NEET : CHAPTER WISE TEST-2

SUBJECT :- PHYSICS **DATE..**
CLASS :- 11^{th} **NAME..**
CHAPTER :- BASIC MATHS & VECTOR **SECTION...**

(SECTION-A)

1. If $\vec{A} = \hat{i} + \hat{j}$ and $\vec{B} = 2\hat{i} + 3\hat{j}$ then unit vector along $\vec{A} + \vec{B}$ is :
(A) $\hat{i}$ and $\hat{j}$ (B) $3\hat{i} + 4\hat{j}$
(C) $\frac{3\hat{i} + 4\hat{j}}{5}$ (D) $3\hat{i} - 4\hat{j}$

2. Vector sum of the forces of 5N and 4N can be :
(A) 10N (B) 4N (C) 3N (D) 5N

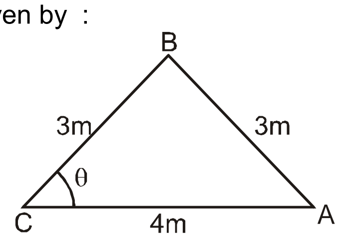
3. If there are two vectors $\vec{A}$ and $\vec{B}$ such that $\vec{A} + \vec{B} = \hat{i} + 2\hat{j} + \hat{k}$ and $\vec{A} - \vec{B} = (\hat{i} - \hat{k})$, then choose the correct options.
(A) the angle between $\vec{A}$ and $\vec{B}$ is 60°
(B) $\vec{A} = \hat{i} + \hat{j}$
(C) $\vec{B} = \hat{j} + \hat{k}$
(D) the angle between $\vec{A}$ and $\vec{B}$ is 120°

4. If $\vec{A} = \hat{i} + 2\hat{j} + 3\hat{k}$ & $\vec{B} = 3\hat{i} - 2\hat{j} + \hat{k}$, then the area of parallelogram formed with $\vec{A}$ and $\vec{B}$ as the sides of the parallelogram is :
(A) $\sqrt{3}$ (B) $8\sqrt{3}$ (C) 64 (D) 0

5. Find v (0), where v (t) = 3 + 2t
(A) 5 (B) 6
(C) 3 (D) None

6. tan15° is equilvalent to :
(A) $(2 - \sqrt{3})$ (B) $(5 + \sqrt{3})$
(C) $\left(\frac{5 - \sqrt{3}}{2}\right)$ (D) $\left(\frac{5 + \sqrt{3}}{2}\right)$

7. θ is angle between side CA and CB of triangle, shown in the figure then θ is given by :



(A) $\cos\theta = \frac{2}{3}$ (B) $\sin\theta = \frac{\sqrt{5}}{3}$
(C) $\tan\theta = \frac{\sqrt{5}}{2}$ (D) $\tan\theta = \frac{2}{3}$

8. Roots of the equation $2x^2 + 5x - 12 = 0$, are
(A) 3/2. 4 (B) 2/3, – 4
(C) 3/2, – 4 (D) 2/3, 4

9. The speed (v) of a particle moving along a straight line is given by $v = t^2 + 3t - 4$ where v is in m/s and t in second. Find time t at which the particle will momentarily come to rest.
(A) 3 (B) 4 (C) 2 (D) 1

10. $y = e^x \ell nx$
(A) $e^x \ell nx + \frac{e^x}{x}$ (B) $e^x \ell nx - \frac{e^x}{x}$
(C) $e^x \ell nx - \frac{e}{x}$ (D) None of these

11. $y = \frac{2x + 5}{3x - 2}$
(A) $y' = \frac{-19}{(3x - 2)^2}$ (B) $y' = \frac{19}{(3x - 2)}$
(C) $y' = \frac{-19}{(3x + 2)}$ (D) $y' = \frac{-19}{(3x + 2)^2}$

12. The sum of the magnitudes of two forces acting at a point is 16 N. The resultant of these force is perpendicular to the smaller force and has a magnitude of 8 N. If the smaller force is of magnitude x, then the value of x is
(A) 2 N (B) 4N
(C) 6 N (D) 7N

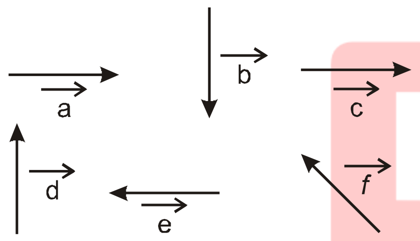
13. The resultant of two forces 3 P & 2 P is R, if first force is doubled, the resultant is also doubled . Then the angle between the forces is :
(A) 30º (B) 60º
(C) 120º (D) 150º

14. A force of 6 kg wt. and another of 8 kg wt. can be applied together to produce the effect of a single force of:
(A) 1 kg wt. (B) 11 kg wt.
(C) 15 kg wt. (D) 20 kg wt.

