{b}}{2}$
(3) $\frac{\vec{a}-\vec{b}}{2}$ (4) None of these

Q.20 The position vector of the vertices of triangle ABC are $\hat{i}$, $\hat{j}$ and $\hat{k}$ then the position vector of its orthocenter is-
(1) $\hat{i}+\hat{j}+\hat{k}$ (2) $2(\hat{i}+\hat{j}+\hat{k})$
(3) $\frac{1}{3}(\hat{i}+\hat{j}+\hat{k})$ (4) $\frac{1}{\sqrt{3}}(\hat{i}+\hat{j}+\hat{k})$

Q.21 If D, E and F are midpoints of sides BC, CA and AB of a triangle ABC, then $\overrightarrow{AD}+\overrightarrow{BE}+\overrightarrow{CF}$ is equal to-
(1) $\vec{0}$ (2) $2\overrightarrow{BC}$ (3) $2\overrightarrow{AB}$ (4) $2\overrightarrow{CA}$

Q.22 If G is centroid of ΔABC and $\overrightarrow{AB}=\vec{a}$, $\overrightarrow{AC}=\vec{b}$ then $\overrightarrow{AG}$ equals-
(1) $\frac{1}{2}(\vec{a}+\vec{b})$ (2) $\frac{1}{3}(\vec{a}+\vec{b})$
(3) $\frac{2}{3}(\vec{a}+\vec{b})$ (4) $\frac{1}{6}(\vec{a}+\vec{b})$

Q.23 If $\vec{a}$, $\vec{b}$, $\vec{c}$ be position vectors of A,B,C respectively and D is the middle point of BC, then $\overrightarrow{AD}$ equals-
(1) $\frac{(\vec{b}+\vec{c}-\vec{a})}{2}$ (2) $\frac{(\vec{a}+\vec{c}-2\vec{a})}{2}$
(3) $\frac{(\vec{b}+\vec{c}-2\vec{a})}{2}$ (4) $\frac{(\vec{a}+\vec{b}-2\vec{c})}{2}$

Q.24 The orthocenter of the triangle whose vertices are $3\hat{i}+2\hat{j}$, $-2\hat{i}+3\hat{j}$ and $\hat{i}+5\hat{j}$ is-
(1) $\hat{i}+5\hat{j}$ (2) $-2\hat{i}+3\hat{j}$
(3) $3\hat{i}+2\hat{j}$ (4) None of these

COLLINEARITY OF THREE POINTS

Q.25 If vectors $(x-2)\hat{i}+\hat{j}$ and $(x+1)\hat{i}+2\hat{j}$ are collinear, then the value of x is-
(1) 3 (2) 4 (3) 5 (4) 0

Q.26 If three collinear points A,B,C are such that AB = BC and the position vector of points A and B with respect to origin O are respectively $\vec{a}$ and $\vec{b}$, then the position vector of point C is-
(1) $\frac{\vec{a}-\vec{b}}{2}$ (2) $\frac{\vec{a}+\vec{b}}{2}$
(3) $\frac{\vec{b}-\vec{a}}{2}$ (4) None of these

Q.27 Three points A, B, C with position vectors $\vec{a}$, $\vec{b}$, $\vec{c}$ are collinear if $x\vec{a}+y\vec{b}+z\vec{c}=\vec{0}$ when-
(1) x + y + z = 0
(2) $x+y+z\neq 0$
(3) x + y + z may or may not be zero
(4) None of these

Q.28 If the position vectors of the points A, B, C are $3\hat{i}-2\hat{j}+4\hat{k}$, $\hat{i}+\hat{j}+\hat{k}$ & $-\hat{i}+4\hat{j}-2\hat{k}$, then A,B,C are-
(1) vertices of a right angled triangle
(2) vertices of an isosceles triangle
(3) vertices of an equilateral triangle
(4) collinear

RELATION BETWEEN TWO PARALLEL VECTORS

Q.29 If $\hat{i}+2\hat{j}+3\hat{k}$ is parallel to sum of the vectors $3\hat{i}+\lambda\hat{j}+2\hat{k}$ and $-2\hat{i}+3\hat{j}+\hat{k}$, then λ equals-
(1) 1 (2) –1 (3) 2 (4) –2

