DPP
DAILY PRACTICE PROBLEMS

CLASS : XIIth **SUBJECT : MATHS**
DATE : **DPP NO. : 3**

Topic :- VECTOR ALGEBRA

1. If D, E, F are respectively the mid-points of AB, AC and BC respectively in a ΔABC, then $\overrightarrow{BE} + \overrightarrow{AF} =$
   a) $\overrightarrow{DC}$ b) $\frac{1}{2}\overrightarrow{BF}$ c) $2\overrightarrow{BF}$ d) $\frac{3}{2}\overrightarrow{BF}$

2. $\vec{\mathbf{a}}, \vec{\mathbf{b}}, \vec{\mathbf{c}}$ are mutually perpendicular unit vectors, then $|\vec{\mathbf{a}} + \vec{\mathbf{b}} + \vec{\mathbf{c}}|$ is equal to
   a) $\sqrt{3}$ b) 3 c) 1 d) 0

3. Let $\vec{a} = \hat{\imath} - 2\hat{\jmath} + 3\hat{k}, \vec{b} = 3\hat{\imath} + 3\hat{\jmath} - \hat{k}$ and $\vec{c} = d\hat{\imath} + \hat{\jmath} + (2d-1)\hat{k}$. If $\vec{c}$ is parallel to the plane of the vectors $\vec{a}$ and $\vec{b}$, then $11d =$
   a) 2 b) 1 c) -1 d) 0

4. If $\vec{\mathbf{a}}, \vec{\mathbf{b}}, \vec{\mathbf{c}}$ are three non-coplanar vectors and $\vec{\mathbf{p}}, \vec{\mathbf{q}}, \vec{\mathbf{r}}$, are reciprocal vectors, then $(l\vec{\mathbf{a}} + m\vec{\mathbf{b}} + n\vec{\mathbf{c}}) \cdot (l\vec{\mathbf{p}} + m\vec{\mathbf{q}} + n\vec{\mathbf{r}})$ is
   a) $l + m + n$ b) $l^3 + m^3 + n^3$ c) $l^2 + m^2 + n^2$ d) None of these

5. If $\vec{\mathbf{a}} \cdot \vec{\mathbf{b}} \cdot \vec{\mathbf{c}}$ are unit vectors, then $|\vec{\mathbf{a}} - \vec{\mathbf{b}}|^2 + |\vec{\mathbf{b}} - \vec{\mathbf{c}}|^2 + |\vec{\mathbf{c}} - \vec{\mathbf{a}}|^2$ does not exceed
   a) 4 b) 9 c) 8 d) 6

6. A constant force $\vec{\mathbf{F}} = 2\hat{\mathbf{i}} - 3\hat{\mathbf{j}} + 2\hat{\mathbf{k}}$ is acting on a particle such that the particle is displaced from the point(1,2,3) to the point (3,4,5). The work done by the force is
   a) 2 b) 3 c) 4 d) 5

7. The value of a, for which the points A, B, C with position vectors $2\hat{\mathbf{i}} - \hat{\mathbf{j}} + \hat{\mathbf{k}}, \hat{\mathbf{i}} - 3\hat{\mathbf{j}} - 5\hat{\mathbf{k}}$ and $a\hat{\mathbf{i}} - 3\hat{\mathbf{j}} + \hat{\mathbf{k}}$ respectively are the vertices of a right with $C = \frac{\pi}{2}$ are
   a) -2 and -1 b) -2 and 1 c) 2 and -1 d) 2 and 1

8. If $(\vec{a} \times \vec{b}) \times \vec{c} = \vec{a} \times (\vec{b} \times \vec{c})$, then
   a) $\vec{b} \times (\vec{c} \times \vec{a}) = \vec{0}$ b) $\vec{a} \times (\vec{b} \times \vec{c}) = \vec{0}$ c) $\vec{c} \times \vec{a} = \vec{a} \times \vec{b}$ d) $\vec{c} \times \vec{b} = \vec{b} \times \vec{a}$

9. If $\vec{a} + \vec{b} \neq 0$ and $\vec{c}$ is a non-zero vector, then $(\vec{a} + \vec{b}) \times \{\vec{c} - (\vec{a} + \vec{b})\}$ is equal to
   a) $\vec{a} + \vec{b}$ b) $(\vec{a} + \vec{b}) \times \vec{c}$ c) $\lambda\,\vec{c}$, where $\lambda \neq 0$ d) $\lambda(\vec{a} \times \vec{b}), \lambda \neq 0$

10. If a force $\vec{\mathbf{F}} = 3\hat{\mathbf{i}} + 2\hat{\mathbf{j}} - 4\hat{\mathbf{k}}$ is acting at the point $P(1,-1,2)$ then the magnitude of moment of $\vec{\mathbf{F}}$ about the point $Q(2,-1,3)$ is
    a) $\sqrt{57}$ b) $\sqrt{39}$ c) 12 d) 17

11. If $|\vec{\mathbf{a}}| = |\vec{\mathbf{b}}| = 1$ and $|\vec{\mathbf{a}} + \vec{\mathbf{b}}| = \sqrt{3}$, then the value of $(3\,\vec{\mathbf{a}} - 4\vec{\mathbf{b}}) \cdot (2\vec{\mathbf{a}} + 5\vec{\mathbf{b}})$ is

a) -21 b) $-\frac{21}{2}$ c) 21 d) $\frac{21}{2}$

12. If $\hat{a}, \hat{b}, \hat{c}$ are three unit vectors such that $\hat{b}$ and $\hat{c}$ are non-parallel and $\hat{a} \times (\hat{b} \times \hat{c}) = \frac{1}{2}\hat{b}$, then the angle between $\hat{a}$ and $\hat{c}$ is
a) $30°$ b) $45°$ c) $60°$ d) $90°$

