DPP Daily Practice Problem *Physics*	*Topic : Vector* DPP No. 11	Time : 30 min. Total Marks : 56 Max.

Type of Questions
Single choice Objective ('–1' negative marking) Q. 1 to Q. 14

Q 1) The unit vector along $\hat{\imath} + \hat{\jmath}$ is

A) $\hat{k}$ B) $\hat{\imath} + \hat{\jmath}$

C) $\frac{\hat{\imath}+\hat{\jmath}}{\sqrt{2}}$ D) $\frac{\hat{\imath}+\hat{\jmath}}{2}$

Q 2) The expression $\frac{1}{\sqrt{2}}\hat{\imath} + \frac{1}{\sqrt{2}}\hat{\jmath}$ is a

A) Unit vector B) Null vector

C) Vector of magnitude $\sqrt{2}$ D) Scalar

Q 3) The vector projection of a vector $3\hat{\imath} + 4\hat{k}$ on y-axis is

A) 5 B) 4

C) 3 D) zero

Q 4) If a particle moves from point P (2,3,5) to point Q (3,4,5). Its displacement vector be

A) $\hat{\imath} + \hat{\jmath} + 10\hat{k}$ B) $\hat{\imath} + \hat{\jmath} + 5\hat{k}$

C) $\hat{\imath} + \hat{\jmath}$ D) $2\hat{\imath} + 4\hat{\jmath} + 6\hat{k}$

Q 5) If A = $3\hat{\imath} + 4\hat{\jmath}$ and B=$7\hat{\imath} + 24\hat{\jmath}$ the vector having the same magnitude as B and parallel to A is

A) $5\hat{\imath} + 20\hat{\jmath}$ B) $15\hat{\imath} + 10\hat{\jmath}$

C) $20\hat{\imath} + 15\hat{\jmath}$ D) $15\hat{\imath} + 20\hat{\jmath}$

Q 6) If A =$2\hat{\imath} + 4\hat{\jmath} - 5\hat{k}$ the direction of cosines of the vector $\vec{A}$ are

A) $\frac{2}{\sqrt{45}}, \frac{4}{\sqrt{45}}\ and\ \frac{-5}{\sqrt{45}}$ B) $\frac{1}{\sqrt{45}}, \frac{2}{\sqrt{45}} and \frac{3}{\sqrt{45}}$

C) $\frac{4}{\sqrt{45}}, 0\ and \frac{4}{\sqrt{45}}$ D) $\frac{3}{\sqrt{45}}, \frac{2}{\sqrt{45}} and \frac{5}{\sqrt{45}}$

Q 7) How many minimum number of coplanar vectors having different magnitudes can be added to give zero resultant

A) 2 B) 3

C) 4 D) 5

Q 8) 100 coplanar forces each equal to 10 N act on a body. Each force makes angle π / 50 with the preceding force. What is the resultant of the forces

A) 1000 N B) 500 N

C) 250 N D) Zero

Q 9) Given vector$\vec{A} = 2\hat{\imath} + 3\hat{\jmath}$, the angle between$\vec{A}$ and y-axis is

A) $tan^{-1} 3/2$ C) $tan^{-1} 2/3$

B) $sin^{-1} 2/3$ D) $cos^{-1} 2/3$

Q 10) A vector is represented by $3\hat{\imath} + \hat{\jmath} + 2\hat{k}$. Its length in XY plane is

A) 2 B) $\sqrt{14}$

C) $\sqrt{10}$ D) $\sqrt{5}$

Q 11) The angle made by the vector $\vec{A} = \hat{\imath} + \hat{\jmath}$ with x- axis is

A) 90° B) 45°

C) 22.5° D) 30°

Q 12) Angular momentum is

A) A scalar B) A polar vector

C) An axial vector D) None of these

Q 13) If $\vec{P} = \vec{Q}$ then which of the following is NOT correct

A) $\hat{P} = \hat{Q}$ B) $|\vec{P}| = |\vec{Q}|$

C) $P\hat{Q} = Q\hat{P}$ D) $\vec{P} + \vec{Q} = \hat{P} + \hat{Q}$

Q 14) Which of the following is a scalar quantity

A) Displacement B) Electric field

C) Acceleration D) Work

DPP Daily Practice Problem Physics	*Topic : Vector* DPP No. 12	Time : 30 min. Total Marks : 56 Max.

Type of Questions
Single choice Objective ('–1' negative marking) Q. 1 to Q. 14

Q 1) If a unit vector is represented by $0.5\hat{i} + 0.8\hat{j} + c\hat{k}$, then the value of 'c' is

A) 1 B) $\sqrt{0.11}$

C) $\sqrt{0.01}$ D) $\sqrt{0.39}$

Q 2) The unit vector parallel to the resultant of the vectors $\vec{A} = 4\hat{i} + 3\hat{j} + 6\hat{k}$ and $\vec{B} = -\hat{i} + 3\hat{j} - 8\hat{k}$ is

A) $\frac{1}{7}(3\hat{i} + 6\hat{j} - 2\hat{k})$ B) $\frac{1}{7}(3\hat{i} + 6\hat{j} + 2\hat{k})$

C) $\frac{1}{49}(3\hat{i} + 6\hat{j} - 2\hat{k})$ D) $\frac{1}{49}(3\hat{i} - 6\hat{j} + 2\hat{k})$

Q 3) Surface area is

A) Scalar B) Vector

C) Neither scalar nor vector D) Both scalar and vector

Q 4) The angle between the two vectors $\vec{A} = 3\hat{i} + 4\hat{j} + 5\hat{k}$ and $\vec{B} = 3\hat{i} + 4\hat{j} + 5\hat{k}$ is

A) 60° B) Zero

C) 90° D) None of these

Q 5) The position vector of a particle is determined by the expression $\vec{r} = 3t^2\hat{i} + 4t^2\hat{j} + 7\hat{k}$ The distance traversed in first 10 sec is