Q.30 If $\vec{a}=4\hat{i}-2\hat{j}+3\hat{k}$ and $\vec{b}=-8\hat{i}+4\hat{j}-6\hat{k}$ are two vectors then $\vec{a}$, $\vec{b}$ are-
(1) like parallel (2) unlike parallel
(3) non-collinear (4) perpendicular

Q.31 If position vectors of A, B, C, D are respectively $2\hat{i}+3\hat{j}+5\hat{k}$, $\hat{i}+2\hat{j}+3\hat{k}$, $-5\hat{i}+4\hat{j}-2\hat{k}$ and $\hat{i}+10\hat{j}+10\hat{k}$, then-
(1) $\overrightarrow{AB}$ || $\overrightarrow{CD}$
(2) $\overrightarrow{DC}$ || $\overrightarrow{AD}$
(3) A, B, C are collinear
(4) B, C, D are collinear

COPLANAR AND NON - COPLANAR VECTORS

Q.32 If $\vec{p}=2\vec{a}-3\vec{b}$, $\vec{q}=\vec{a}-2\vec{b}+\vec{c}$, $\vec{r}=-3\vec{a}+\vec{b}+2\vec{c}$, $\vec{a}$, $\vec{b}$, $\vec{c}$ being non zero, non coplanar vectors then the vectors $-2\vec{a}+3\vec{b}-\vec{c}$ is equal to -
(1) $\frac{-7\vec{q}+\vec{r}}{5}$ (2) $\vec{p}-4\vec{q}$
(3) $2\vec{p}-3\vec{q}+\vec{r}$ (4) $4\vec{p}-2\vec{r}$

Q.33 If $\vec{a}$, $\vec{b}$, $\vec{c}$, $\vec{d}$ are four linearly independent vectors and $x\vec{a}+y\vec{b}+z\vec{c}+u\vec{d}=\vec{0}$, then-
(1) x + y + z + u = 0 (2) x + y = z + u
(3) x + z = y + u (4) All correct

SCALAR OR DOT PRODUCT OF TWO VECTORS

Q.34 If the angle between $\vec{a}$ and $\vec{b}$ is θ then for $\vec{a}.\vec{b}\geq 0$
(1) $0\leq\theta\leq\pi$ (2) $0<\theta<\pi/2$
(3) $\pi/2\leq\theta\leq\pi$ (4) $0\leq\theta\leq\pi/2$

Q.35 If $\vec{a}=2\hat{i}+\hat{j}+\hat{k}$, $\vec{b}=3\hat{i}-4\hat{j}+2\hat{k}$ & $\vec{c}=\hat{i}-2\hat{j}+2\hat{k}$ then the projection of $\vec{a}+\vec{b}$ on $\vec{c}$ is-
(1) $\frac{17}{3}$ (2) $\frac{5}{3}$
(3) $\frac{4}{3}$ (4) None of these

Q.36 If vectors $3\hat{i}+2\hat{j}+8\hat{k}$ and $2\hat{i}+x\hat{j}+\hat{k}$ are perpendicular then x is equal to-
(1) 7 (2) –7 (3) 5 (4) –4

Q.37 Angle between the vectors $2\hat{i}+6\hat{j}+3\hat{k}$ and $12\hat{i}-4\hat{j}+3\hat{k}$ is -
(1) $\cos^{-1}\left(\frac{1}{10}\right)$ (2) $\cos^{-1}\left(\frac{9}{11}\right)$
(3) $\cos^{-1}\left(\frac{9}{91}\right)$ (4) $\cos^{-1}\left(\frac{1}{9}\right)$

Q.38 Two forces $\vec{P}=2\hat{i}-5\hat{j}+6\hat{k}$ and $\vec{Q}=-\hat{i}+2\hat{j}-\hat{k}$ are acting on a particle. These forces displace the particle from point $A(4\hat{i}-3\hat{j}-2\hat{k})$ to point $B(6\hat{i}+\hat{j}-3\hat{k})$. The work done by these forces is-
(1) 15 units (2) –15 units
(3) 10 units (4) –10 units