15. A particle moves so that its position vector is given by $\vec{r} = \cos\omega t\hat{x} + \sin\omega t\hat{y}$. Where ω is a constant.
Which of the following is true?
(A) Velocity is perpendicular to $\vec{r}$ and acceleration is directed away from the origin.
(B) Velocity and acceleration both are perpendicular to $\vec{r}$.
(C) Velocity and acceleration both are parallel to $\vec{r}$.
(D) Velocity is perpendicular to $\vec{r}$ and acceleration is directed towards the origin.

16. If the magnitude of sum of two vectors is equal to the magnitude of difference of the two vectors, the angle between these vectors is :
(A) 180° (B) 0°
(C) 90° (D) 45°

17. Six vectors, $\vec{a}$ through $\vec{f}$ have the mangitudes and directions indicated in the figure.Which of the following statements is true ?



(A) $\vec{b} + \vec{c} = \vec{f}$ (B) $\vec{d} + \vec{c} = \vec{f}$
(C) $\vec{d} + \vec{e} = \vec{f}$ (D) $\vec{b} + \vec{e} = \vec{f}$

18. **Assertion :** If three vectors $\vec{A}, \vec{B}$ **and** $\vec{C}$ satisfy the relation $\vec{A}.\vec{B} = 0$ & $\vec{A}.\vec{C} = 0$ then the vector $\vec{A}$ is parallel to $\vec{B} \times \vec{C}$.
Reason : $\vec{A} \perp \vec{B}$ and $\vec{A} \perp \vec{C}$ hence $\vec{A}$ is perpendicular to plane formed by $\vec{B}$ and $\vec{C}$.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not correct explanation of A
(C) A is true but R is false
(D) A and R are false

19. **Assertion :** A vector is a quantity that has both magnitude and direction and obeys the triangle law of addition.
Reason : The magnitude of the resultant vector of two given vectors can never be less than the magnitude of any of the given vector.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not correct explanation of A
(C) A is true but R is false
(D) A and R are false

20. A vector $\vec{A}$ points vertically downward & $\vec{B}$ points towards east, then the vector product $\vec{A} \times \vec{B}$ is
(A) along west (B) along east
(C) zero (D) along south

21. Given : $\vec{a} + \vec{b} + \vec{c} = 0$. Out of the three vectors $\vec{a}, \vec{b}$ and $\vec{c}$ two are equal in magnitude. The magnitude of the third vector is $\sqrt{2}$ times that of either of the two having equal magnitude. The angles between the vectors are:
(A) 90°, 135°,. 135° (B) 30°, 60°, 90°
(C) 45°, 45°, 90° (D) 45°, 60°, 90°

22. Two vectors $\vec{A}$ and $\vec{B}$ lie in a plane. Another vector $\vec{C}$ lies outside this plane. The resultant $\vec{A} + \vec{B} + \vec{C}$ of these three vectors
(A) can be zero
(B) cannot be zero
(C) lies in the plane of $\vec{A}$ & $\vec{B}$
(D) lies in the plane of $\vec{A}$ & $\vec{A} + \vec{B}$

23. Find integrals of given function.
$\int (1 - \cot^2 x)\, dx$
(A) 2x + cot x + C (B) x + cot x + C
(C) 2x – cot x + C (D) 2x + tan x + C

24. Find the value of a if distance between the point (–9cm, a cm) and (3cm, 3 cm) is 13 cm.
(A) 6 cm (B) 8 cm
(C) 10 cm (D) 12 cm

25. If vector $\vec{P}, \vec{Q}$ and $\vec{R}$ have magnitude 5, 12 and 13 units and $\vec{P} + \vec{Q} = \vec{R}$ the angle between $\vec{Q}$ and $\vec{R}$ is -
(A) $\cos^{-1}\frac{5}{12}$ (B) $\cos^{-1}\frac{5}{13}$
(C) $\cos^{-1}\frac{12}{13}$ (D) $\cos^{-1}\frac{2}{13}$

26. Following sets of three forces act on a body. Whose resultant can not be zero -
(A) 10, 10, 10 (B) 10, 10, 20
(C) 10, 20, 30 (D) 10, 20, 40