A) 500 m B) 300 m

C) 150 m D) 100 m

Q 6) Unit vector parallel to the resultant of vectors $\vec{A} = 4\hat{i} - 3\hat{j}$ and $\vec{B} = 8\hat{i} + 8\hat{j}$ will be

A) $\frac{24\hat{i}+5\hat{j}}{13}$ B) $\frac{12\hat{i}+5\hat{j}}{13}$

C) $\frac{6\hat{i}+5\hat{j}}{13}$ D) None of these

Q 7) The component of vector $\vec{A} = 2\hat{i} + 3\hat{j}$ along the vector $\hat{i} + \hat{j}$ is

A) $\frac{5}{\sqrt{2}}$ B) $10\sqrt{2}$

C) $5\sqrt{2}$ D) 5

Q 8) The angle between the two vectors $\vec{A} = 3\hat{i} + 4\hat{j} + 5\hat{k}$ and $\vec{B} = 3\hat{i} + 4\hat{j} - 5\hat{k}$ will be

A) 90° B) 0°

C) 60° D) 45°

Q 9) A boy walks uniformally along the sides of a rectangular park of size 400 m× 300 m, starting from one corner to the other corner diagonally opposite. Which of the following statement is incorrect

A) He has travelled a distance of 700 m B) His displacement is 700 m

C) His displacement is 500 m D) His velocity is not uniform throughout the walk

Q 10) Five equal forces of 10 N each are applied at one point and all are lying in one plane. If the angles between them are equal, the resultant force will be

A) $Zero$ B) $10\ N$

C) $20\ N$ D) $10\sqrt{2}$

Q 11) The magnitude of a given vector with end points $(4, -4, 0)$ and $(2, -2, 0)$ must be

A) 6 B) $5\sqrt{2}$

C) 4 D) $2\sqrt{10}$

Q 12) If a particle moves from point P (2,3,5) to point Q (3,4,5). Its displacement vector be

A) $\hat{i} + \hat{j} + 10\hat{k}$ B) $\hat{i} + \hat{j} + 5\hat{k}$

C) $\hat{i} + \hat{j}$ D) $2\hat{i} + 4\hat{j} + 6\hat{k}$

Q 13) A force of 5 N acts on a particle along a direction making an angle of 60° with vertical. Its vertical component be

A) 10 N B) 3 N

C) 4 N D) 2.5 N

Q 14) Vector $\vec{A}$ makes equal angles with x, y and z axis. Value of its components (in terms of magnitude of $\vec{A}$) will be

A) $\frac{A}{\sqrt{3}}$ B) $\frac{A}{\sqrt{2}}$

C) $\sqrt{3}A$ D) $\frac{\sqrt{3}}{A}$

DPP Daily Practice Problem Physics	*Topic : Mathematical Tools* DPP No. 13	Time : 30 min. Total Marks : 56 Max.

Type of Questions
Single choice Objective ('–1' negative marking) Q. 1 to Q. 14

Q 1) With respect to a rectangular cartesian coordinate system, three vectors are expressed as $\vec{a} = 4\hat{\imath} - \hat{\jmath},\ \vec{b} = -3\hat{\imath} + 2\hat{\jmath}\ and\ \vec{c} = -\hat{k}$ where $\hat{\imath}, \hat{\jmath}, \hat{k}$ are unit vectors, along the X, Y and Z-axis respectively. The unit vectors $\hat{r}$ along the direction of sum of these vector is

A) $\hat{r} = \frac{1}{\sqrt{3}}(\hat{\imath} + \hat{\jmath} - \hat{k})$ B) $\hat{r} = \frac{1}{\sqrt{2}}(\hat{\imath} + \hat{\jmath} - \hat{k})$

C) $\hat{r} = \frac{1}{3}(\hat{\imath} - \hat{\jmath} + \hat{k})$ D) $\hat{r} = \frac{1}{\sqrt{2}}(\hat{\imath} + \hat{\jmath} + \hat{k})$

Q 2) The position vector of a particle is $\vec{r} = (a\cos\omega t)\hat{\imath} + (a\sin\omega t)\hat{\jmath}$. The velocity of the particle is

A) Parallel to the position vector B) Perpendicular to the position vector

C) Directed towards the origin D) Directed away from the origin

Q 3) There are two force vectors, one of 5 N and other of 12 N at what angle the two vectors be added to get resultant vector of 17 N, 7 N and 13 N respectively

A) 0°, 180° and 90° B) 0°, 90° and 180°

C) 0°, 90° and 90° D) 180°, 0° and 90°

Q 4) A truck travelling due north at 20 m/s turns west and travels at the same speed. The change in its velocity be

A) 40 m/s N–W B) $20\sqrt{2}$ m/s N–W

C) 40 m/s S–W D) $20\sqrt{2}$ m/s S–W

Q 5) If the sum of two unit vectors is a unit vector, then magnitude of difference is

A) $\sqrt{2}$ B) $\sqrt{3}$

C) $1/\sqrt{2}$ D) $\sqrt{5}$

Q 6) $\vec{A} = 2\hat{\imath} + \hat{\jmath}, \vec{B} = 3\hat{\jmath} - \hat{k}\ and\ \vec{C} = 6\hat{\imath} - 2\hat{k}. Value\ of\ \vec{A} - 2\vec{B} + 3\vec{C}\ would\ be$

A) $20\hat{\imath} + 5\hat{\jmath} + 4\hat{k}$ B) $20\hat{\imath} - 5\hat{\jmath} - 4\hat{k}$

C) $4\hat{\imath} + 5\hat{\jmath} + 20\hat{k}$ D) $5\hat{\imath} + 4\hat{\jmath} + 10\hat{k}$

Q 7) Two forces, each of magnitude F have a resultant of the same magnitude F. The angle between the two forces is

A) 45° B) 120°

C) 150° D) 60°

Q 8) For the resultant of the two vectors to be maximum, what must be the angle between them