13. If the vectors $3\hat{\imath} + \lambda\hat{\jmath} + \hat{k}$ and $2\hat{\imath} - \hat{\jmath} + 8\hat{k}$ are perpendicular, then λ is equal to
a) -14 b) 7 c) 14 d) $1/7$

14. The equation of the plane perpendicular to the line $\frac{x-1}{1} = \frac{y-2}{-1} = \frac{z+1}{2}$ and passing through the point$(2,3,1)$ is
a) $\vec{\mathbf{r}} \cdot (\hat{\mathbf{i}} + \hat{\mathbf{j}} + 2\hat{\mathbf{k}}) = 1$ b) $\vec{\mathbf{r}} \cdot (\hat{\mathbf{i}} - \hat{\mathbf{j}} + 2\hat{\mathbf{k}}) = 1$ c) $\vec{\mathbf{r}} \cdot (\hat{\mathbf{i}} - \hat{\mathbf{j}} + 2\hat{\mathbf{k}}) = 7$ d) $\vec{\mathbf{r}} \cdot (\hat{\mathbf{i}} + \hat{\mathbf{j}} - 2\hat{\mathbf{k}}) = 10$

15. $(\vec{\mathbf{a}} - \vec{\mathbf{b}}) \cdot \{(\vec{\mathbf{b}} - \vec{\mathbf{c}}) \times (\vec{\mathbf{c}} - \vec{\mathbf{a}})\}$ is equal to
a) $2\,\vec{\mathbf{a}} \cdot \vec{\mathbf{b}} \times \vec{\mathbf{c}}$ b) $\vec{\mathbf{a}} \cdot \vec{\mathbf{b}} \times \vec{\mathbf{c}}$ c) 0 d) $\vec{\mathbf{a}} \cdot \vec{\mathbf{b}}$

16. If $\hat{n}_1, \hat{n}_2$ are two unit vectors and θ is the angle between them, then $\cos\theta/2 =$
a) $\frac{1}{2}|\hat{n}_1 + \hat{n}_2|$ b) $\frac{1}{2}|\hat{n}_1 - \hat{n}_2|$ c) $\frac{1}{2}(\hat{n}_1 . \hat{n}_2)$ d) $\frac{|\hat{n}_1 \times \hat{n}_2|}{2|\hat{n}_1|\,|\hat{n}_2|}$

17. Let $ABCD$ be the parallelogram whose sides AB and AD are represented by the vectors $2\hat{\mathbf{i}} + 4\hat{\mathbf{j}} - 5\hat{\mathbf{k}}$ and $\hat{\mathbf{i}} + 2\hat{\mathbf{j}} + 3\hat{\mathbf{k}}$ respectively. Then if $\vec{\mathbf{a}}$ is a unit vector parallel to $\overrightarrow{\mathbf{AC}}$, then $\vec{\mathbf{a}}$ is equal to
a) $(3\hat{\mathbf{i}} - 6\hat{\mathbf{j}} - 2\hat{\mathbf{k}})/3$ b) $(3\hat{\mathbf{i}} + 6\hat{\mathbf{j}} + 2\hat{\mathbf{k}})/3$ c) $(3\hat{\mathbf{i}} - 6\hat{\mathbf{j}} - 3\hat{\mathbf{k}})/7$ d) $(3\hat{\mathbf{i}} + 6\hat{\mathbf{j}} - 2\hat{\mathbf{k}})/7$

18. If the points with position vectors $60\hat{\mathbf{i}} + 3\hat{\mathbf{j}}$, $40\hat{\mathbf{i}} - 8\hat{\mathbf{j}}$ and $a\hat{\mathbf{i}} - 52\hat{\mathbf{j}}$ are collinear, then a is equal to
a) -40 b) -20 c) 20 d) 40

19. If $\vec{a}, \vec{b}, \vec{c}$ are three non-coplanar vectors such that $\vec{a} + \vec{b} + \vec{c} = \alpha\vec{d}$ and $\vec{b} + \vec{c} + \vec{d} = \beta\vec{a}$, then $\vec{a} + \vec{b} + \vec{c} + \vec{d}$ is equal to
a) $\vec{0}$ b) $\alpha\vec{a}$ c) $\beta\vec{b}$ d) $(\alpha + \beta)\vec{c}$

20. The unit vector perpendicular to $\hat{\mathbf{i}} - \hat{\mathbf{j}}$ and coplanar with $\hat{\mathbf{i}} + 2\hat{\mathbf{j}}$ and $\hat{\mathbf{i}} + 3\hat{\mathbf{j}}$ is
a) $\frac{2\hat{\mathbf{i}} - 5\hat{\mathbf{j}}}{\sqrt{29}}$ b) $2\hat{\mathbf{i}} + 5\hat{\mathbf{j}}$ c) $\frac{1}{\sqrt{2}}(\hat{\mathbf{i}} + \hat{\mathbf{j}})$ d) $\hat{\mathbf{i}} + \hat{\mathbf{j}}$