CHAPTER II

(1) The value of $\vec{a}\,.\,\vec{b}$ when $\vec{a}=\vec{i}-2\vec{j}+\vec{k}$ and $\vec{b}=4\vec{i}-4\vec{j}+7\vec{k}$ is

(1) 19 (2) 3 (3) -19 (4) 14

(2) The value of $\vec{a}\,.\,\vec{b}$ when $\vec{a}=\vec{j}+2\vec{k}$ and $\vec{b}=2\vec{i}+\vec{k}$ is

(1) 2 (2) -2 (3) 3 (4) 4

(3) The value of $\vec{a}\,.\,\vec{b}$ when $\vec{a}=\vec{j}-2\vec{k}$ and $\vec{b}=2\vec{i}+3\vec{j}-2\vec{k}$ is

(1) 7 (2) -7 (3) 5 (4) 6

(4) If $m\vec{i}+2\vec{j}+\vec{k}$ and $4\vec{i}-9\vec{j}+2\vec{k}$ are perpendicular then m is

(1) -4 (2) 8 (3) 4 (4) 12

(5) If $5\vec{i}-9\vec{j}+2\vec{k}$ and $m\vec{i}+2\vec{j}+\vec{k}$ are perpendicular then m is

(1) $\frac{5}{16}$ (2) $\frac{-5}{16}$ (3) $\frac{16}{5}$ (4) $\frac{-16}{5}$

(6) If $\vec{a}$ and $\vec{b}$ are two vectors such that $|\vec{a}|=4$, $|\vec{b}|=3$ and $\vec{a}\,.\,\vec{b}=6$, then the angle between $\vec{a}$ and $\vec{b}$ is

(1) $\frac{\pi}{6}$ (2) $\frac{-\pi}{6}$ (3) $\frac{-\pi}{3}$ (4) $\frac{\pi}{3}$

(7) The angle between the vectors $3\vec{i}-2\vec{j}-6\vec{k}$ and $4\vec{i}-\vec{j}+8\vec{k}$ is

(1) $\cos^{-1}\left(\frac{34}{63}\right)$ (2) $\sin^{-1}\left(-\frac{34}{63}\right)$ (3) $\sin^{-1}\left(\frac{34}{63}\right)$ (4) $\cos^{-1}\left(-\frac{34}{63}\right)$

(8) The angle between the vectors $\vec{i}-\vec{j}$ and $\vec{j}-\vec{k}$ is

(1) $\frac{\pi}{3}$ (2) $\frac{-2\pi}{3}$ (3) $\frac{-\pi}{3}$ (4) $\frac{2\pi}{3}$

(9) The projection of the vector $7\vec{i}+\vec{j}-4\vec{k}$ on $2\vec{i}+6\vec{j}+3\vec{k}$ is

(1) $\frac{7}{8}$ (2) $\frac{8}{\sqrt{66}}$ (3) $\frac{8}{7}$ (4) $\frac{\sqrt{66}}{8}$

(10) $\vec{a}\,.\,\vec{b}$ when $\vec{a}=2\vec{i}+2\vec{j}-\vec{k}$ and $\vec{b}=6\vec{i}-3\vec{j}+2\vec{k}$ is

(1) 4 (2) -4 (3) 3 (4) 5

(11) If the vectors $2\vec{i}+\lambda\vec{j}+\vec{k}$ and $\vec{i}-2\vec{j}+\vec{k}$ are perpendicular to each other, then λ is

(1) $\frac{2}{3}$ (2) $\frac{-2}{3}$ (3) $\frac{3}{2}$ (4) $\frac{-3}{2}$

(12) If the vectors $\vec{a}=3\vec{i}+2\vec{j}+9\vec{k}$ and $\vec{b}=\vec{i}+m\vec{j}+3\vec{k}$ are perpendicular then m is

(1) -15 (2) 15 (3) 30 (4) -30

13) If the vectors $\vec{a} = 3\vec{i} + 2\vec{j} + 9\vec{k}$ and $\vec{b} = \vec{i} + m\vec{j} + 3\vec{k}$ are parallel then m is

(1) $\frac{3}{2}$ (2) $\frac{2}{3}$ (3) $-\frac{3}{2}$ (4) $-\frac{2}{3}$

14) If $\vec{a}, \vec{b}, \vec{c}$ are three mutually perpendicular unit vectors, then $\left|\vec{a} + \vec{b} + \vec{c}\right| =$

(1) 3 (2) 9 (3) $3\sqrt{3}$ (4) $\sqrt{3}$

15) If $\left|\vec{a} + \vec{b}\right| = 60$, $\left|\vec{a} - \vec{b}\right| = 40$ and $\left|\vec{b}\right| = 46$ then $\left|\vec{a}\right|$ is

(1) 22 (2) 21 (3) 18 (4) 11

16) Let $\vec{u}, \vec{v}$ and $\vec{w}$ be vector such that $\vec{u} + \vec{v} + \vec{w} = \vec{0}$.

