PHYSICS

BOOKS - TARGET PHYSICS (HINGLISH)

SCALARS AND VECTORS

Classical Thinking

1. Vectors are physical quantities which are completely specified by _____

A. magnitude only

B. number only

C. direction only

D. both magnitude and direction

Answer: D

Watch Video Solution

2. The magnitude of a vector cannot be :

A. zero

B. negative

C. positive

D. unity

Answer: B

Watch Video Solution

3. Which of the following is a scalar?

A. Displacement

B. Kinetic energy

C. Couple

D. Momentum

Answer: B

Watch Video Solution

4. Which of the following is a scalar?

A. Torque

B. Linear momentum

C. Electric field

D. Electric potentrial

Answer: D

Watch Video Solution

5. Out of the following physical quantities which is NOT a scalar?

A. Angular velocity

B. Angular frequency

C. Number of moles

D. Total path length

Answer: A

Watch Video Solution

6. Which of the following quantity is a vector?

A. pressure

B. time

C. impulse

D. charge

Answer: C

Watch Video Solution

7. The vectors of the same quantity having same magnitude and same direction are called _____

A. parallel vectors

B. equal vectors

C. zero vectors

D. negative vectors

Answer: B

Watch Video Solution

8. A single vector which produces the same effect of two or more vectors is called _____

A. position vector

B. resultant vector

C. positive vector

D. equal vector

Answer: B

Watch Video Solution

9. Choose the INCORRECT statement.

A. Vectors having same direction can be added.

B. Vectors having same magnitude can be added.

C. Vectors having different physical quantities can be added.

D. Vectors representing same physical quanity can be added.

Answer: C

Watch Video Solution

10. Vectors subtraction is _____

A. non-commutative only

B. non-associative only

C. neither non-commutative nor non-associative

D. neither non-commutative nor non-associative

Answer: D

View Text Solution

11. The process of finding the resultant of two or more vectors is called _____

A. resolution of vectors

B. addition of vectors only

C. subtraction of vectors only

D. composition of vectors

Answer: D

View Text Solution

12. The resultant if two vectors will be maximum, if they are_____.

A. equal vectors

B. parallel vectors

C. coplanar vectors

D. orthogonal vectors

Answer: B

View Text Solution

13. The resultant of two vectors will be minimum, if they are

A. equal vectors

B. parallel vectors

C. coplanar vectors

D. perpendicular to each other.

Answer: D

View Text Solution

14. The process of finding the components of a given vector is called as _____

A. composition of vector

B. multiplication of vector

C. addition of vector

D. resolution of vector

Answer: D

Watch Video Solution

15. If the component of one vector in the direction of another vector is zero, then those two vectors are _____

A. parallel to each other

B. opposite to each other

C. coplanar vectors

D. perpendicular to each other.

Answer: D

Watch Video Solution

16. Under what condition $\left|\vec{A}+\vec{B}\right|=\left|\vec{A}\right|+\left|\vec{B}\right|$ holds good?

A. $\vec{A}$ and $\vec{B}$ act in the same direction.

B. $\vec{A}$ and $\vec{B}$ act in the opposite direction.

C. $\vec{A}$ and $\vec{B}$ are different physical quantities.

