DPP – 02

1. A $(1,-1,-3), B(2,1,-2) \& C(-5,2,-6)$ are the position vectors of the vertices of a triangle ABC. The length of the bisector of its internal angle at A is :
(A) $\sqrt{10}/4$ (B) $3\sqrt{10}/4$ (C) $\sqrt{10}$ (D) none

2. Let $\vec{p}$ is the p.v. of the orthocentre $\&\vec{g}$ is the p.v. of the centroid of the triangle ABC where circumcentre is the origin. If $\vec{p} = K\vec{g}$, then $K =$
$(A)3$ (B) 2 (C) 1/3 (D) 2/3

3. A vector $\vec{a}$ has components 2p&1 with respect to a rectangular cartesian system. The system is rotated through a certain angle about the origin in the counterclockwise sense. If with respect to the new system, $\vec{a}$ has components $\mathrm{p}+1\&1$ then,
(A) $\mathrm{p}=0$ (B) $\mathrm{p}=1$ or $\mathrm{p}=-1/3$
(C) $p=-1$ or $p=1/3$ (D) $\mathrm{p}=1$ or $\mathrm{p}=-1$

4. The number of vectors of unit length perpendicular to vectors $\vec{a}=(1,1,0)$ & $\vec{b}(0,1,1)$ is:
(A) 1 $(B)2$ (C) 3 (D) ∞

5. Four points $A(1,-1,1); B(1,3,1); C(4,3,1)$ and $D(4,-1,1)$ taken in order are the vertices of

(A) a parallelogram which is neither a rectangle nor a rhombus
(B) rhombus
(C) an isosceles trapezium
(D) a cyclic quadrilateral.

6. Let $\alpha, \beta \& \gamma$ be distinct real numbers. The points whose position vectors are $\alpha\hat{\imath}+\beta\hat{\jmath}+\gamma\hat{k}$;

$\beta\hat{\imath}+\gamma\hat{\jmath}+\alpha\hat{k}$ and $\gamma\hat{\imath}+\alpha\hat{\jmath}+\beta\hat{k}$
(A) are collinear (B) form an equilateral triangle
(C) form a scalene triangle (D) form a right-angled triangle

7. If the vectors $\vec{a}=3\hat{\imath}+\hat{\jmath}-2\hat{k}, \vec{b}=-\hat{\imath}+3\hat{\jmath}+4\hat{k} \& \vec{c}=4\hat{\imath}-2\hat{\jmath}-6\hat{k}$ constitute the sides of a ΔABC, then the length of the median bisecting the vector $\vec{c}$ is
(A) $\sqrt{2}$ (B) $\sqrt{14}$ (C) $\sqrt{74}$ $(D)\sqrt{6}$

8. Let A(0, −1,1), B(0,0,1), C(1,0,1) are the vertices of a △ ABC. If R and r denotes the circumradius and inradius of △ ABC, then $\frac{r}{R}$ has value equal to

(A) $\tan\frac{3\pi}{8}$ (B*) $\cot\frac{3\pi}{8}$ (C) $\tan\frac{\pi}{12}$ (D) $\cot\frac{\pi}{12}$

9. If $\vec{a} = x\hat{\imath} - 2\hat{\jmath} + 5\hat{k}$ and $\vec{b} = \hat{\imath} + y\hat{\jmath} - z\hat{k}$ are linearly dependent, then the value of $\frac{xy^2}{z}$ equals

(A) $\frac{4}{5}$ (B) $\frac{-3}{5}$ (C) $\frac{3}{5}$ (D) $\frac{-4}{5}$

10. A vector of magnitude 10 along the normal to the curve $3x^2 + 8xy + 2y^2 - 3 = 0$ at its point $P(1,0)$ can be

(A) $6\hat{\imath} + 8\hat{\jmath}$ (B) $-6\hat{\imath} + 8\hat{\jmath}$ (C) $6\hat{\imath} - 8\hat{\jmath}$ (D^*) $-6\hat{\imath} - 8\hat{\jmath}$

11. If (0,1,0), $B(0,0,0)$, $C(1,0,1)$ are the vertices of a △ ABC. Match the entries of column-I with column-II.

Column-I	**Column-II**
(A) Orthocenter of △ ABC.	(P) $\frac{\sqrt{2}}{2}$
(B) Circumcenter of △ ABC.	(Q) $\frac{\sqrt{3}}{2}$
(C) Area (△ ABC).	(R) $\frac{\sqrt{3}}{3}$
(D) Distance between orthocenter and centroid.	(S) $\frac{\sqrt{3}}{6}$
(E) Distance between orthocenter and circumcenter.	(T) (0,0,0)
(F) Distance between circumcenter and centroid.	(U) $\left(\frac{1}{2},\frac{1}{2},\frac{1}{2}\right)$
(G) Incentre of △ ABC.	(V) $\left(\frac{1}{3},\frac{1}{3},\frac{1}{3}\right)$
(H) Centroid of △ ABC	(W) $\left(\frac{1}{\sqrt{1}+\sqrt{2}+\sqrt{3}},\frac{\sqrt{2}}{\sqrt{1}+\sqrt{2}+\sqrt{3}},\frac{1}{\sqrt{1}+\sqrt{2}+\sqrt{3}}\right)$

ANSWER KEY

1.	(B)	**2.**	(A)	**3.**	(B)	**4.**	(B)	**5.**	(D)
6.	(B)	**7.**	(D)	**8.**	(B)	**9.**	(D)	**10.**	(A)

11. (A) T; (B) U ; (C) P ; (D) R ; (E) Q; (F) S; (G) W; (H) V