If $\left|\vec{u}\right| = 3$, $\left|\vec{v}\right| = 4$ and $\left|\vec{w}\right| = 5$ then $\vec{u}.\vec{v} + \vec{v}.\vec{w} + \vec{w}.\vec{u}$ is

(1) 25 (2) -25 (3) 5 (4) $\sqrt{5}$

17) The projection of $\vec{i} - \vec{j}$ on z-axis is

(1) 0 (2) 1 (3) -1 (4) 2

18) The projection of $\vec{i} + 2\vec{j} - 2\vec{k}$ on $2\vec{i} - \vec{j} + 5\vec{k}$ is

(1) $\frac{-10}{\sqrt{30}}$ (2) $\frac{10}{\sqrt{30}}$ (3) $\frac{1}{3}$ (4) $\frac{\sqrt{10}}{30}$

19) The projection of $3\vec{i} + \vec{j} - \vec{k}$ on $4\vec{i} - \vec{j} + 2\vec{k}$ is

(1) $\frac{9}{\sqrt{21}}$ (2) $\frac{-9}{\sqrt{21}}$ (3) $\frac{81}{\sqrt{21}}$ (4) $\frac{-81}{\sqrt{21}}$

20) The work done in moving a particle from the point A with position vector $2\vec{i} - 6\vec{j} + 7\vec{k}$ to the point B, with position vector $3\vec{i} - \vec{j} - 5\vec{k}$ by a force $\vec{F} = \vec{i} + 3\vec{j} - \vec{k}$ is

(1) 25 (2) 26 (3) 27 (4) 28

21) The work done by the force $\vec{F} = a\vec{i} + \vec{j} + \vec{k}$ in moving the point of application from (1, 1, 1) to (2, 2, 2) along a straight line is given to be 5 units. The value of a is

(1) -3 (2) 3 (3) 8 (4) -8

22) If $\left|\vec{a}\right| = 3$, $\left|\vec{b}\right| = 4$ and $\vec{a}.\vec{b} = 9$ then $\left|\vec{a} \times \vec{b}\right|$ is

(1) $3\sqrt{7}$ (2) 63 (3) 69 (4) $\sqrt{69}$

23) The angle between two vectors $\vec{a}$ and $\vec{b}$ if $\left|\vec{a} \times \vec{b}\right| = \vec{a}.\vec{b}$ is

(1) $\frac{\pi}{4}$ (2) $\frac{\pi}{3}$ (3) $\frac{\pi}{6}$ (4) $\frac{\pi}{2}$

(24) If $|\vec{a}| = 2$, $|\vec{b}| = 7$ and $\vec{a} \times \vec{b} = 3\vec{i} - 2\vec{j} + 6\vec{k}$ then the angle between $\vec{a}$ and $\vec{b}$ is

(1) $\frac{\pi}{4}$ (2) $\frac{\pi}{3}$ (3) $\frac{\pi}{6}$ (4) $\frac{\pi}{2}$

(25) The d.c.s of a vector whose direction ratios are 2, 3, – 6 are

(1) $\left(\frac{2}{7}, \frac{3}{7}, \frac{-6}{7}\right)$ (2) $\left(\frac{2}{49}, \frac{3}{49}, \frac{-6}{49}\right)$

(3) $\left(\frac{\sqrt{2}}{7}, \frac{\sqrt{3}}{7}, \frac{-\sqrt{6}}{7}\right)$ (4) $\left(\frac{2}{7}, \frac{3}{7}, \frac{6}{7}\right)$

(26) The unit normal vectors to the plane $2x - y + 2z = 5$ are

(1) $2\vec{i} - \vec{j} + 2\vec{k}$ (2) $\frac{1}{3}\left(2\vec{i} - \vec{j} + 2\vec{k}\right)$

(3) $-\frac{1}{3}\left(2\vec{i} - \vec{j} + 2\vec{k}\right)$ (4) $\pm\frac{1}{3}\left(2\vec{i} - \vec{j} + 2\vec{k}\right)$

(27) The length of the perpendicular from the origin to the plane $\vec{r} \cdot \left(3\vec{i} + 4\vec{j} + 12\vec{k}\right) = 26$ is

(1) 26 (2) $\frac{26}{169}$ (3) 2 (4) $\frac{1}{2}$

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

(1) $\frac{7}{\sqrt{30}}$ (2) $\frac{\sqrt{30}}{7}$ (3) $\frac{30}{7}$ (4) $\frac{7}{30}$

(29) Chord AB is a diameter of the sphere $\left|\vec{r} - \left(2\vec{i} + \vec{j} - 6\vec{k}\right)\right| = \sqrt{18}$ with coordinate of A as (3, 2, – 2) The coordinates of B is