D. $\vec{A}$ and $\vec{B}$ have same magnitude.

Answer: A

Watch Video Solution

17. Law of polygon of vector is repeated use of

A. triangle law of vertor.

B. parallelogram law of vectors.

C. addition of vectot in one dimension.

D. multiplication law of vector.

Answer: A

Watch Video Solution

18. In parallelogram law of vector, the direction of resultant vector is given by

A. $\tan\alpha = \frac{Q\cos\theta}{P + Q\sin\theta}$

B. $\tan\alpha = \frac{Q\sin\theta}{P + Q\cos\theta}$

C. $\tan\alpha = \frac{P\sin\theta}{P + Q\cos\theta}$

D. $\tan\alpha = \frac{P\cos\theta}{P + Q\cos\theta}$

Answer: B

View Text Solution

19. If vector $\vec{A} = \hat{3}i + \hat{2}j - \hat{4}k,$ its magnitude is

A. 1

B. $\sqrt{3}$

C. $\sqrt{9}$

D. $\sqrt{29}$

Answer: D

View Text Solution

20. A vector is represented by $3\hat{i} + \hat{j} + 2\hat{k}$, Its length in XY plane is :-

A. 2 unit

B. $\sqrt{5}unit$

C. $\sqrt{10}unit$

D. $\sqrt{15}unit$

Answer: C

Watch Video Solution

21. The direction cosines of $\vec{A} = -\hat{i} + 2\hat{j} + 3j\hat{k}$ is

A. $\frac{1}{\sqrt{14}}, \frac{2}{\sqrt{14}}, \frac{3}{\sqrt{14}}$

B. $-\frac{1}{\sqrt{14}}, \frac{2}{\sqrt{14}}, \frac{3}{\sqrt{14}}$

C. $\frac{1}{\sqrt{14}}, \frac{-2}{\sqrt{14}}, \frac{3}{\sqrt{14}}$

D. $\frac{-1}{\sqrt{14}}, \frac{2}{\sqrt{14}}, \frac{-3}{\sqrt{14}}$

Answer: B

Watch Video Solution

22. In a cartesian coordinate system, the coordinates of two points P and Q are (2,3,-6) and (-2,-5,7) respectively, the vector $\overline{PQ}$ is represented by

A. $-4\hat{i} - 8\hat{j} - 13\hat{k}$

B. $-4\hat{i} + 8\hat{j} - 13\hat{k}$

C. $4\hat{i} - 8\hat{j} - 13\hat{k}$

D. $-4\hat{i}-8\hat{j}+13\hat{k}$

Answer: D

Watch Video Solution

23. Three coplanar vector in arbitary units are given $\overrightarrow{A}=4\hat{i}+2\hat{j}-3\hat{k}, \overrightarrow{B}=\hat{i}+\hat{j}+3\hat{k}$ and $\overrightarrow{C}=4\hat{i}+5\hat{j}+3\hat{k}$, the resultant is

A. $8\hat{i}+3\hat{j}+3\hat{k}$

B. $5\hat{i}+3\hat{j}-3\hat{k}$

C. $9\hat{i}+3\hat{j}+12\hat{k}$

D. $9\hat{i}+8\hat{j}+3\hat{k}$

Answer: D

Watch Video Solution

24. 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. $\frac{1}{7}\left(3\hat{i} + 6\hat{j} - 2\hat{k}\right)$

B. $\frac{1}{7}\left(3\hat{i} + 6\hat{j} + 2\hat{k}\right)$

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

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

Answer: A

Watch Video Solution

25. If $\vec{A} = 3\hat{i} + 2\hat{j} - 4\hat{k}$ and $\vec{B} = 5\hat{i} - 7\hat{j} + 2\hat{k}$, which vector when added to $\vec{A} + \vec{B}$ will given unit vector along X-axis?

A. $7\hat{i} + 5\hat{j} + 2\hat{k}$

B. $-7\hat{i} - 5\hat{j} + 2\hat{k}$

C. $-7\hat{i} + 5\hat{j} + 2\hat{k}$

D. $7\hat{i} + 5\hat{j} - 2\hat{k}$

Answer: C

Watch Video Solution

26. The magnitude of the reusltant of two vectors $\vec{P}$ and $\vec{Q}$ is R. It is given by

A. $R = \sqrt{P^2 + Q^2 + 2PQ\sin\theta}$

B. $R = \sqrt{P^2 + Q^2 + 2PQ\cos\theta}$

C. $R = \sqrt{P^2 + Q^2 + PQ\sin\theta}$

D. $R = \sqrt{P^2 + Q^2 + PQ\cos\theta}$

Answer: B

View Text Solution

27. Two equal forces acting at a point, at right angle to each other have a resultant of 14.14N. The magnitude of each forces is