27. The resultant of the forces $\vec{P}$ and $\vec{Q}$ is $\vec{R}$. If $\vec{Q}$ is doubled then the resultant also doubles in magnitude. Find the angle between $\vec{P}$ & $\vec{Q}$.
(A) $\cos\theta = \frac{Q}{2P}$ (B) $\cos\theta = \frac{-4Q}{3P}$
(C) $\cos\theta = \frac{-2Q}{3P}$ (D) $\cos\theta = \frac{-3P}{4Q}$

28. The horizontal component of a force of 10 N inclined at 30° to vertical is :

(A) 3 N (B) $5\sqrt{3}$ N

(C) 5 N (D) $\frac{10}{\sqrt{3}}$ N

29. If a, b, c are three unit vectors such that a + b + c = 0, then a.b + b.c + c.a is equal to

(A) –1 (B) 3

(C) 0 (D) $-\frac{3}{2}$

30. Two forces P and Q act at a point and have resultant R. If Q is replaced by $\frac{(R^2 - P^2)}{Q}$ acting in the direction opposite to that of Q, the resultant

(A) remains same (B) becomes half

(C) becomes twice (D) none of these

31. There are two vectors $\vec{A} = 3\hat{i} + \hat{j} - 2\hat{k}$ and $\vec{B} = 4\hat{i} - 2\hat{j} - 6\hat{k}$. Find the unit vector along $\vec{C} = \vec{A} + \vec{B}$.

(A) $\frac{7\hat{i} - \hat{j} + 8\hat{k}}{\sqrt{114}}$ (B) $\frac{7\hat{i} - \hat{j} - 8\hat{k}}{\sqrt{114}}$

(C) $\frac{7\hat{i} + \hat{j} - 8\hat{k}}{\sqrt{104}}$ (D) $\frac{7\hat{i} - \hat{j} - 8\hat{k}}{\sqrt{104}}$

32. An object moves in the xy plane with an acceleration that has a positive x component. At t = 0 the object has a velocity given by $\vec{v} = 3\hat{i} + 0\hat{j}$. What can be concluded about the y component of the acceleration?

(A) The y component must be positive and constant

(B) The y component must be negative and constant

(C) The y component must be zero

(D) Nothing at all can be concluded about the y component.

33. If $\hat{S}$ is a unit vector in the direction of vector $\vec{S}$ then

(A) $\hat{S} = S / \vec{S}$ (B) $\hat{S} = \vec{S} / S$

(C) $\hat{S} = \vec{S} \cdot \vec{S} \;/ S^2$ (D) $\hat{S} = \vec{S} \cdot \left(\frac{\vec{S}}{S}\right)$

34. If the x component of a vector $\vec{A}$, in the xy plane, is half as large as the magnitude of the vector, the tangent of the angle between the vector and the x axis is:

(A) $\sqrt{3}$ (B) 1/2

(C) $\sqrt{3}/2$ (D) 3/2

35. Three forces P, Q & R are acting at a point in the plane . The angle between P & Q and Q & R are 150º & 120º respectively, then for equilibrium, forces P, Q & R are in the ratio

(A) 1 : 2 : 3 (B) 1 : 2 : $\sqrt{3}$

(C) 3 : 2 : 1 (D) $\sqrt{3}$: 2 : 1

(SECTION-B)

36. The maximum and minimum magnitude of the resultant of two vectors are 17 units and 7 units respectively. Then the magnitude of resultant of the vectors when they act perpendicular to each other is :

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

37. If $|\vec{A} + \vec{B}|^2 = A^2 + B^2$, then

(A) $\vec{A}$ and $\vec{B}$ must be parallel and in the same direction

(B) $\vec{A}$ and $\vec{B}$ must be parallel and in opposite directions

(C) either $\vec{A}$ or $\vec{B}$ must be zero

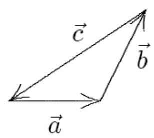
(D) none of the above is true

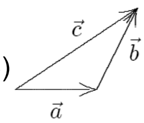
38. The angle between the vector $-\hat{i} + \hat{j}$ and $2\hat{i} + 3\hat{j}$ is :

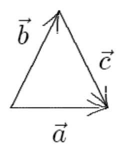
(A) cos $\theta = \frac{1}{5}$ (B) sin $\theta = \sqrt{\frac{25}{26}}$

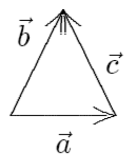
(C) tan $\theta = \sqrt{5}$ (D) none of these

39. The vectors $\vec{a}, \vec{b}$ and $\vec{c}$ are related by $\vec{c} = \vec{a} + \vec{b}$. Which diagram below illustrates this relationship?