A) 0° B) 60°

C) 90° D) 180°

Q 9) A particle is simultaneously acted by two forces equal to 4 N and 3 N. The net force on the particle is

A) 7 N B) 5 N

C) 1 N D) Between 1 N to 7 N

Q 10) If the resultant of the two forces has a magnitude smaller than the magnitude of larger force, the two forces must be

A) Different both in magnitude and direction B) Mutually perpendicular to one another

C) Possess extremely small magnitude D) Point in opposite directions

Q 11) $if\ |\vec{A} - \vec{B}| = |\vec{A}| = |\vec{B}|,\ the\ angle\ between\ \vec{A}\ and\ \vec{B}\ is$

A) 60° B) 120°

C) 0° D) 90°

Q 12) The resultant of two vectors $\vec{P}$ and $\vec{Q}$ is $\vec{R}$. If Q is doubled, the new resultant is perpendicular to P. Then R equals

A) P B) $(P + Q)$

C) Q D) $(P - Q)$

Q 13) Magnitude of vector which comes on addition of two vectors, $6\hat{\imath} + 7\hat{\jmath}$ and $3\hat{\imath} + 4\hat{\jmath}$ is

A) $\sqrt{136}$ B) $\sqrt{202}$

C) $\sqrt{13.2}$ D) $\sqrt{160}$

Q 14) Forces F_1 and F_2 act on a point mass in two mutually perpendicular directions. The resultant force on the point mass will be

A) $F_1 + F_2$ B) $F_1 - F_2$

C) $\sqrt{F_1^2 + F_2^2}$ D) $F_1^2 + F_2^2$

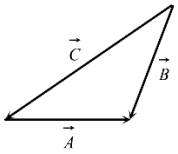
DPP Daily Practice Problem Physics	*Topic : Mathematical Tools* DPP No. 14	Time : 30 min. Total Marks : 56 Max.

Type of Questions
Single choice Objective ('–1' negative marking) Q. 1 to Q. 11

Q 1) A particle has displacement of 12 m towards east and 5 m towards north then 6 m vertically upward. The sum of these displacements is

A) 12 m B) 14.31 m
C) 10.04 m D) None of these

Q 2) For the figure



A) $\vec{A}+\vec{B}=\vec{C}$ B) $\vec{C}+\vec{A}=\vec{B}$
C) $\vec{B}+\vec{C}=\vec{A}$ D) $\vec{A}+\vec{B}+\vec{C}=0$

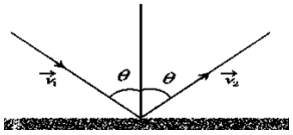
Q 3) The three vectors $\vec{A}=3\hat{\imath}-2\hat{\jmath}+\hat{k}, \vec{B}=\hat{\imath}-3\hat{\jmath}+5\hat{k}$ and $\vec{C}=2\hat{\imath}+\hat{\jmath}-4\hat{k}$. form

A) An equilateral triangle B) Isosceles triangle
C) A right angled triangle D) No triangle

Q 4) The magnitude of vector $\vec{A}$, $\vec{B}$ and $\vec{C}$ are respectively 12, 5 and 13 units and $\vec{A}+\vec{B}=\vec{C}$ then the angle between $\vec{A}$ and $\vec{B}$ is

A) 0 B) π
C) $\pi/2$ D) $\pi/4$

Q 5) An object of m kg with speed of v m/s strikes a wall at an angle θ and rebounds at the same speed and same angle. The magnitude of the change in momentum of the object will be An object of m kg with speed of v m/s strikes a wall at an angle θ and rebounds at the same speed and same angle. The magnitude of the change in momentum of the object will be



A) 2 m v cosθ B) 2 m v sinθ
C) 0 D) 2 m v

Q 6) The value of the sum of two vectors $\vec{A}$ and $\vec{B}$ with θ as the angle between them is

A) $\sqrt{A^2+B^2+2ABCos\,\theta}$ B) $\sqrt{A^2-B^2+2ABCos\,\theta}$
C) $\sqrt{A^2+B^2-2ABSin\,\theta}$ D) $\sqrt{A^2+B^2+2ABSin\,\theta}$

Q 7) Following sets of three forces act on a body. Whose resultant cannot be zero

A) 10, 10, 10 B) 10, 10, 20
C) 10, 20, 23 D) 10, 20, 40

Q 8) The sum of two forces acting at a point is 16 N. If the resultant force is 8 N and its direction is perpendicular to minimum force then the forces are

A) 6 N and 10 N B) 8 N and 8 N
C) 4 N and 12 N D) 2 N and 14 N

Q 9) When three forces of 50 N, 30 N and 15 N act on a body, then the body is

A) At rest B) Moving with a uniform velocity
C) In equilibrium D) Moving with an acceleration

Q 10) Let $\vec{C}=\vec{A}+\vec{B}$ then

A) $|\vec{C}|$ is always greater then $|\vec{A}|$ B) It is possible to have $|\vec{C}|<|\vec{A}|$ and $|\vec{C}|<|\vec{B}|$
C) C is always equal to A + B D) C is never equal to A + B

Q 11) The resultant of two vectors A and B is perpendicular to the vector A and its magnitude is equal to half the magnitude of vector B. The angle between A and B is

A) 120° B) 150°
C) 135° D) None of these

Q 12) If vectors P, Q and R have magnitude 5, 12 and 13 units and $\vec{P}+\vec{Q}=\vec{R}$, the angle between Q and R is

A) $cos^{-1}\frac{5}{12}$ B) $cos^{-1}\frac{5}{13}$
C) $cos^{-1}\frac{12}{13}$ D) $cos^{-1}\frac{7}{13}$

Q 13) What vector must be added to the two vectors $\hat{\imath}-2\hat{\jmath}+2\hat{k}$ and $2\hat{\imath}+\hat{\jmath}-\hat{k}$ so that the resultant may be a unit vector along x-axis

A) $2\hat{\imath}+\hat{\jmath}-\hat{k}$ B) $-2\hat{\imath}+\hat{\jmath}-\hat{k}$
C) $2\hat{\imath}-\hat{\jmath}+\hat{k}$ D) $-2\hat{\imath}-\hat{\jmath}-\hat{k}$

Q 14) Maximum and minimum magnitudes of the resultant of two vectors of magnitudes P and Q are in the ratio 3 : 1. Which of the following relations is true

A) P = 2Q B) P = Q
C) P Q=1 D) None of these

DPP Daily Practice Problem Physics	*Topic : Mathematical Tools* DPP No. 15	Time : 30 min. Total Marks : 56 Max.