A. 28.28 N

B. 24.14 N

C. 10 N

D. 7.07 N

Answer: C

View Text Solution

28. A body is acted upon by two forces of manitudes $F_1 = \sqrt{2}N$ and $F_2 = 3N$ which are inclined at 45° to each other. There magnitude of resultant force acting on the body is

A. 17 N

B. 11 N

C. $\sqrt{17}N$

D. $\sqrt{11}N$

Answer: C

Watch Video Solution

29. The velocity of a body is 20 m/s making an angle of 30° with the horizontal, the vertical component of velocity is

A. 20m/s

B. 17.32m/s

C. 10m/s

D. 7m/s

Answer: C

View Text Solution

View Text Solution

30. A body of mass 10kg is placed on a smooth inclined plane making an angle of 30° with the horizontal, the component of the force of gravity trying to move the body down the inclined plane is $[g = 9.8m/s^2]$

A. 98 N

B. 49 N

C. 10 N

D. 5 N

Answer: B

Watch Video Solution

31. The vector $\overrightarrow{A} = 6\hat{i} + 9\hat{j} - 3\hat{k}$ and $\overrightarrow{B} = 2\hat{i} + 3\hat{j} - \hat{k}$ are

A. parallel

B. antiparallel

C. perpendicular

D. identical

Answer: A

Watch Video Solution

32. Two vectors of different physical quantities can be _____ to obtain a scalar.

A. added

B. subracted

C. multiplied

D. divided

Answer: C

Watch Video Solution

33. Choose the WRONG statement.

A. Scalar product of two vectors is a scalar quantity.

B. Dot product of two vector obeys the distributive law of multiplication.

C. Dot product of a vector with itself is zero.

D. Scalar product of vector with itself is equal to square of its magnitude.

Answer: C

View Text Solution

34. The scalar product of electric field intensity and area vector through which the line of force emerges is _____

A. electric potential

B. electric current

C. electric charge density

D. electric flux

Answer: D

Watch Video Solution

35. The example of dot product is _____

A. angular momentum

B. moment of force

C. linear velocity in terms of angular velocity

D. magnectic flux linked with the surface os magnetic induction

Answer: D

Watch Video Solution

36. Two vectors $\vec{A}$ and $\vec{B}$ are at right angles to each other then

A. $\vec{A} \cdot \vec{B} = 0$

B. $\vec{A} \times \vec{B} = 0$

C. $\frac{\vec{A}}{\vec{B}} = 0$

D. $\frac{\vec{B}}{\vec{A}} = 0$

Answer: A

Watch Video Solution

37. Two vectors $\vec{P}$ and $\vec{Q}$ are given $\vec{P} = 5\hat{i} + 7\hat{j} - 3\hat{k}$ and $\vec{Q} = 2\hat{i} + 2\hat{j} - a\hat{k}$. If they are

mutually perpendicular then value of 'a' is

A. 8

B. 5

C. 3

D. -8

Answer: D

Watch Video Solution

38. A force of $\left(5\hat{i}+6\hat{j}\right)$ N makes a body to move on a rough surface with a velocity of $\left(4\hat{j}-2\hat{k}\right)$ m/s. What is the power?