Q.39 If angle between vectors $\vec{a}$ and $\vec{b}$ is 120° and $|\vec{a}|=3$, $|\vec{b}|=4$, then length of $4\vec{a}-3\vec{b}$ is-
(1) $12\sqrt{3}$ (2) $2\sqrt{3}$
(3) 432 (4) None of these

Q.40 If the angle between two vectors $\vec{a}$ and $\vec{b}$ is 120°. If $|\vec{a}|=2$, $|\vec{b}|=1$ then the value of $|2\vec{a}+\vec{b}|$ is-
(1) $\sqrt{21}$ (2) $\sqrt{13}$ (3) 21 (4) 13

VECTOR OR CROSS PRODUCT OF TWO VECTORS

Q.41 If $\vec{a}=2\hat{i}+\hat{j}+3\hat{k}$, $\vec{b}=\hat{i}+3\hat{j}+3\hat{k}$ then $|\vec{a}\times\vec{b}|$ is
(1) $\sqrt{6}$ (2) $2\sqrt{6}$ (3) $\sqrt{70}$ (4) $4\sqrt{6}$

Q.42 If $\vec{a}$ and $\vec{b}$ are two vectors, then-
(1) $|\vec{a}\times\vec{b}|\geq|\vec{a}||\vec{b}|$ (2) $|\vec{a}\times\vec{b}|\leq|\vec{a}||\vec{b}|$
(3) $|\vec{a}\times\vec{b}|>|\vec{a}||\vec{b}|$ (4) $|\vec{a}\times\vec{b}|<|\vec{a}||\vec{b}|$

Q.43 The unit vector perpendicular to vectors $\hat{i}+\hat{j}$ and $\hat{j}+\hat{k}$ is-
(1) $\frac{1}{\sqrt{3}}(\hat{i}-\hat{j}+\hat{k})$ (2) $\frac{1}{\sqrt{3}}(\hat{i}+\hat{j}-\hat{k})$
(3) $\frac{1}{\sqrt{3}}(\hat{i}+\hat{j}+\hat{k})$ (4) None of these

Q.44 If $|(\vec{a}\times\vec{b})|^2+(\vec{a}.\vec{b})^2=144$ and $|\vec{a}|=4$, then $|\vec{b}|$ is equal to -
(1) 3 (2) 8 (3) 12 (4) 16

Q.45 In a parallelogram PQRS, $\overrightarrow{PQ}=\vec{a}+\vec{b}$ and $\overrightarrow{PR}=\vec{a}-\vec{b}$, then its vector area is-
(1) $|\vec{a}|^2-|\vec{b}|^2$ (2) $\vec{a}\times\vec{b}$
(3) $2(\vec{a}\times\vec{b})$ (4) $2(\vec{b}\times\vec{a})$

Q.46 Two constant forces $\vec{P}=2\hat{i}-5\hat{j}+6\hat{k}$ and $\vec{Q}=-\hat{i}+2\hat{j}-\hat{k}$ are acting on a point A (4,–3,–2). The moment of their resultant about origin (0, 0, 0) is-

(1) $21\hat{i}+22\hat{j}+9\hat{k}$ (2) $-(21\hat{i}+22\hat{j}+9\hat{k})$

(3) $21\hat{i}-22\hat{j}-9\hat{k}$ (4) None of these

SCALAR TRIPLE PRODUCT

Q.47 If $\vec{a}=4\hat{i}-3\hat{j}+\hat{k}$, $\vec{b}=3\hat{i}+2\hat{j}-\hat{k}$ & $\vec{c}=3\hat{i}-\hat{j}+2\hat{k}$ represent three coterminous edges of a parallelopiped then its volume is-

(1) 60 (2) 15 (3) 30 (4) 40

Q.48 If $\vec{a}$, $\vec{b}$, $\vec{c}$ are mutually perpendicular unit vectors, then $[\vec{a}\ \vec{b}\ \vec{c}]$ equals-

(1) 0 (2) ±1 (3) 3 (4) 1

Q.49 Three vectors $\hat{i}-\hat{j}-\hat{k}, -\hat{i}+\hat{j}-\hat{k}$ & $-\hat{i}-\hat{j}+\hat{k}$ are-

