DPP
DAILY PRACTICE PROBLEMS

CLASS : XIIth **SUBJECT : MATHS**
DATE : **DPP NO. : 7**

Topic :- VECTOR ALGEBRA

1. Three vectors $7\hat{\mathbf{i}} - 11\hat{\mathbf{j}} + \hat{\mathbf{k}}$, $5\hat{\mathbf{i}} + 3\hat{\mathbf{j}} - 2\hat{\mathbf{k}}$ and $12\hat{\mathbf{i}} - 8\hat{\mathbf{j}} - \hat{\mathbf{k}}$ from
 a) an equilateral triangle b) an isosceles triangle
 c) a right angled triangle d) Collinear

2. If $|\vec{\mathbf{a}}| = 2, |\vec{\mathbf{b}}| = 3$, and $\vec{\mathbf{a}}, \vec{\mathbf{b}}$ are mutually perpendicular, then the area of triangle whose vertices are $\vec{\mathbf{0}}, \vec{\mathbf{a}} + \vec{\mathbf{b}}, \vec{\mathbf{a}} - \vec{\mathbf{b}}$ is
 a) 5 b) 1 c) 6 d) 8

3. If V is the volume of the parallelopiped having three coterminus edges as $\vec{a}, \vec{b}$ and $\vec{c}$, then the volume of the parallelopiped having three coterminus edges as
$\vec{\alpha} = (\vec{a} \cdot \vec{a})\vec{a} + (\vec{a} \cdot \vec{b})\vec{b} + (\vec{a} \cdot \vec{c})\vec{c}$
$\vec{\beta} = (\vec{a} \cdot \vec{b})\vec{a} + (\vec{b} \cdot \vec{b})\vec{b} + (\vec{b} \cdot \vec{c})\vec{c}$
$\vec{\gamma} = (\vec{a} \cdot \vec{c})\vec{a} + (\vec{b} \cdot \vec{c})\vec{b} + (\vec{c} \cdot \vec{c})\vec{c}$, is
 a) V^3 b) $3V$ c) V^2 d) $2V$

4. The unit vectors orthogonal to the vector $-\hat{i} + 2\hat{j} + 2\hat{k}$ and making equal angles with the X and Y axes is (are)
 a) $\pm\frac{1}{3}(2\hat{i} + 2\hat{j} - \hat{k})$ b) $\pm\frac{1}{3}(\hat{i} + \hat{j} - \hat{k})$ c) $\pm\frac{1}{3}(2\hat{i} - 2\hat{j} - \hat{k})$ d) None of these

5. The unit vector perpendicular to vectors $\hat{i} - \hat{j}$ and $\hat{i} + \hat{j}$ forming a right handed system is
 a) $\hat{k}$ b) $-\hat{k}$ c) $\frac{1}{\sqrt{2}}(\hat{i} - \hat{j})$ d) $\frac{1}{\sqrt{2}}(\hat{i} + \hat{j})$

6. Given, $\vec{\mathbf{p}} = 3\hat{\mathbf{i}} + 2\hat{\mathbf{j}} + 4\hat{\mathbf{k}}$, $\vec{\mathbf{a}} = \hat{\mathbf{i}} + \hat{\mathbf{j}}$, $\vec{\mathbf{b}} = \hat{\mathbf{j}} + \hat{\mathbf{k}}$, $\vec{\mathbf{c}} = \hat{\mathbf{i}} + \hat{\mathbf{k}}$ and $\vec{\mathbf{p}} = x\vec{\mathbf{a}} + y\vec{\mathbf{b}} + z\vec{\mathbf{c}}$, then x, y, z are respectively
 a) $\frac{3}{2}, \frac{1}{2}, \frac{5}{2}$ b) $\frac{1}{2}, \frac{3}{2}, \frac{5}{2}$ c) $\frac{5}{2}, \frac{3}{2}, \frac{1}{2}$ d) $\frac{1}{2}, \frac{5}{2}, \frac{3}{2}$

7. If S is the circumcentre, O is the orthocentre of ΔABC, then $\overrightarrow{\mathbf{SA}} + \overrightarrow{\mathbf{SB}} + \overrightarrow{\mathbf{SC}}$ is equal to
 a) $\overrightarrow{\mathbf{SO}}$ b) $2\,\overrightarrow{\mathbf{SO}}$ c) $\overrightarrow{\mathbf{OS}}$ d) $2\,\overrightarrow{\mathbf{OS}}$

8. If $\vec{a}$ and $\vec{b}$ are two vectors such that $\vec{a}.\vec{b} = 0$ and $\vec{a} \times \vec{b} = \vec{0}$, then
 a) $\vec{a} || \vec{b}$ b) $\vec{a} \perp \vec{b}$ c) Either $\vec{a}$ and $\vec{b}$ is a null vector d) None of these

9. If a tetrahedron has vertices at $O(0, 0, 0)$, $A(1, 2, 1)$, $B(2, 1, 3)$ and $C(-1, 1, 2)$. Then, the angle between the faces OAB and ABC will be

a) $\cos^{-1}\left(\frac{19}{35}\right)$ b) $\cos^{-1}\left(\frac{17}{31}\right)$ c) 30° d) 90°