A. 8 unit

B. 13 unit

C. 14 unit

D. 24 unit

Answer: D

Watch Video Solution

39. A constant force of $\left(2\hat{i}+3\hat{j}+5\hat{k}\right)$ N produces a displacement of $\left(3\hat{i}+2\hat{j}+2\hat{k}\right)$ m. Then work done is

A. 5 j

B. 15 j

C. 22 j

D. 50 j

Answer: C

Watch Video Solution

40. The angle between the vectors $\vec{P} = 3\hat{i} + \hat{j} + 2\hat{k}$ and $\vec{Q} = \hat{i} - 2\hat{j} + 3\hat{k}$ is

A. 120°

B. 90°

C. 60°

D. 45°

Answer: C

Watch Video Solution

41. The angle between the following pair of vectors $\vec{A} = \hat{i} + \hat{j} + \hat{k}$ and $\vec{B} = -\hat{i} - \hat{j} + 2\hat{k}$ is

A. 150°

B. 120°

C. 90°

D. 30°

Answer: C

Watch Video Solution

42. What is the dot product of two vectors of magnitude 3 and 5, if the angle between them is 60°?

A. 15

B. 8

C. 7.5

D. 5.3

Answer: C

Watch Video Solution

43. The vector product of two vector is a vector whose direction is given is given by

A. Left hand thumb rule.

B. Right hand screw rule.

C. Fleming's left hand rule.

D. Biot-Savart's rule.

Answer: B

Watch Video Solution

44. The magnitude of self cross product is

A. zero

B. magnitude of vector.

C. square of the magnitude of vector.

D. half the magnitude of vector.

Answer: A

Watch Video Solution

45. The vector product of two non-zero vector is zero

A. only when they are in the same direction

B. only when they are making angle 60°

C. only when they are perpendicular.

D. whey they are parallel or antiparallel.

Answer: D

View Text Solution

46. The example of cross product is _____

A. power

B. torque

C. work

D. electric flux

Answer: B

Watch Video Solution

47. If $\vec{A} = -2\hat{i} + 3\hat{j} - 4\hat{k}$ and $\vec{B} = 3\hat{i} - 4\hat{j} + 5\hat{k}$ then $\vec{A} \times \vec{B}$ is

A. $\hat{i} - 2\hat{j} - \hat{k}$

B. $-\hat{i} + 2\hat{j} - \hat{k}$

C. $-\hat{i} - 2\hat{j} + \hat{k}$

D. $-\hat{i} - 2\hat{j} - \hat{k}$

Answer: D

Watch Video Solution

48. Determine a vector product of $\vec{A} = \hat{i} + \hat{j} + \hat{k}$ and $\vec{B} = -3\hat{i} + \hat{j} + \hat{k}$

A. $3\hat{i} - \hat{j} + 4\hat{k}$

B. $-3\hat{i} + \hat{j} + 4\hat{k}$

C. $3\hat{i} + \hat{j} - 4\hat{k}$

D. $-3\hat{i} - \hat{j} + 4\hat{k}$

Answer: D

View Text Solution

49. If $\vec{P} = \hat{i} + 2\hat{j} + \hat{k}$ and $\vec{Q} = 3\hat{i} + \hat{j} - \hat{k}$ then $\vec{P} \times \vec{Q}$ is

A. $-3\hat{i} + 4\hat{j} - 5\hat{k}$

B. $3\hat{i} - 4\hat{j} + 5\hat{k}$

C. $3\hat{i} + 4\hat{j} - 5\hat{k}$

D. $3\hat{i} + 4\hat{j} - 5\hat{k}$

Answer: A

View Text Solution

50. Linear momentum $\vec{P} = 2\hat{i} + 4\hat{j} + 5\hat{k}$ and position vector is $\vec{r} = 3\hat{i} - \hat{j} + 2\hat{k}$, the angular momentum is given by

A. $3\hat{i} - 19\hat{j} + 14\hat{k}$

B. $13\hat{i} + 19\hat{j} + 14\hat{k}$

C. $-3\hat{i} - 19\hat{j} + 14\hat{k}$

D. $-13\hat{i} - 11\hat{j} + 14\hat{k}$

Answer: D

Watch Video Solution

51. The area of a triangle formed by the sides of vector $\vec{A}$ and $\vec{B}$ is

A. $\left|\vec{A} \times \vec{B}\right|$

B. $\left|\vec{A} \cdot \vec{B}\right|$

C. $\frac{1}{2}\left|\vec{A} \cdot \vec{B}\right|$

D. $\frac{1}{2}\left|\vec{A} \times \vec{B}\right|$

Answer: D

Watch Video Solution

52. The area of the triangle having two sides $\vec{A} = \hat{i} - 2\hat{j} - 2\hat{k}$ and $\vec{B} = 2\hat{i} + 2\hat{j} + 3\hat{k}$ is s