Type of Questions
Single choice Objective ('–1' negative marking) Q. 1 to Q. 14

Q 1) What is the angle between $\vec{P}$ and the resultant of $(\vec{P}+\vec{Q})$ and $(\vec{P}-\vec{Q})$

A) Zero
B) $\tan^{-1}$ (P/Q)
C) $\tan^{-1}$(Q/P)
D) $\tan^{-1}$(P-Q)/(P+Q)

Q 2) The resultant of $\vec{P}$ and $\vec{Q}$ is perpendicular to $\vec{P}$. What is the angle between $\vec{P}$ and $\vec{Q}$

A) $cos^{-1}(P/Q)$
B) $cos^{-1}(-P/Q)$
C) $sin^{-1}(P/Q)$
D) $sin^{-1}(-P/Q)$

Q 3) Two vectors $\vec{A}$ and $\vec{B}$ lie in a plane, another vector $\vec{C}$ lies outside this plane, then the resultant of these three vectors i.e., $\vec{A}+\vec{B}+\vec{C}$

A) Can be zero
B) Cannot be zero
C) Lies in the plane containing $\vec{A}+\vec{B}$
D) Lies in the plane containing $\vec{C}$

Q 4) Two forces, F_1 and F_2 are acting on a body. One force is double that of the other force and the resultant is equal to the greater force. Then the angle between the two forces is

A) $cos^{-1}(1/2)$
B) $cos^{-1}(-1/2)$
C) $cos^{-1}(-1/4)$
D) $cos^{-1}(1/4)$

Q 5) Given that $\vec{A}+\vec{B}=\vec{C}$ and that $\vec{C}$ is $\perp$ to $\vec{A}$. Further if $|\vec{A}|=|\vec{C}|$, then what is the angle between $\vec{A}$ and $\vec{B}$

A) $\frac{\pi}{4}\ radian$
B) $\frac{\pi}{2}\ radian$
C) $\frac{3\pi}{4}\ radian$
D) $\pi\ radian$

Q 6) A body is at rest under the action of three forces, two of which are $\vec{F}_1=4\hat{\imath}$, $\vec{F}_2=6\hat{\jmath}$ the third force is

A) $4\hat{\imath}+6\hat{\jmath}$
B) $4\hat{\imath}-6\hat{\jmath}$
C) $-4\hat{\imath}+6\hat{\jmath}$
D) $-4\hat{\imath}-6\hat{\jmath}$

Q 7) A plane is revolving around the earth with a speed of 100 km/hr at a constant height from the surface of earth. The change in the velocity as it travels half circle is

A) 200 km/hr
B) 150 km/hr
C) 100 $\sqrt{2}$ km / hr
D) 0

Q 8) What displacement must be added to the displacement $25\hat{\imath}-6\hat{\jmath}$ m to give a displacement of 7.0 m pointing in the x-direction

A) $18\hat{\imath}-6\hat{\jmath}$
B) $32\hat{\imath}-13\hat{\jmath}$
C) $-18\hat{\imath}+6\hat{\jmath}$
D) $-25\hat{\imath}+13\hat{\jmath}$

Q 9) A body moves due East with velocity 20 km/hour and then due North with velocity 15 km/hour. The resultant velocity

A) 5 km/hour
B) 15 km/hour
C) 20 km/hour
D) 25 km/hour

Q 10) The magnitudes of vectors, $\vec{A}$, $\vec{B}$ and $\vec{C}$ are 3, 4 and 5 units respectively. If $\vec{A}+\vec{B}=\vec{C}$, the angle between $\vec{A}$ and $\vec{B}$ is

A) $\frac{\pi}{2}$
B) $cos^{-1}(0.6)$
C) $tan^{-1}\left(\frac{7}{5}\right)$
D) $\frac{\pi}{4}$

Q 11) While travelling from one station to another, a car travels 75 km North, 60 km North-east and 20 km East. The minimum distance between the two stations is

A) 72 km
B) 112 km
C) 132 km
D) 155 km

Q 12) A scooter going due east at 10 ms $^{-1}$ turns right through an angle of 90°. If the speed of the scooter remains unchanged in taking turn, the change is the velocity of the scooter is

A) 20.0 ms $^{-1}$ south eastern direction
B) 10.0 ms $^{-1}$ in southern direction
C) 14.14 ms $^{-1}$ in south-west direction
D) Zero

Q 13) A person goes 10 km north and 20 km east. What will be displacement from initial point

A) 22.36 km
B) 2 km
C) 5 km
D) 20 km

Q 14) Two forces $\vec{F}_1=5\hat{\imath}+10\hat{\jmath}-20\hat{k}$ and $\vec{F}_2=10\hat{\imath}-5\hat{\jmath}-15\hat{k}$ act on a single point. The angle between $\vec{F}_1$ and $\vec{F}_2$ is nearly

A) 30°
B) 45°
C) 60°
D) 90°

DPP Daily Practice Problem *Physics*	*Topic : Vector* DPP No. 16	Time : 30 min. Total Marks : 56 Max.

