DPP
DAILY PRACTICE PROBLEMS

CLASS : XIIth | **SUBJECT : MATHS**
DATE : | **DPP NO. : 8**

Topic :- VECTOR ALGEBRA

1. The point of intersection of $\vec{\mathbf{r}} \times \vec{\mathbf{a}} = \vec{\mathbf{b}} \times \vec{\mathbf{a}}$ and $\vec{\mathbf{r}} \times \vec{\mathbf{b}} = \vec{\mathbf{a}} \times \vec{\mathbf{b}}$, where $\vec{\mathbf{a}} = \hat{\mathbf{i}} + \hat{\mathbf{j}}$ and $\vec{\mathbf{b}} = \hat{\mathbf{i}} - \hat{\mathbf{k}}$ is
   a) $3\hat{\mathbf{i}} + \hat{\mathbf{j}} - \hat{\mathbf{k}}$ b) $3\hat{\mathbf{i}} - \hat{\mathbf{k}}$ c) $3\hat{\mathbf{i}} + 2\hat{\mathbf{j}} + \hat{\mathbf{k}}$ d) None of these

2. If the non-zero vectors $\vec{a}$ and $\vec{b}$ are perpendicular to each other, then the solution of the equation, $\vec{r} \times \vec{a} = \vec{b}$ is given by
   a) $\vec{r} = x\vec{a} + \frac{\vec{a} \times \vec{b}}{|\vec{a}|^2}$ b) $\vec{r} = x\vec{b} - \frac{\vec{a} \times \vec{b}}{|\vec{b}|^2}$ c) $\vec{r} = x(\vec{a} \times \vec{b})$ d) $\vec{r} = x(\vec{b} \times \vec{a})$

3. If $\vec{a}, \vec{b}, \vec{c}$ are position vectors of the vertices of a triangle ABC, then a unit vector perpendicular to its plane is
   a) $\vec{a} \times \vec{b} + \vec{b} \times \vec{c} + \vec{c} \times \vec{a}$ b) $\frac{\vec{a} \times \vec{b} + \vec{b} \times \vec{c} + \vec{c} \times \vec{a}}{|\vec{a} \times \vec{b} + \vec{b} \times \vec{c} + \vec{c} \times \vec{a}|}$ c) $\frac{\vec{a} \times \vec{b}}{|\vec{a} \times \vec{b}|}$ d) None of these

4. If $\vec{\mathbf{u}}, \vec{\mathbf{v}}$ and $\vec{\mathbf{w}}$ are three non-coplanar vectors, then $(\vec{\mathbf{u}} + \vec{\mathbf{v}} - \vec{\mathbf{w}}) \cdot [(\vec{\mathbf{u}} - \vec{\mathbf{v}}) \times (\vec{\mathbf{v}} - \vec{\mathbf{w}})]$ equals
   a) 0 b) $\vec{\mathbf{u}} \cdot \vec{\mathbf{v}} \times \vec{\mathbf{w}}$ c) $\vec{\mathbf{u}} \cdot \vec{\mathbf{w}} \times \vec{\mathbf{v}}$ d) $3\vec{\mathbf{u}} \cdot \vec{\mathbf{v}} \times \vec{\mathbf{w}}$

5. The resultant of $(\vec{\mathbf{p}} - 2\vec{\mathbf{q}})$ where. $\vec{\mathbf{p}} = 7\hat{\mathbf{i}} - 2\hat{\mathbf{j}} + 3\hat{\mathbf{k}}$ and $\vec{\mathbf{q}} = 3\hat{\mathbf{i}} + \hat{\mathbf{j}} + 5\hat{\mathbf{k}}$ is
   a) $\sqrt{29}$ b) 4 c) $\sqrt{62} - 2\sqrt{35}$ d) $\sqrt{66}$