A. $\sqrt{45} sq.\ unit$

B. $\sqrt{22.5} sq.\ unit$

C. $4.717 sq.\ unit$

D. $9.43 sq.\ unit$

Answer: C

View Text Solution

View Text Solution

53. Area of parallelogram whose adjacent sides are $\left(\hat{i}+2\hat{j}+3\hat{k}\right)m$ and $\left(\hat{i}-3\hat{j}+\hat{k}\right)$m is

A. $\sqrt{50}m^2$

B. $\sqrt{150}m^2$

C. $\sqrt{25}m^2$

D. $\sqrt{75}m^2$

Answer: B

View Text Solution

54. If $\vec{P} = \hat{i} + 2\hat{j} - 4\hat{k}$ and $\vec{Q} = \hat{i} + 2\hat{j} - \hat{k}$ then $\left(\vec{P} + \vec{Q}\right) \cdot \left(\vec{P} - \vec{Q}\right)$ is

A. 5

B. 15

C. 25

D. 115

Answer: B

View Text Solution

55. If $\vec{A} = 2\hat{i} + 3\hat{j} + 4\hat{k}$ and $\vec{B} = \hat{i} + 2\hat{j} + 3\hat{k}$. The value of $\left(2\vec{A} - \vec{B}\right) \cdot \left(\vec{A} + 2\vec{B}\right)$ is

A. 30

B. 40

C. 55

D. 90

Answer: D

View Text Solution

56. A particle moves from position $3\hat{i}+2\hat{j}-6\hat{k}$ to $14\hat{i}+13\hat{j}+9\hat{k}$ due to a uniform force of $4\hat{i}+\hat{j}+3\hat{k}N$. If the displacement is in meters, then find the work done by the force.

A. 200 j

B. 100 j

C. 75 j

D. 50 j

Answer: B

Watch Video Solution

Critical Thinking

1. Scalars are physical quantities which are completely specified by _____

A. number and unit

B. number only

C. unit only

D. neither number nor unit

Answer: A

Watch Video Solution

2. A vector is not changed if

A. it is divided by a scalar

B. it is multiplied by a scalar

C. it slides parallel to itself

D. all of these

Answer: C

Watch Video Solution

3. The velocity vector of a stationary particle is _____

A. zero vector

B. vector with magnitude of velocity vector

C. scalar

D. scalar with magnitude of velocity vector

Answer: A

Watch Video Solution

4. If the angle between two collinear vector is π radians, vector are said to be _____

A. antiparallel vector

B. parallel vectors

C. similar vector

D. identical vector

Answer: A

Watch Video Solution

5. If the angular displacement is large, it is a scalar quantity because

A. its magnitude for large values cannot be calculate.

B. it is not coplanar for large values.

C. it will not obey the commutative law of vector addition.

D. it will not obey principal of homogeneity.

Answer: C

Watch Video Solution

6. Angular momentum is

A. a scalar

B. a polar vector

C. an axial vector

D. None of these

Answer: C

Watch Video Solution

7. The component of a vector may be

A. double its magnitude.

B. equal to its magnitude.

C. greater than its magnitude.

D. either greater or equal to its magnitude.

Answer: A

Watch Video Solution

8. Which of the following is NOT essential for three forces to produce zero resultant?

A. They should be in same plane.

B. It should be possible to represent them by the three sides of a triangle taken in the same order.

C. They should act along the sides of parallelogram.

D. The resultant of any two forces should be equal and opposite to the third force.

Answer: C

Watch Video Solution

9. Following sets of three forces act on a body. Whose resultant can not be zero.

A. 10,10,10

B. 10,10,20

C. 10,20,23

D. 10,20,40

Answer: D

Watch Video Solution

10. If more than forces are acting on a heavy rigid body such that the body is in balanced state, then all the forces are