Type of Questions
Single choice Objective ('–1' negative marking) Q. 1 to Q. 14

Q 1) Which pair of the following forces will never give resultant force of 2 N

A) 2 N and 2 N B) 1 N and 1 N
C) 1 N and 3 N D) 1 N and 4 N

Q 2) Two forces 3N and 2 N are at an angle θ such that the resultant is R. The first force is now increased to 6N and the resultant become 2R. The value of θ is

A) 30° B) 60°
C) 90° D) 120°

Q 3) Three concurrent forces of the same magnitude are in equilibrium. What is the angle between the forces ? Also name the triangle formed by the forces as sides

A) 60° equilateral triangle B) 120° equilateral triangle
C) 120°, 30°, 30° an isosceles triangle D) 120° an obtuse angled triangle

Q 4) If $|\vec{A}+\vec{B}| = |\vec{A}| + |\vec{B}|$ then angle between $\vec{A}$ and $\vec{B}$ will be

A) 90° B) 120°
C) 0° D) 60°

Q 5) The maximum and minimum magnitude of the resultant of two given vectors are 17 units and 7 unit respectively. If these two vectors are at right angles to each other, the magnitude of their resultant is

A) 14 B) 16
C) 18 D) 13

Q 6) The vector sum of two forces is perpendicular to their vector differences. In that case, the forces

A) Are equal to each other in magnitude B) Are not equal to each other in magnitude
C) Cannot be predicted D) Are equal to each other

Q 7) y component of velocity is 20 and x component of velocity is 10. The direction of motion of the body with the horizontal at this instant is

A) $tan^{-1}(2)$ B) $tan^{-1}(1/2)$
C) 45° D) 0°

Q 8) Two forces of 12 N and 8 N act upon a body. The resultant force on the body has maximum value of

A) 4 N B) 0 N
C) 20 N D) 8 N

Q 9) Two equal forces (P each) act at a point inclined to each other at an angle of 120°. The magnitude of their resultant is

A) P / 2 B) P / 4
C) P D) 2P

Q 10) The vectors $5\hat{\imath}+8\hat{\jmath}$ and $2\hat{\imath}+7\hat{\jmath}$ are added. The magnitude of the sum of these vector is

A) $\sqrt{274}$ B) 38
C) 238 D) 560

Q 11) Two vectors $\vec{A}$ and $\vec{B}$ are such that $\vec{A}+\vec{B} = \vec{A}-\vec{B}$. Then

A) $\vec{A}.\vec{B} = 0$ B) $\vec{A}\times\vec{B} = 0$
C) $\vec{A} = 0$ D) $\vec{B} = 0$

Q 12) If a vector $2\hat{\imath}+3\hat{\jmath}+8\hat{k}$ is perpendicular to the vector $4\hat{\imath}-4\hat{\jmath}+\alpha\hat{k}$. Then the value of α is

A) -1 B) $\frac{1}{2}$
C) $-\frac{1}{2}$ D) 1

Q 13) If a vector $2\hat{\imath}+3\hat{\jmath}-\hat{k}$ is perpendicular to the vector $-4\hat{\imath}-6\hat{\jmath}-\lambda\hat{k}$ are parallel to each other then value of λ be

A) 0 B) 2
C) 3 D) 4

Q 14) A particle moves from position $2\hat{\imath}+3\hat{\jmath}-6\hat{k}$ to $14\hat{\imath}+13\hat{\jmath}+9\hat{k}$ due to a uniform force of $(4\hat{\imath}+\hat{\jmath}+3\hat{k})N$. If the displacement in meters then work done will be

A) 100 J B) 200 J
C) 300 J D) 250 J

DPP Daily Practice Problem Physics	*Topic : Mathematical Tools* DPP No. 17	Time : 30 min. Total Marks : 56 Max.

Type of Questions
Single choice Objective ('–1' negative marking) Q. 1 to Q. 14

Q 1) If for two vector $\vec{A}$ and $\vec{B}$, sum ($\vec{A}+\vec{B}$) is perpendicular to the difference ($\vec{A}-\vec{B}$) . The ratio of their magnitude is

A) 1 B) 2
C) 3 D) None of these

Q 2) The angle between the vectors $\vec{A}$ and $\vec{B}$ is θ. The value of the triple product $\vec{A}.(\vec{B}\times\vec{A})$ is

A) A^2B B) $Zero$
C) $A^2B\ sin\ \theta$ D) $A^2B\ cos\ \theta$

Q 3) If $\vec{A}\times\vec{B}=\vec{B}\times\vec{A}$ then the angle between A and B is

A) $\pi/2$ B) $\pi/3$
C) π D) $\pi/4$

Q 4) The torque of the force $\vec{F}=(2\hat{\imath}-3\hat{\jmath}+4\hat{k})$N acting at the point $\vec{r}=(3\hat{\imath}+2\hat{\jmath}+3\hat{k})m$ about the origin be

A) $6\hat{\imath}-6\hat{\jmath}+12\hat{k}$ B) $17\hat{\imath}-6\hat{\jmath}-13\hat{k}$
C) $-6\hat{\imath}+6\hat{\jmath}-12\hat{k}$ D) $-17\hat{\imath}+6\hat{\jmath}+13\hat{k}$

Q 5) Consider two vectors $\vec{F}_1=(2\hat{\imath}+5\hat{k})$ and $\vec{F}_2=(3\hat{\jmath}+4\hat{k})$. The magnitude of the scalar product of these vectors is

A) 20 B) 23
C) $5\sqrt{33}$ D) 26

Q 6) If $|\vec{V}1+\vec{V}2|=|\vec{V}1-\vec{V}2|$ and V2 is finite, then

A) V1 is parallel to V2 B) $\vec{V}1=\vec{V}2$
C) V1 and V2 are mutually perpendicular D) $|\vec{V}_1|=|\vec{V}_2|$

Q 7) The angle between the vectors $\hat{\imath}+\hat{\jmath}$ and $\hat{\jmath}+\hat{k}$ is

A) 30° B) 45°
C) 60° D) 90°

Q 8) A particle moves with a velocity $6\hat{\imath}-4\hat{\jmath}+3\hat{k}$ m/s under the influence of a constant force $\vec{F}=(2\hat{\imath}-3\hat{\jmath}+4\hat{k})\ N$. The instantaneous power applied to the particle is

