DPP

DAILY PRACTICE PROBLEMS

CLASS : XIIth **SUBJECT : MATHS**
DATE : **DPP NO. : 5**

Topic :- VECTOR ALGEBRA

1. The vectors $2\hat{i} + 3\hat{j} - 4\hat{k}$ and $a\hat{i} + b\hat{j} + c\hat{k}$ are perpendicular when
   a) $a = 2, b = 3, c = -4$ b) $a = 4, b = 4, c = 5$ c) $a = 4, b = 4, c = -2$ d) None of these

2. If $\vec{\boldsymbol{\alpha}} = x(\vec{\mathbf{a}} \times \vec{\mathbf{b}}) + y(\vec{\mathbf{b}} \times \vec{\mathbf{b}}) + z(\vec{\mathbf{c}} \times \vec{\mathbf{a}})$ and $[\vec{\mathbf{a}}\ \vec{\mathbf{b}}\ \vec{\mathbf{c}}] = \frac{1}{8}$, then x + y + z is equal to
   a) $8\,\vec{\alpha} \cdot (\vec{\mathbf{a}} + \vec{\mathbf{b}} + \vec{\mathbf{c}})$ b) $\vec{\alpha} \cdot (\vec{\mathbf{a}} + \vec{\mathbf{b}} + \vec{\mathbf{c}})$ c) $8\,(\vec{\mathbf{a}} + \vec{\mathbf{b}} + \vec{\mathbf{c}})$ d) None of these

3. If vectors $3\hat{\mathbf{i}} + \hat{\mathbf{j}} - 5\hat{\mathbf{k}}$ and $a\hat{\mathbf{i}} + b\hat{\mathbf{j}} - 15\hat{\mathbf{k}}$ are collinear, then
   a) $a = 3, b = 1$ b) $a = 9, b = 1$ c) $a = 3, b = 3$ d) $a = 9, b = 3$

4. Let $\vec{\mathbf{a}}$and $\vec{\mathbf{b}}$ be two unit vectors such that angle between them is 60°. Then, $|\vec{\mathbf{a}} - \vec{\mathbf{b}}|$is equal to
   a) $\sqrt{5}$ b) $\sqrt{3}$ c) 0 d) 1

5. The point collinear with $(1, -2, -3)$and $(2,0,0)$ among the following is
   a) $(0,4,6)$ b) $(0, -4, -5)$ c) $(0, -4, -6)$ d) $(0, -4,6)$

6. If $\vec{\mathbf{a}}$ and $\vec{\mathbf{b}}$ are unit vectors, then the vectors $(\vec{\mathbf{a}} + \vec{\mathbf{b}}) \times (\vec{\mathbf{a}} \times \vec{\mathbf{b}})$ is parallel to the vector
   a) $\vec{\mathbf{a}} - \vec{\mathbf{b}}$ b) $\vec{\mathbf{a}} + \vec{\mathbf{b}}$ c) $2\,\vec{\mathbf{a}} - \vec{\mathbf{b}}$ d) $2\,\vec{\mathbf{a}} + \vec{\mathbf{b}}$

7. If θ is the angle between the lines AB and AC where A,B and C are the three points with coordinates $(1,2,-1)$,$(2,0,3)$,$(3,-1,2)$ respectively, then $\sqrt{462}\cos\theta$ is equal to
   a) 20 b) 10 c) 30 d) 40

8. Let $\vec{\mathbf{v}} = 2\hat{\mathbf{i}} + \hat{\mathbf{j}} - \hat{\mathbf{k}}$ and $\vec{\mathbf{w}} = \hat{\mathbf{i}} + 3\hat{\mathbf{k}}$, If $\vec{\mathbf{u}}$ is a unit vector, then maximum value of the scalar triple product $[\,\vec{\mathbf{u}}\ \vec{\mathbf{v}}\ \vec{\mathbf{w}}\,]$ is
   a) -1 b) $\sqrt{10} + \sqrt{6}$ c) $\sqrt{59}$ d) $\sqrt{60}$

9. Each of the angle between vectors $\vec{a}$, $\vec{b}$ and $\vec{c}$ is equal to 60°. If $|\vec{a}| = 4$, $|\vec{b}| = 2$ and $|\vec{c}| = 6$, then the modulus of $\vec{a} + \vec{b} + \vec{c}$, is
   a) 10 b) 15 c) 12 d) None of these

10. A force of magnitude 5 unit acting along the vector $2\hat{\mathbf{i}} - 2\hat{\mathbf{j}} + \hat{\mathbf{k}}$ displaces the point of applications from (1,2,3) to (5,3,7) then the work done is
    a) 50/7 unit b) 50/3 unit c) 25/3 unit d) 25/4 unit

11. The equation of the plane passing through three non-collinear points $\vec{\mathbf{a}},\vec{\mathbf{b}},\vec{\mathbf{c}}$ is

a) $\vec{\mathbf{r}}\cdot(\vec{\mathbf{b}}\times\vec{\mathbf{c}}+\vec{\mathbf{c}}\times\vec{\mathbf{a}}+\vec{\mathbf{a}}\times\vec{\mathbf{b}})=0$
b) $\vec{\mathbf{r}}\cdot(\vec{\mathbf{b}}\times\vec{\mathbf{c}}+\vec{\mathbf{c}}\times\vec{\mathbf{a}}+\vec{\mathbf{a}}\times\vec{\mathbf{b}})=[\vec{\mathbf{a}}\,\vec{\mathbf{b}}\,\vec{\mathbf{c}}]$
c) $\vec{\mathbf{r}}\cdot(\vec{\mathbf{a}}\times(\vec{\mathbf{b}}\times\vec{\mathbf{c}}))=[\vec{\mathbf{a}}\,\vec{\mathbf{b}}\,\vec{\mathbf{c}}]$
d) $\vec{\mathbf{r}}\cdot(\vec{\mathbf{a}}+\vec{\mathbf{b}}+\vec{\mathbf{c}})=0$