6. If $\vec{a}, \vec{b}, \vec{c}$ are three non-zero vectors such that $\vec{a} + \vec{b} + \vec{c} = \vec{0}$ and $m = \vec{a}.\vec{b} + \vec{b}.\vec{c} + \vec{c}.\vec{a}$, then
   a) $m < 0$ b) $m > 0$ c) $m = 0$ d) $m = 3$

7. If $\vec{\mathbf{a}} = \hat{\mathbf{i}} + \hat{\mathbf{j}} + \hat{\mathbf{k}}$, $\vec{\mathbf{b}} = \hat{\mathbf{i}} + \hat{\mathbf{j}}$, $\vec{\mathbf{c}} = \hat{\mathbf{i}}$ and $(\vec{\mathbf{a}} \times \vec{\mathbf{b}}) \times \vec{\mathbf{c}} = \lambda \vec{\mathbf{a}} + \mu \vec{\mathbf{b}}$, then $\lambda + \mu$ is equal to
   a) 0 b) 1 c) 2 d) 3

8. If $\vec{a} = 2\hat{i} + 2\hat{j} + 3\hat{k}$, $\vec{b} = -\hat{i} + 2\hat{j} + \hat{k}$, $\vec{c} = 3\hat{i} + \hat{j}$ and $\vec{a} + t\vec{b}$ is normal to the vector $\vec{c}$, then the vector of t is
   a) 8 b) 4 c) 6 d) 2

9. If $\vec{a}, \vec{b}$ represent the diagonals of a rhombus, then
   a) $\vec{a} \times \vec{b} = \vec{0}$ b) $\vec{a}.\vec{b} = \vec{0}$ c) $\vec{a} \times \vec{b} = 1$ d) $\vec{a} \times \vec{b} = \vec{a}$

10. Three vectors $\vec{a}, \vec{b}, \vec{c}$ are such that $\vec{a} \times \vec{b} = 2\vec{a} \times \vec{c}$, $|\vec{a}| = |\vec{c}| = 1$ and $|\vec{b}| = 4$. If the angle between $\vec{b}$ and $\vec{c}$ is $\cos^{-1}\left(\frac{1}{4}\right)$, then $\vec{b} - 2\vec{c}$ is equal to

a) $\pm 4\vec{a}$ b) $\pm 3\vec{a}$ c) $\pm 5\vec{a}$ d) $\pm 4\vec{a}$

11. $\hat{i}.(\hat{j} \times \hat{k}) + \hat{j}.(\hat{k} \times \hat{i}) + \hat{k}.(\hat{i} \times \hat{j}) =$
    a) 1 b) 3 c) -3 d) 0

12. If $\vec{a} = \hat{i} + 2\hat{j} - 3\hat{k}$ and $\vec{b} = 3\hat{i} - \hat{j} + 2\hat{k}$, then the angle between the vectors $\vec{a} + \vec{b}$ and $\vec{a} - \vec{b}$, is
    a) 30° b) 60° c) 90° d) 0°

13. If $\vec{a}, \vec{b}, \vec{c}$ are three non-zero vectors such that $\vec{a} \cdot \vec{b} = \vec{a} \cdot \vec{c}$, then
    a) $\vec{b} = \vec{c}$
    b) $\vec{a} \perp \vec{b}, \vec{c}$
    c) $\vec{a} \perp (\vec{b} - \vec{c})$
    d) Either $\vec{a} \perp (\vec{b} - \vec{c})$ or $\vec{b} = \vec{c}$

14. The length of longer diagonal of the parallelogram constructed on $5\vec{\mathbf{a}} + 2\vec{\mathbf{b}}$ and $\vec{\mathbf{a}} - 3\vec{\mathbf{b}}$. If it is given that $|\vec{\mathbf{a}}| = 2\sqrt{2}, |\vec{\mathbf{b}}| = 3$ and angle between $\vec{\mathbf{a}}$ and $\vec{\mathbf{b}}$ is $\frac{\pi}{4}$, is
    a) 15 b) $\sqrt{113}$ c) $\sqrt{593}$ d) $\sqrt{369}$