A) 35 J/s B) 45 J/s
C) 25 J/s D) 195 J/s

Q 9) If $\vec{P}.\vec{Q}$ = PQ, then angle between $\vec{P}$ and $\vec{Q}$ is

A) 0° B) 30°
C) 60° D) 45°

Q 10) A force $\vec{F}=(5\hat{\imath}+6\hat{\jmath}+4\hat{k})\ N$ acting on a body, produces a displacement force $\vec{S}=(6\hat{\imath}-5\hat{k})\ N$. Work done by the force is

A) 10 units B) 18 units
C) 11 units D) 5 units

Q 11) The angle between the two vectors $\vec{A}=5\hat{\imath}+5\hat{\jmath}$ and $\vec{B}=5\hat{\imath}-5\hat{\jmath}$ will be

A) Zero B) 45°
C) 90° D) 180°

Q 12) The vector $\vec{P}=a\hat{\imath}+a\hat{\jmath}+3\hat{k}$ and $\vec{Q}=a\hat{\imath}-2\hat{\jmath}-\hat{k}$ are perpendicular to each other. The positive value of a is

A) 3 B) 4
C) 9 D) 13

Q 13) A vector $\vec{F}1$ is along the positive X-axis. If its vector product with another vector $\vec{F}2$ is zero then $\vec{F}2$ could be

A) $4\hat{\jmath}$ B) $3\hat{\imath}+2\hat{\jmath}$
C) $3\hat{\imath}+2\hat{\jmath}+3\hat{k}$ D) $3\hat{\imath}+2\hat{\jmath}+3\hat{k}$

Q 14) Let $\vec{A}=\hat{\imath}Acos\ \theta+\hat{\jmath}Asin\ \theta$ be any vector. Another vector $\vec{B}$ which is normal to A is

A) $\hat{\imath}Bcos\ \theta+\hat{\jmath}Bsin\ \theta$ B) $\hat{\imath}Bsin\ \theta+\hat{\jmath}Bcos\ \theta$
C) $\hat{\imath}Bsin\ \theta-\hat{\jmath}Bcos\ \theta$ D) $\hat{\imath}Bcos\ \theta-\hat{\jmath}Bsin\ \theta$

DPP Daily Practice Problem *Physics*	*Topic : Mathematical Tools* DPP No. 18	Time : 30 min. Total Marks : 56 Max.

Type of Questions
Single choice Objective ('–1' negative marking) Q. 1 to Q. 14

Q 1) The angle between two vectors $-2\hat{\imath}+3\hat{\jmath}+\hat{k}$ and $\hat{\imath}+2\hat{\jmath}-4\hat{k}$ is

A) 0° B) 90°
C) 180° D) None of the above

Q 2) If $\vec{A}\times\vec{B}=\vec{C}$, then which of the following statements is wrong

A) $\vec{C}\perp\vec{A}$ B) $\vec{C}\perp\vec{B}$
C) $\vec{C}\perp(\vec{A}+\vec{B})$ D) $\vec{C}\perp(\vec{A}\times\vec{B})$

Q 3) The angle between two vectors given by $6\hat{\imath}+6\hat{\jmath}-3\hat{k}$ and $7\hat{\imath}+4\hat{\jmath}+4\hat{k}$ is

A) $cos^{-1}\left(\frac{1}{\sqrt{3}}\right)$ B) $cos^{-1}\left(\frac{5}{\sqrt{3}}\right)$
C) $sin^{-1}\left(\frac{2}{\sqrt{3}}\right)$ D) $sin^{-1}\left(\frac{\sqrt{5}}{3}\right)$

Q 4) A vector $\vec{A}$ points vertically upward and $\vec{B}$ points towards north. The vector product $\vec{A}\times\vec{B}$ is

A) Zero B) Along west
C) Along east D) Vertically downward

Q 5) If force $(\vec{F})=4\hat{\imath}+5\hat{\jmath}$ and displacement $(\vec{s})=4\hat{\imath}+5\hat{k}$ then the work done is

A) 4 × 3 B) 5 × 6
C) 6 × 3 D) 4 × 6

Q 6) If $|\vec{A}\times\vec{B}|=|\vec{A}.\vec{B}|$, then angle between $\vec{A}$ and $\vec{B}$ will be

A) 30° B) 45°
C) 60° D) 90°

Q 7) In an clockwise system

A) $\hat{\jmath}\times\hat{k}=\hat{\imath}$ B) $\hat{\imath}.\hat{\imath}=0$
C) $\hat{\jmath}\times\hat{\jmath}=1$ D) $\hat{k}.\hat{\jmath}=1$

Q 8) Three vectors $\vec{a}$, $\vec{b}$ and $\vec{c}$ satisfy the relation $\vec{a}.\vec{b}=0$ and $\vec{a}.\vec{c}=0$. The vector $\vec{a}$ is parallel to

A) $\vec{b}$ B) $\vec{c}$
C) $\vec{b}.\vec{c}$ D) $\vec{b}\times\vec{c}$

Q 9) Find the torque of a force $\vec{F}=-3\hat{\imath}+\hat{\jmath}+5\hat{k}$ acting at the point $\vec{r}=7\hat{\imath}+3\hat{\jmath}+\hat{k}$

A) $14\hat{\imath}-38\hat{\jmath}+16\hat{k}$ B) $4\hat{\imath}+4\hat{\jmath}+6\hat{k}$
C) $21\hat{\imath}+4\hat{\jmath}+4\hat{k}$ D) $-14\hat{\imath}+34\hat{\jmath}-16\hat{k}$

Q 10) The value of $(\vec{A}+\vec{B})\times(\vec{A}-\vec{B})$ is

A) 0 B) A^2-B^2
C) $\vec{B}\times\vec{A}$ D) $2(\vec{B}\times\vec{A})$

Q 11) If $\vec{A}$ and $\vec{B}$ are perpendicular vectors and vector $\vec{A}=5\hat{\imath}+7\hat{\jmath}-3\hat{k}$ and $\vec{B}=2\hat{\imath}+2\hat{\jmath}-a\hat{k}$. The value of a is

A) -2 B) 8
C) -7 D) -8

Q 12) A force vector applied on a mass is represented as $\vec{F}=6\hat{\imath}-8\hat{\jmath}+10\hat{k}$ and accelerates with 1 m/s^2. What will be the mass of the body in kg.