(A) 

(B) 

(C) 

(D) 

40. The vector $-\vec{A}$ is:

(A) greater than $\vec{A}$ in magnitude

(B) less than $\vec{A}$ in magnitude

(C) in the same direction as $\vec{A}$

(D) in the direction opposite to $\vec{A}$

41. Which of the following sets of displacements might be capable of bringing a car to its returning point?

(A) 5, 10, 30 and 50 km

(B) 5, 9, 9 and 16 km

(C) 40, 40, 90 and 200 km

(D) 10, 20, 40 and 90 km

42. Match the integrals (given in column - II) with the given functions (in column - I)

Column - I	**Column - II**
(A) $\int \sec x \tan x dx$	(p) $-\dfrac{\operatorname{cosec} Kx}{K} + C$
(B) $\int \operatorname{cosec} Kx \cot Kx \, dx$	(q) $-\dfrac{\cot Kx}{K} + C$
(C) $\int \operatorname{cosec}^2 Kx \, dx$	(r) $\sec x + C$
(D) $\int \cos Kx \, dx$	(s) $\dfrac{\sin Kx}{K} + C$

43. **Statement-1** : If the rectangular components of a force are 8 N and 6N, then the magnitude of the force is 10N.

Statement-2 : If $|\vec{A}| = |\vec{B}| = 1$ then $|\vec{A} \times \vec{B}|^2 + |\vec{A}.\vec{B}|^2 = 1$.

(A) Statement-1 is True, Statement-2 is True; Statement-2 is a correct explanation for Statement-1.
(B) Statement-1 is True, Statement-2 is True; Statement-2 is NOT a correct explanation for Statement-1
(C) Statement-1 is True, Statement-2 is False
(D) Statement-1 is False, Statement-2 is True

44. The vectors $\vec{A}$ and $\vec{B}$ are such that $|\vec{A} + \vec{B}| = |\vec{A} - \vec{B}|$. The angle between vectors $\vec{A}$ and $\vec{B}$ is –

(A) 90° (B) 60°
(C) 75° (D) 45°

45. If $|\vec{A} \times \vec{B}| = \sqrt{3}\, \vec{A}.\vec{B}$, then the value of $|\vec{A} + \vec{B}|$ is :

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

46. Find the second derivative of given functions w.r.t. corresponding independent variable.
y = sin x + cos x

(A) – sin x – cos x (B) – sin x + cos x
(C) sin x + cos x (D) – tan x – cos x

47. Suppose that the radius r and area A = πr^2 of a circle are differentiable functions of t.Write an equation that relates dA / dt to dr / dt.

(A) $2r\dfrac{dr}{dt}$ (B) $2\pi r\dfrac{dr}{dt}$
(C) $4\pi r\dfrac{dr}{dt}$ (D) $3\pi r\dfrac{dr}{dt}$

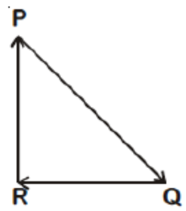
48. Find the torque $\left(\vec{\tau} = \vec{r} \times \vec{F}\right)$ of a force $\vec{F} = -3\hat{i} + \hat{j} + 5\hat{k}$ acting at the point $\vec{r} = 7\hat{i} + 3\hat{j} + \hat{k}$

(A) $14\hat{i} - 38\hat{j} + 16\hat{k}$ (B) $4\hat{i} + 4\hat{j} + 6\hat{k}$
(C) $-14\hat{i} + 38\hat{j} - 16\hat{k}$ (D) $-21\hat{i} + 3\hat{j} - 5\hat{k}$

49. The moment of the force, $\vec{F} = 4\hat{i} + 5\hat{j} - 6\hat{k}$ at (2, 0, –3), about the point (2,–2,–2), is given by

(A) $-7\hat{i} - 8\hat{j} - 4\hat{k}$ (B) $-4\hat{i} - \hat{j} - 8\hat{k}$
(C) $-8\hat{i} - 4\hat{j} - 7\hat{k}$ (D) $-7\hat{i} - 4\hat{j} - 8\hat{k}$

50. A particle moving with velocity $\vec{V}$ is acted by three forces shown by the vector triangle PQR.
The velocity of the particle will :



(A) Increase
(B) Decrease
(C) Remain constant
(D) Change according to the smallest force $\overrightarrow{QR}$