15. If the projection of the vector $\vec{\mathbf{a}}$ on $\vec{\mathbf{b}}$ is $|\vec{\mathbf{a}} \times \vec{\mathbf{b}}|$ and if $3\vec{\mathbf{b}} = \hat{\mathbf{i}} + \hat{\mathbf{j}} + \hat{\mathbf{k}}$, then the angle between $\vec{\mathbf{a}}$ and $\vec{\mathbf{b}}$ is
    a) $\frac{\pi}{3}$ b) $\frac{\pi}{2}$ c) $\frac{\pi}{4}$ d) $\frac{\pi}{6}$

16. The unit vector perpendicular to the plane passing through points $P(\hat{i} - \hat{j} + 2\hat{k})$, $Q(2\hat{i} - \hat{k})$ and $R(2\hat{j} + \hat{k})$ is
    a) $2\hat{i} + \hat{j} + \hat{k}$ b) $\sqrt{6}(2\hat{i} + \hat{j} + \hat{k})$ c) $\frac{1}{\sqrt{6}}(2\hat{i} + \hat{j} + \hat{k})$ d) $\frac{1}{6}(2\hat{i} + \hat{j} + \hat{k})$

17. Let $\vec{\mathbf{a}}, \vec{\mathbf{b}}, \vec{\mathbf{c}}$ be three non-zero vectors such that no two of these are collinear. If the vector $\vec{\mathbf{a}} + 2\vec{\mathbf{b}}$ is collinear with $\vec{\mathbf{c}}$, then $\vec{\mathbf{a}} + 2\vec{\mathbf{b}} + 6\vec{\mathbf{c}}$ equals
    a) $\lambda\vec{\mathbf{a}}$ ($\lambda \neq 0$, a scalar) b) $\lambda\vec{\mathbf{b}}$ ($\lambda \neq 0$, a scalar) c) $\lambda\vec{\mathbf{c}}$ ($\lambda \neq 0$, a scalar) d) 0

18. Let $\vec{\mathbf{u}} = \hat{\mathbf{i}} + \hat{\mathbf{j}}, \vec{\mathbf{v}} = \hat{\mathbf{i}} - \hat{\mathbf{j}}$ and $\vec{\mathbf{w}} = \hat{\mathbf{i}} + 2\hat{\mathbf{j}} + 3\hat{\mathbf{k}}$. If $\hat{\mathbf{n}}$ is a unit vector such that $\vec{\mathbf{u}}.\hat{\mathbf{n}} = 0$ and $\vec{\mathbf{v}}.\hat{\mathbf{n}} = 0$, then $|\vec{w}.\hat{\mathbf{n}}|$ is equal to
    a) 0 b) 1 c) 2 d) 3

19. If position vector of point A is $\vec{\mathbf{a}} + 2\vec{\mathbf{b}}$ and any point $P(\vec{\mathbf{a}})$ divides $\overrightarrow{AB}$ in the ratio of 2 :3, then position vector of B is
    a) $2\vec{\mathbf{a}} - \vec{\mathbf{b}}$ b) $\vec{\mathbf{b}} - 2\vec{\mathbf{a}}$ c) $\vec{\mathbf{a}} - 3\vec{\mathbf{b}}$ d) $\vec{\mathbf{b}}$

20. If $\vec{\mathbf{A}} = \hat{\mathbf{i}} + 2\hat{\mathbf{j}} + 3\hat{\mathbf{k}}$, $\vec{\mathbf{B}} = \hat{\mathbf{i}} + 2\hat{\mathbf{j}} + \hat{\mathbf{k}}$ and $\vec{\mathbf{C}} = 3\hat{\mathbf{i}} + \hat{\mathbf{j}}$, evaluate t, if the vector $(\vec{\mathbf{A}} + t\vec{\mathbf{B}})$ and $\vec{\mathbf{C}}$ are mutually perpendicular.
    a) 5 b) 4 c) 1 d) 2