A) $10\sqrt{2}$ B) 20
C) $2\sqrt{10}$ D) 10

Q 13) Two adjacent sides of a parallelogram are represented by the two vectors $\hat{\imath}+2\hat{\jmath}+3\hat{k}$ and $3\hat{\imath}-2\hat{\jmath}+\hat{k}$. What is the area of parallelogram

A) 8 B) $8\sqrt{3}$
C) $3\sqrt{8}$ D) 192

Q 14) The position vectors of radius are $2\hat{\imath}+\hat{\jmath}+\hat{k}$ and $2\hat{\imath}-3\hat{\jmath}+\hat{k}$ while those of linear momentum are $2\hat{\imath}+3\hat{\jmath}-\hat{k}$. Then the angular momentum is

A) $2\hat{\imath}-4\hat{k}$ B) $4\hat{\imath}-8\hat{k}$
C) $2\hat{\imath}-4\hat{\jmath}+2\hat{k}$ D) $4\hat{\jmath}-8\hat{k}$

DPP Daily Practice Problem Physics	*Topic : Mathematical Tools* DPP No. 19	Time : 30 min. Total Marks : 56 Max.

Type of Questions
Single choice Objective ('–1' negative marking) Q. 1 to Q. 14

Q 1) What is the value of linear velocity, if $\vec{\omega} = 3\hat{\imath} - 4\hat{\jmath} + \hat{k}$ and $\vec{r} = 5\hat{\imath} - 6\hat{\jmath} + 6\hat{k}$

A) $6\hat{\imath} - 2\hat{\jmath} + 3\hat{k}$ B) $6\hat{\imath} - 2\hat{\jmath} + 8\hat{k}$
C) $4\hat{\imath} - 13\hat{\jmath} + 6\hat{k}$ D) $-18\hat{\imath} - 13\hat{\jmath} + 2\hat{k}$

Q 2) Dot product of two mutual perpendicular vector is

A) 0 B) 1
C) ∞ D) None of these

Q 3) When $\vec{A}.\vec{B} = -|\vec{A}||\vec{B}|$, then

A) $\vec{A}$ *and* $\vec{B}$ are perpendicular to each other B) $\vec{A}$ *and* $\vec{B}$ act in the same direction
C) $\vec{A}$ *and* $\vec{B}$ act in the opposite direction D) $\vec{A}$ *and* $\vec{B}$ can act in any direction

Q 4) If $|\vec{A} \times \vec{B}| = 3\vec{A}.\vec{B}$, then the value of $|\vec{A} + \vec{B}|$ is

A) $\left(A^2 + B^2 + \frac{AB}{\sqrt{3}}\right)^{1/2}$ B) $A + B$
C) $\left(A^2 + B^2 + \sqrt{3}AB\right)^{1/2}$ D) $\left(A^2 + B^2 + AB\right)^{1/2}$

Q 5) A force $\vec{F} = 3\hat{\imath} + c\hat{\jmath} + 2\hat{k}$ acting on a particle causes a displacement $\vec{S} = -4\hat{\imath} + 2\hat{\jmath} - 3\hat{k}$ in its own direction. If the work done is 6J, then the value of c will be

A) 12 B) 6
C) 1 D) 0

Q 6) A force $\vec{F} = (5\hat{\imath} + 3\hat{\jmath})$ N is applied over a particle which displaces it from its original position to the point $\vec{s} = (2\hat{\imath} - \hat{\jmath})\ m$. The work done on the particle is

A) + 11 J B) + 7 J
C) + 13 J D) -7 J

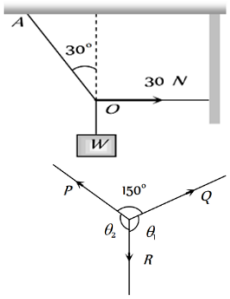
Q 7) If a vector $\vec{A}$ is parallel to another vector $\vec{B}$ then the resultant of the vector $\vec{A} \times \vec{B}$ will be equal to

A) A B) $\vec{A}$
C) Zero vector D) Zero

Q 8) If a body is in equilibrium under a set of non-collinear forces, then the minimum number of forces has to be

A) Four B) Three
C) Two D) Five

Q 9) As shown in figure the tension in the horizontal cord is 30 N. The weight W and tension in the string OA in Newton are



A) $30\sqrt{3}, 30$ B) $30\sqrt{3}, 60$
C) $60\sqrt{3}, 30$ D) None of these

Q 10) P, Q and R are three coplanar forces acting at a point and are in equilibrium. Given P = 1.9318 kg wt, $\sin\theta_1 =$ 0.9659, the value of R is (in kg wt)

A) 0.9659 B) 2
C) 1 D) $\frac{1}{2}$

Q 11) If the resultant of n forces of different magnitudes acting at a point is zero, then the minimum value of n is

A) 1 B) 2
C) 3 D) 4

Q 12) Can the resultant of 2 vectors be zero

A) Yes, when the 2 vectors are same in magnitude and direction
B) No
C) Yes, when the 2 vectors are same in magnitude but opposite in sense
D) Yes, when the 2 vectors are same in magnitude making an angle of $\frac{2\pi}{3}$ with each other

Q 13) The sum of the magnitudes of two forces acting at point is 18 and the magnitude of their resultant is 12. If the resultant is at 90° with the force of smaller magnitude, what are the, magnitudes of forces

A) 12, 5 B) 14, 4
C) 5, 13 D) 10, 8

Q 14) The length of second's hand in watch is 1 cm. The change in velocity of its tip in 15 seconds is

A) Zero B) $\frac{\pi}{30\sqrt{2}} cm/sec$
C) $\frac{\pi}{30} cm/sec$ D) $\frac{\pi\sqrt{2}}{30} cm/sec$

DPP Daily Practice Problem Physics	*Topic : Mathematical Tools* DPP No. 20	Time : 30 min. Total Marks : 56 Max.