(1) coplanar

(2) non- coplanar

(3) two are perpendicular to each other

(4) none of these

Q.50 If $\vec{a},\vec{b},\vec{c}$ are any three coplanar unit vectors then -

(1) $\vec{a}.(\vec{b}\times\vec{c})=1$ (2) $\vec{a}.(\vec{b}\times\vec{c})=3$

(3) $(\vec{a}\times\vec{b}).\vec{c}=0$ (4) $(\vec{c}\times\vec{a}).\vec{b}=1$

Q.51 For any non-zero vector $\vec{d}$; $\vec{d}.\vec{a}=\vec{d}.\vec{b}=\vec{d}.\vec{c}=0$ then $[\vec{a}\ \vec{b}\ \vec{c}]$ equals-

(1) 0 (2) 1

(2) – 1 (4) None of these

Q.52 If $\vec{a},\vec{b},\vec{c}$ are coplanar vectors, then which of the following are non-coplanar vectors-

(1) $\vec{a}\times\vec{b},\vec{b}\times\vec{c},\ \vec{c}\times\vec{a}$

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

(3) $\vec{a}-\vec{b},\ \vec{b}-\vec{c},\ \vec{c}-\vec{a}$

(4) None of these

VECTOR TRIPLE PRODUCT

Q.53 $\vec{a}\times(\vec{b}\times\vec{c})$ is coplanar with-

(1) $\vec{a}$ and $\vec{b}$ (2) $\vec{b}$ and $\vec{c}$

(3) $\vec{c}$ and $\vec{a}$ (4) None of these

Q.54 For three vectors $\vec{a},\vec{b},\ \vec{c}$ correct statement is-

(1) $\vec{a}\times(\vec{b}\times\vec{c})=\vec{b}.(\vec{a}\times\vec{c})$

(2) $(\vec{a}\times\vec{b}).\vec{c}=\vec{a}.(\vec{b}\times\vec{c})$

(3) $\vec{a}\times(\vec{b}\times\vec{c})=(\vec{a}\times\vec{b})\times\vec{c}$

(4) None of these

Q.55 For any vectors $\vec{a}$, $\vec{b}$, $\vec{c}$ correct statement is-

(1) $\vec{a}\times(\vec{b}\times\vec{c})$ = $(\vec{a}\times\vec{b})\times\vec{c}$

(2) $\vec{a}\times\vec{b}=\vec{b}\times\vec{a}$

(3) $\vec{a}.(\vec{b}\times\vec{c})=\vec{a}.\vec{b}\times\vec{a}.\vec{c}$

(4) $\vec{a}.(\vec{b}-\vec{c})=\vec{a}.\vec{b}-\vec{a}.\vec{c}$

Q.56 Which of the following is true statement-

(1) $(\vec{a}\times\vec{b})\times\vec{c}$ is coplanar with $\vec{c}$

(2) $(\vec{a}\times\vec{b})\times\vec{c}$ is perpendicular to $\vec{a}$

(3) $(\vec{a}\times\vec{b})\times\vec{c}$ is perpendicular to $\vec{b}$

(4) $(\vec{a}\times\vec{b})\times\vec{c}$ is perpendicular to $\vec{c}$

Q.57 $(\vec{a}\times\vec{b})\times\vec{c}$ equals-

(1) $(\vec{a}.\vec{c})\vec{b}-(\vec{a}.\vec{b})\vec{c}$

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

(3) $(\vec{b}.\vec{c})\vec{a}-(\vec{a}.\vec{c})\vec{b}$

(4) $(\vec{a}.\vec{c})\vec{b}-(\vec{b}.\vec{c})\vec{a}$

Q.58 $(\hat{i}\times\hat{j}).[(\hat{j}\times\hat{k})\times(\hat{k}\times\hat{i})]$ equals-

(1) 0 (2) 1 (3) –1 (4) 2

ANSWER KEY

TOPIC WISE QUESTIONS

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	2	4	2	4	2	3	4	1	4	3	1	1	1	4	3
Que.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Ans.	2	2	4	2	3	1	2	3	1	3	3	1	4	2	2
Que.	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Ans.	1	1	4	4	1	2	3	2	1	2	3	2	1	1	4
Que.	46	47	48	49	50	51	52	53	54	55	56	57	58		
Ans.	2	3	2	2	3	1	4	2	2	4	4	4	2		