(1) (1, 0, 10) (2) (– 1, 0, – 10) (3) (– 1, 0, 10) (4) (1, 0, – 10)

(30) The centre and radius of the sphere $\left|\vec{r} - \left(2\vec{i} - \vec{j} + 4\vec{k}\right)\right| = 5$ are

(1) (2, – 1, 4) and 5 (2) (2, 1, 4) and 5

(3) (– 2, 1, 4) and 6 (4) (2, 1, – 4) and 5

(31) The centre and radius of the sphere $\left|2\vec{r} + \left(3\vec{i} - \vec{j} + 4\vec{k}\right)\right| = 4$ are

(1) $\left(\frac{-3}{2}, \frac{1}{2}, -2\right)$, 4 (2) $\left(\frac{-3}{2}, \frac{1}{2}, -2\right)$ and 2

(3) $\left(\frac{-3}{2}, \frac{1}{2}, -2\right)$, 6 (3) $\left(\frac{-3}{2}, \frac{1}{2}, -2\right)$ and 5

32) The vector equation of a plane passing through a point where $P.V$ is $\vec{a}$ and perpendicular to a vector $\vec{n}$ is

(1) $\vec{r} \cdot \vec{n} = \vec{a} \cdot \vec{n}$ (2) $\vec{r} \times \vec{n} = \vec{a} \times \vec{n}$

(3) $\vec{r} + \vec{n} = \vec{a} + \vec{n}$ (4) $\vec{r} - \vec{n} = \vec{a} - \vec{n}$

33) The vector equation of a plane whose distance from the origin is p and perpendicular to a unit vector $\hat{n}$ is

(1) $\vec{r} \cdot \vec{n} = p$ (2) $\vec{r} , \hat{n} = q$ (3) $\vec{r} \times \vec{n} = p$ (4) $\vec{r} \cdot \hat{n} = p$

34) The non-parametric vector equation of a plane passing through a point whose $P.V$ is $\vec{a}$ and parallel to $\vec{u}$ and $\vec{v}$ is

(1) $[\vec{r} - \vec{a} , \vec{u} , \vec{v}] = 0$ (2) $[\vec{r} \ \vec{u} \ \vec{v}] = 0$

(3) $[\vec{r} \ \vec{a} \ \vec{u} \times \vec{v}] = 0$ (4) $[\vec{a} \ \vec{u} \ \vec{v}] = 0$

35) The non parametric vector equation of a plane passing through the points whose $P.Vs$ are $\vec{a}, \vec{b}$ and parallel to $\vec{v}$, is

(1) $[\vec{r} - \vec{a} \ \ \vec{b} - \vec{a} \ \ \vec{v}] = 0$ (2) $[\vec{r} \ \ \vec{b} - \vec{a} \ \ \vec{v}] = 0$

(3) $[\vec{a} \ \vec{b} \ \vec{v}] = 0$ (4) $[\vec{r} \ \vec{a} \ \vec{b}] = 0$

36) The non-parametric vector equation of a plane passing through three non-collinear points whose $P.Vs$ are $\vec{a}, \vec{b}, \vec{c}$ is

(1) $[\vec{r} - \vec{a} \ \ \vec{b} - \vec{a} \ \ \vec{c} - \vec{a}] = 0$ (2) $[\vec{r} \ \vec{a} \ \vec{b}] = 0$

(3) $[\vec{r} \ \vec{b} \ \vec{c}] = 0$ (4) $[\vec{a} \ \vec{b} \ \vec{c}] = 0$

(37) The vector equation of a plane passing through the line of intersection of the planes $\vec{r} \cdot \vec{n}_1 = q_1$ and $\vec{r} \cdot \vec{n}_2 = q_2$ is

(1) $(\vec{r} \cdot \vec{n}_1 - q_1) + \lambda (\vec{r} \cdot \vec{n}_2 - q_2) = 0$ (2) $\vec{r} \cdot \vec{n}_1 + \vec{r} \cdot \vec{n}_2 = q_1 + \lambda q_2$

(3) $\vec{r} \times \vec{n}_1 + \vec{r} \times \vec{n}_2 = q_1 + q_2$ (4) $\vec{r} \times \vec{n}_1 - \vec{r} \times \vec{n}_2 = q_1 + q_2$

(38) The angle between the line $\vec{r} = \vec{a} + t\,\vec{b}$ and the plane $\vec{r} \cdot \vec{n} = q$ is connected by the relation

(1) $\cos\theta = \dfrac{\vec{a} \cdot \vec{n}}{q}$ (2) $\cos\theta = \dfrac{\vec{b} \cdot \vec{n}}{|\vec{b}|\,|\vec{n}|}$

(3) $\sin\theta = \dfrac{\vec{a} \cdot \vec{b}}{|\vec{n}|}$ (4) $\sin\theta = \dfrac{\vec{b} \cdot \vec{n}}{|\vec{b}|\,|\vec{n}|}$