Type of Questions
Single choice Objective ('–1' negative marking) Q. 1 to Q. 8
Assertion and Reason ('-2' negative marking) Q. 9 to Q. 14

Q 1) If $\vec{A} = 3\hat{\imath} + \hat{\jmath} + 2\hat{k}$ and $\vec{B} = 2\hat{\imath} - 2\hat{\jmath} + 4\hat{k}$ then value of $|\vec{A} \times \vec{B}|$ will be

A) $8\sqrt{2}$ B) $8\sqrt{3}$
C) $8\sqrt{5}$ D) $5\sqrt{8}$

Q 2) Consider a vector $\vec{F} = 4\hat{\imath} - 3\hat{\jmath}$. Another vector that is perpendicular to $\vec{F}$ is

A) $4\hat{\imath} + 3\hat{\jmath}$ B) $6\hat{\imath}$
C) $7\hat{k}$ D) $3\hat{\imath} - 4\hat{\jmath}$

Q 3) Two vectors $\vec{A}$ and $\vec{B}$ are at right angles to each other, when

A) $\vec{A} + \vec{B} = 0$ B) $\vec{A} - \vec{B} = 0$
C) $\vec{A} \times \vec{B} = 0$ D) $\vec{A} \cdot \vec{B} = 0$

Q 4) A particle moves towards east with velocity 5 m/s. After 10 seconds its direction changes towards north with same velocity. The average acceleration of the particle is

A) Zero B) $\frac{1}{\sqrt{2}} m/s^2\ N - W$
C) $\frac{1}{\sqrt{2}} m/s^2\ N - E$ D) $\frac{1}{\sqrt{2}} m/s^2\ S - W$

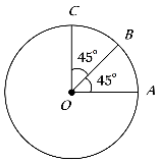
Q 5) A force $\vec{F} = -K(y\hat{\imath} + x\hat{\jmath})$ (where K is a positive constant) acts on a particle moving in the x-y plane. Starting from the origin, the particle is taken along the positive x- axis to the point (a, 0) and then parallel to the y-axis to the point (a, a). The total work done by the forces $\vec{F}$ on the particle is

A) $-2Ka^2$ B) $2Ka^2$
C) $-Ka^2$ D) Ka^2

Q 6) The speed of a boat is 5 km/h in still water. It crosses a river of width 1 km along the shortest possible path in 15 minutes. The velocity of the river water is

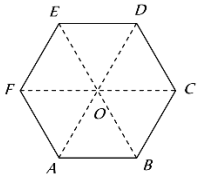
A) 1 km/h B) 3 km/h
C) 4 km/h D) 5 km/h

Q 7) Find the resultant of three vectors $\overrightarrow{OA}$, $\overrightarrow{OB}$ and $\overrightarrow{OC}$ shown in the following figure. Radius of the circle is R



A) $2R$ B) $R(1+\sqrt{2})$
C) $R\sqrt{2}$ D) $R(\sqrt{2}-1)$

Q 8) Figure shows ABCDEF as a regular hexagon. What is the value of $\overrightarrow{AB} + \overrightarrow{AC} + \overrightarrow{AD} + \overrightarrow{AE} + \overrightarrow{AF}$



A) $\overrightarrow{AO}$ B) $\overrightarrow{2AO}$
C) $4\overrightarrow{AO}$ D) $6\overrightarrow{AO}$

Read the assertion and reason carefully to mark the correct option out of the options given below :
(a) If both assertion and reason are true and the reason is the correct explanation of the assertion.
(b) If both assertion and reason are true but reason is not the correct explanation of the assertion.
(c) If assertion is true but reason is false.
(d) If the assertion and reason both are false.
(e) If assertion is false but reason is true.

Q 9) Assertion $\vec{A} \times \vec{B}$ is perpendicular to both $\vec{A} + \vec{B}$ as well as $\vec{A} - \vec{B}$
Reason $\vec{A} + \vec{B}$ as well as $\vec{A} - \vec{B}$ lie in the plane containing $\vec{A}$ and $\vec{B}$, but $\vec{A} \times \vec{B}$ lies perpendicular to the plane containing $\vec{A}$ and $\vec{B}$.

Q 10) Assertion Angle between $\hat{\imath} + \hat{\jmath}$ and $\hat{\imath}$ is 45°
Reason $\hat{\imath} + \hat{\jmath}$ is equally inclined to both $\hat{\imath}$ and $\hat{\jmath}$ and the angle between $\hat{\imath} + \hat{\jmath}$ is 90°

Q 11) Assertion If θ be the angle between $\vec{A}$ and $\vec{B}$, then $\tan\theta = \frac{\vec{A} \times \vec{B}}{\vec{A} \cdot \vec{B}}$
Reason $\vec{A} \times \vec{B}$ is perpendicular to $\vec{A} \cdot \vec{B}$

Q 12) Assertion If $|\vec{A} + \vec{B}| = |\vec{A} - \vec{B}|$, then angle between $\vec{A}$ and $\vec{B}$ is 90°
Reason $\vec{A} + \vec{B} = \vec{B} + \vec{A}$

Q 13) Assertion Vector product of two vectors is an axial vector
Reason If $\vec{v}$ = instantaneous velocity, $\vec{r}$ = radius vector and $\vec{\omega}$ = angular velocity, then $\vec{\omega} = \vec{v} \times \vec{r}$.

Q 14) Assertion Minimum number of non-equal vectors in a plane required to give zero resultant is three.
Reason If $\vec{A} + \vec{B} + \vec{C} = 0$ then they must lie in one plane