A. collinear.

B. coplanar.

C. acting in random direction.

D. represented by the sides of a polygon of vectors.

Answer: D

Watch Video Solution

11. The vector projection of a vector $3\hat{i} + 4\hat{k}$ on y-axis is

A. five

B. four

C. three

D. zero

Answer: D

Watch Video Solution

12. A vector is represented by $3\hat{i} + \hat{j} + 2\hat{k}$ Its length in XY plane is

A. 2

B. $\sqrt{14}$

C. $\sqrt{10}$

D. $\sqrt{5}$

Answer: C

Watch Video Solution

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

A. 7 N

B. 5 N

C. 1 N

D. Between 1 N and N

Answer: D

Watch Video Solution

14. The resultant of two vectors at right angles is 5 N. If the anagle between them is 120° and the resultant is $\sqrt{13}$ then the vector are

A. 3 N,4 N`

B. $\sqrt{2}N, \sqrt{5}N$

C. $\sqrt{3}N, \sqrt{4}N$

D. $\sqrt{7}N, \sqrt{3}N$

Answer: A

Watch Video Solution

15. $\vec{A}$ is a vector with magnitude A, then the unit vector $\hat{A}$ in the direction $\vec{A}$ is

A. $A\vec{A}$

B. $\vec{A}\vec{A}$

C. $\vec{A} \times \vec{A}$

D. $\frac{\vec{A}}{A}$

Answer: D

Watch Video Solution

16. 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. $\sqrt{0.01}$

B. $\sqrt{0.11}$

C. 1

D. $\sqrt{0.39}$

Answer: B

Watch Video Solution

17. A Unit vector in the direction of the negative of the vector $\left(-\hat{i}+\hat{j}-\hat{k}\right)$ is

A. $\frac{-1}{\sqrt{3}}\left(-\hat{i}+\hat{j}-\hat{k}\right)$

B. $\sqrt{3}\left(\hat{i}+\hat{j}-\hat{k}\right)$

C. $\frac{-1}{\sqrt{2}}\left(\hat{i}+\hat{j}-\hat{k}\right)$

D. $\frac{-1}{\sqrt{3}}\left(\hat{i}+\hat{j}-\hat{k}\right)$

Answer: A

Watch Video Solution

18. If $\vec{A}=2\hat{i}+6\hat{j}$ and $\vec{B}=4\hat{i}+3\hat{j}$, the vector having the same magnitude as $\vec{B}$ and parallel to $\vec{A}$ is

A. $\frac{5}{2}\left(2\hat{i}-6\hat{j}\right)$

B. $\frac{\sqrt{10}}{4}\left(\hat{i}-3\hat{j}\right)$

C. $\frac{\sqrt{10}}{4}\left(4\hat{i}+3\hat{j}\right)$

D. $\frac{\sqrt{10}}{2}\left(\hat{i}+3\hat{j}\right)$

Answer: D

Watch Video Solution

19. If the sum of two unit vectors is a unit vector, then magnitude of difference is-

A. $\sqrt{2}$

B. $\sqrt{2}$

C. $\frac{1}{\sqrt{2}}$

D. $\sqrt{5}$

Answer: B

Watch Video Solution

20. A vector of magnitude b is rotated through angle θ. What is the change in magnitude of the vector?

A. $2a \sin \theta / 2$

B. $2a \cos \theta / 2$

C. $2a \sin \theta / 2$

D. $2a \cos \theta$

Answer: A

Watch Video Solution

Watch Video Solution

21. The resultant of two vectors $\vec{P}$ and $\vec{Q}$ is $\vec{R}$. If the magnitude of $\vec{Q}$ is doubled, the new resultant vector becomes perpendicular to $\vec{P}$. Then, the magnitude of $\vec{R}$ is equal to

