DPP - 2

VECTOR

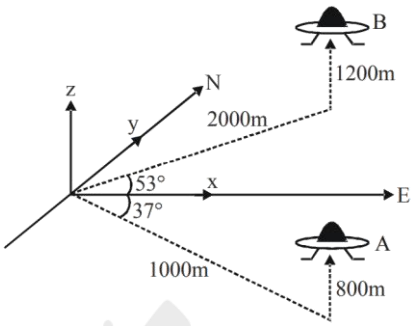
Q.1 If the angle between the unit vectors $\hat{a}$ and $\hat{b}$ is 60°, then $|\hat{a} - \hat{b}|$ is :-

(A) 0 (B) 1 (C) 2 (D) 4

Q.2 The projection of a vector, $\vec{r} = 3\hat{i} + \hat{j} + 2\hat{k}$, on the x − y plane has magnitude :-

(A) 3 (B) 4 (C) $\sqrt{14}$ (D) $\sqrt{10}$

Q.3 Personnel at an air post control tower track a UFO. At 11:02 am it was located at position A and at 11:12 am is was located at position B. Displacement vector of UFO is :



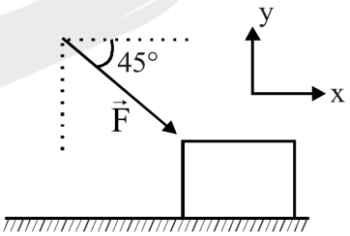
(A) $400\hat{i} + 2200\hat{j} + 400\hat{k}$

(B) $1200\hat{i} + 1000\hat{j} + 800\hat{k}$

(C) $2000\hat{i} + 2200\hat{j} + 2000\hat{k}$

(D) $400\hat{i} + 1000\hat{j} + 400\hat{k}$

Q.4 A person pushes a box kept on a horizontal surface with force of 100 N. In unit vector notation force $\vec{F}$ can be expressed as :



(A) $100(\hat{i} + \hat{j})$ (B) $100(\hat{i} - \hat{j})$

(C) $50\sqrt{2}(\hat{i} - \hat{j})$ (D) $50\sqrt{2}(\hat{i} + \hat{j})$

Q.5 In a methane (CH_4) molecule each hydrogen atom is at a corner of a regular tetrahedron with the carbon atom at the centre. In coordinates where one of theC-H bonds is in the direction of $\hat{i} + \hat{j} + \hat{k}$, an adjacent C − H bond in the $\hat{i} - \hat{j} - \hat{k}$ direction. Then angle between these two bonds :-

(A) $\cos^{-1}\left(-\frac{2}{3}\right)$ (B) $\cos^{-1}\left(\frac{2}{3}\right)$

(C) $\cos^{-1}\left(-\frac{1}{3}\right)$ (D) $\cos^{-1}\left(\frac{1}{3}\right)$

Q.6 A particle moves from a position $3\hat{i} + 2\hat{j} - 6\hat{k}$ to a position $14\hat{i} + 13\hat{j} + 9\hat{k}$ in m and a uniform force of $4\hat{i} + \hat{j} + 3\hat{k}$N acts on it. The work done by the force is :-

(A) 200 J (B) 100 J (C) 300 J (D) 500 J

Q.7 Which of the following is perpendicular to $\hat{i} - \hat{j} - \hat{k}$?

(A) $\hat{i} + \hat{j} + \hat{k}$ (B) $-\hat{i} + \hat{j} + \hat{k}$ (C) $\hat{i} + \hat{j} - \hat{k}$ (D) none of these

Q.8 Which of the following statements about the sum of the two vectors $\vec{A}$ and $\vec{B}$, is/are correct?

(A) $|\vec{A} + \vec{B}| \leq A + B$ (B) $|\vec{A} + \vec{B}| \geq A + B$

(C) $|\vec{A} + \vec{B}| \geq |\vec{A} - \vec{B}|$ (D) $|\vec{A} + \vec{B}| \geq |A - B|$

Paragraph for Question Nos. 9 and 10

For any particle moving with some velocity ($\vec{v}$)& acceleration ($\vec{a}$), tangential acceleration & normal acceleration are defined as follows

Tangential acceleration - The component of acceleration in the direction of velocity.

Normal acceleration - The component of acceleration in the direction perpendicular to velocity.

If at a given instant, velocity & acceleration of a particle are given by.

$\vec{v} = 4\hat{i} + 3\hat{j}$

$\vec{a} = 10\hat{i} + 15\hat{j} + 20\hat{k}$

Q.9 Find the tangential acceleration of the particle at the given instant :-

(A) $17(4\hat{i} + 3\hat{j})$ (B) $\frac{17}{5}(4\hat{i} + 3\hat{j})$ (C) $17(4\hat{i} - 3\hat{j})$ (D) $\frac{17}{5}(4\hat{i} - 3\hat{j})$

Q.10 Find the normal acceleration of the particle at the given instant :-

(A) $\frac{-9\hat{i}+12\hat{j}+50\hat{k}}{5}$ (B) $\frac{9\hat{i}-12\hat{j}-50\hat{k}}{5}$ (C) $\frac{-18\hat{i}+24\hat{j}+100\hat{k}}{5}$ (D) $\frac{18\hat{i}-24\hat{j}-100\hat{k}}{5}$

ANSWER KEY

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