10. If $\vec{\mathbf{a}}$ and $\vec{\mathbf{b}}$ are vectors such that the $|\vec{\mathbf{a}}+\vec{\mathbf{b}}| = |\vec{\mathbf{a}}-\vec{\mathbf{b}}|$, then the angle between $\vec{\mathbf{a}}$ and $\vec{\mathbf{b}}$ is

a) 120° b) 60° c) 90° d) 30°

11. If $\vec{a}$ and $\vec{b}$ are not perpendicular to each other and $\vec{r}\times\vec{a} = \vec{b}\times\vec{a}$, $\vec{r}.\vec{c} = 0$, then $\vec{r}$ is equal to

a) $\vec{a}-\vec{c}$

b) $\vec{b}+x\,\vec{a}$ for all scalars x

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

d) None of these

12. Let $\vec{\alpha}$,$\vec{\beta}$ and $\vec{\gamma}$ be the unit vectors such that $\vec{\alpha}$ and $\vec{\beta}$ are mutually perpendicular and $\vec{\gamma}$ is equally inclined to $\vec{\alpha}$ and $\vec{\beta}$ at an angle θ. If $\vec{\gamma} = x\vec{\alpha}+y\vec{\beta}+z(\vec{\alpha}\times\vec{\beta})$, then which one of the following is incorrect?

a) $z^2 = 1-2x^2$ b) $z^2 = 1-2y^2$ c) $z^2 = 1-x^2-y^2$ d) $x^2+y^2 = 1$

13. If $\vec{\mathbf{a}}\times\vec{\mathbf{b}} = \vec{\mathbf{c}}\times\vec{\mathbf{d}}$ and $\vec{\mathbf{a}}\times\vec{\mathbf{c}} = \vec{\mathbf{b}}\times\vec{\mathbf{d}}$, then

a) $(\vec{\mathbf{a}}-\vec{\mathbf{d}}) = \lambda(\vec{\mathbf{b}}-\vec{\mathbf{c}})$ b) $(\vec{\mathbf{a}}+\vec{\mathbf{d}}) = \lambda(\vec{\mathbf{b}}+\vec{\mathbf{c}})$ c) $(\vec{\mathbf{a}}-\vec{\mathbf{b}}) = \lambda(\vec{\mathbf{c}}+\vec{\mathbf{d}})$ d) $(\vec{\mathbf{a}}+\vec{\mathbf{b}}) = \lambda(\vec{\mathbf{c}}-\vec{\mathbf{d}})$

14. If $\vec{a}$,$\vec{b}$,$\vec{c}$ are three non-coplanar mutually perpendicular unit vectors, then $[\vec{a}\vec{b}\vec{c}]$, is

a) +1 b) 0 c) −2 d) 2

15. If P,Q,R and S are four points in space, then $|\overrightarrow{\mathbf{PQ}}\times\overrightarrow{\mathbf{RS}}+\overrightarrow{\mathbf{QR}}\times\overrightarrow{\mathbf{SP}}+\overrightarrow{\mathbf{RS}}\times\overrightarrow{\mathbf{QS}}| = k$ (area of ΔPQR). The value of k is

a) 0 b) 2 c) 4 d) 3

16. In a ΔABC, if $\vec{AB} = 3\hat{i}+4\hat{k}$, $\vec{AC} = 5\hat{i}+2\hat{j}+4\hat{k}$, then the length of median through A, is

a) $3\sqrt{2}$ b) $6\sqrt{2}$ c) $5\sqrt{2}$ d) $\sqrt{33}$

17. The vectors $\overrightarrow{\mathbf{AB}} = 3\hat{\mathbf{i}}+5\hat{\mathbf{j}}+4\hat{\mathbf{k}}$ and $\overrightarrow{\mathbf{AC}} = 5\hat{\mathbf{i}}-5\hat{\mathbf{j}}+2\hat{\mathbf{k}}$ are the sides of a triangle ABC. The length of the median through A is

a) $\sqrt{13}$ units b) $2\sqrt{5}$ units c) 5 units d) 10 units

18. If $\vec{\mathbf{a}}$, $\vec{\mathbf{b}}$, $\vec{\mathbf{c}}$ are non-coplanar vectors and $(\vec{\mathbf{a}}-\lambda\vec{\mathbf{b}})\cdot(\vec{\mathbf{b}}-2\vec{\mathbf{c}})\times(\vec{\mathbf{c}}+2\vec{\mathbf{a}}) = 0$, then λ is equal to

a) 1 b) 1/4 c) 0 d) −1/4

19. If $\vec{a}$ is perpendicular to $\vec{b}$ and $\vec{r}$ is a non-zero vector such that, $p\vec{r}+(\vec{r}.\vec{b})\vec{a} = \vec{c}$, then $\vec{r} =$

a) $\frac{\vec{c}}{p}-\frac{(\vec{b}.\vec{c})\vec{a}}{p^2}$ b) $\frac{\vec{a}}{p}-\frac{(\vec{c}.\vec{a})\vec{b}}{p^2}$ c) $\frac{\vec{b}}{p}-\frac{(\vec{a}.\vec{b})\vec{c}}{p^2}$ d) $\frac{\vec{c}}{p^2}-\frac{(\vec{b}.\vec{c})\vec{a}}{p}$

20. Constant forces $\vec{\mathbf{P}}_1 = \hat{\mathbf{i}} - \hat{\mathbf{j}} + \hat{\mathbf{k}}$, $\vec{\mathbf{P}}_2 = -\hat{\mathbf{i}} + 2\hat{\mathbf{j}} - \hat{\mathbf{k}}$ and $\vec{\mathbf{P}}_3 = \hat{\mathbf{j}} - \hat{\mathbf{k}}$ act on a particle at point A. The work done when the particle is displaced from the point A to B where $\vec{\mathbf{A}} = 4\hat{\mathbf{i}} - 3\hat{\mathbf{j}} - 2\hat{\mathbf{k}}$ and $\vec{\mathbf{B}} = 6\hat{\mathbf{i}} + \hat{\mathbf{j}} - 3\hat{\mathbf{k}}$ is

a) 3 b) 9 c) 20 d) None of these