12. If a vector $\vec{r}$ of magnitude $3\sqrt{6}$ is directed along the bisector of the angle between the vectors $\vec{a}=7\hat{i}-4\hat{j}-4\hat{k}$ and $\vec{b}=-2\hat{i}-\hat{j}+2\hat{k}$, then $\vec{r}=$

a) $\hat{i}-7\hat{j}+2\hat{k}$
b) $\hat{i}+7\hat{j}-2\hat{k}$
c) $-\hat{i}+7\hat{j}+2\hat{k}$
d) $\hat{i}-7\hat{j}-2\hat{k}$

13. If the point whose position vectors are $2\hat{\mathbf{i}}+\hat{\mathbf{j}}+\hat{\mathbf{k}}$, $6\hat{\mathbf{i}}-\hat{\mathbf{j}}+2\hat{\mathbf{k}}$ and $14\hat{\mathbf{i}}-5\hat{\mathbf{j}}+p\hat{\mathbf{k}}$ are collinear, then the value of p is

a) 2
b) 4
c) 6
d) 8

14. Let $\vec{\mathbf{a}}\cdot\vec{\mathbf{b}}$ and $\vec{\mathbf{c}}$ be non-zero vectors such that

$$(\vec{\mathbf{a}}\times\vec{\mathbf{b}})\times\vec{\mathbf{c}}=\frac{1}{3}|\vec{\mathbf{b}}|\,|\vec{\mathbf{c}}|\vec{\mathbf{a}}$$

If θ is the acute angle between the vectors $\vec{\mathbf{b}}$ and $\vec{\mathbf{c}}$ then $\sin\theta$ equals

a) $\frac{1}{3}$
b) $\frac{\sqrt{2}}{3}$
c) $\frac{2}{3}$
d) $\frac{2\sqrt{2}}{3}$

15. Let ABC be a triangle, the position vectors of whose vertices are respectively $7\hat{\mathbf{i}}+10\hat{\mathbf{k}}$, $-\hat{\mathbf{i}}+6\hat{\mathbf{j}}+6\hat{\mathbf{k}}$ and $-4\hat{\mathbf{i}}+9\hat{\mathbf{j}}+6\hat{\mathbf{k}}$ Then, the ΔABC is

a) Isosceles
b) Equilateral
c) Right angled isosceles
d) None of these

16. If C is the middle point of AB and P is any point outside AB, then

a) $\vec{PA}+\vec{PB}=\vec{PC}$
b) $\vec{PA}+\vec{PB}=2\vec{PC}$
c) $\vec{PA}+\vec{PB}+\vec{PC}=\vec{0}$
d) $\vec{PA}+\vec{PB}+2\vec{PC}=\vec{0}$

17. If $\vec{\mathbf{a}},\vec{\mathbf{b}}$ are any two vwctors, then $(2\vec{a}+3\vec{\mathbf{b}})\times(5\vec{\mathbf{a}}+7\vec{\mathbf{b}})+\vec{\mathbf{a}}\times\vec{\mathbf{b}}$ is equal to

a) $\vec{\mathbf{0}}$
b) 0
c) $\vec{\mathbf{a}}\times\vec{\mathbf{b}}$
d) $\vec{\mathbf{b}}\times\vec{\mathbf{a}}$

18. The moment about the point $M(-2, 4, -6)$ of the force represented in magnitude and position by AB where the points A and B have the coordinates $(1, 2, -3)$ and $(3, -4, 2)$ respectively is

a) $8\hat{i}-9\hat{j}-14\hat{k}$
b) $2\hat{i}-6\hat{j}+5\hat{k}$
c) $-3\hat{i}+2\hat{j}-3\hat{k}$
d) $-5\hat{i}+8\hat{j}-8\hat{k}$

19. If the position vectors of A,B and $C$are respectively $2\hat{\mathbf{i}}-\hat{\mathbf{j}}+\hat{\mathbf{k}}$, $\hat{\mathbf{i}}-3\hat{\mathbf{j}}-5\hat{\mathbf{k}}$ and $3\hat{\mathbf{i}}-4\hat{\mathbf{j}}-4\hat{\mathbf{k}}$ then $\cos^2 A$ is equal to

a) 0
b) $\frac{6}{41}$
c) $\frac{35}{41}$
d) 1

20. If $\vec{r}\cdot\vec{a}=\vec{r}\cdot\vec{b}=\vec{r}\cdot\vec{c}=0$ where $\vec{a},\vec{b},\vec{c}$ are non-coplanar, then

a) $\vec{r}\perp\vec{c}\times\vec{a}$
b) $\vec{r}\perp\vec{a}\times\vec{b}$
c) $\vec{r}\perp\vec{b}\times\vec{c}$
d) $\vec{r}=\vec{0}$