A. P+Q

B. Q

C. P

D. $\frac{P+Q}{2}$

Answer: B

Watch Video Solution

22. A force vector applied on a mass is represented as $\vec{F} = 6\hat{i} - 8\hat{j} + 10\hat{k}$ and acceleration with 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

Answer: A

Watch Video Solution

23. Vector $\vec{A} = 2\hat{i} - 3\hat{j} + a\hat{k}$ and $\vec{B} = 12\hat{i} - b\hat{j} + 6\hat{k}$ are parallel to each other, then values of 'a' and 'b' are

A. 1,18

B. 1,-18

C. $-1, 18$

D. $-1, \ -18$

Answer: A

Watch Video Solution

24. If a $4\hat{i}+3\hat{j}+8\hat{k}$ is perpendicular to the vector $4\hat{j}-4\hat{i}+m\hat{k}$, then the value of m is

A. $\frac{1}{2}$

B. $-\frac{1}{2}$

C. 1

D. -1

Answer: A

Watch Video Solution

25. A force $\vec{F} = 3\hat{i} + c\hat{j} + 2\hat{k}$ acting on a particle causes a displacement $\vec{d} = -4\hat{i} + 2\hat{j} + 3\hat{k}$. If the work done is $6j$. Find the value of 'c' ?

A. 0

B. 1

C. -6

D. 12

Answer: C

Watch Video Solution

26. Work done when a force of $\left(7\hat{i} - 4\hat{j} - 4\hat{k}\right)$ N moves a body through a distance of 10 metre in its own direction is

A. 160 j

B. 120 j

C. 90 j

D. 10 j

Answer: C

Watch Video Solution

27. If $\vec{P} = \hat{i} - 2\hat{j} - 3\hat{k}$ and $\vec{Q} = 4\hat{i} - 2\hat{j} + 6\hat{k}$, the angle made by $\vec{P} + \vec{Q}$ with X-axis is

A. 30°

B. 45°

C. 60°

D. 90°

Answer: B

Watch Video Solution

28. Choose the CORRECT statement.

A. The vector product does not obey commutative law but obeys distributive law of multiplication.

B. The vector product obeys commutative law of multiplication but does not obey distributive law of multiplication.

C. The vector product does not obey both commutative and distributive law of multiplication.

D. The vector product obeys both commutative and distributive law of multiplication.

Answer: A

Watch Video Solution

29. The sine of the angle between $3\hat{i} + \hat{j} + 2\hat{k}$ and $2\hat{i} - 2\hat{j} + 4\hat{k}$ is

A. 1

B. 0.91

C. 0.76

D. 0.67

Answer: C

Watch Video Solution

30. If $\vec{A} . \vec{B} = 0$ and $\vec{A} \times \vec{B} = 0$, then which of the following conditions is necessary?

A. A=1,B=0

B. A=0 and B=0

C. A=0 or B=0

D. A=0,B=1

Answer: C

Watch Video Solution

31. If the ratio of the dot product of two vectors and cross product of same two vectors is $\sqrt{3}$, the two vectors make angle

A. 30°

B. 45°

C. 90°

D. 120°

Answer: A

Watch Video Solution

32. Select the WRONG one.

A. $\vec{P} \times \vec{Q} \neq \vec{Q} \times \vec{P}$

B. $\vec{P} \times \left(\vec{Q} \times \vec{R}\right) = \left(\vec{P} \times \vec{Q}\right) \times \vec{R}$

C. $\vec{P} \cdot \vec{Q} = \vec{Q} \cdot \vec{P}$

D. $\vec{P} \times \left(\vec{Q} + \vec{R}\right) = \vec{P} \times \vec{Q} + \vec{P} \times \vec{R}$

Answer: B

Watch Video Solution

33. If $\vec{a}$ and $\vec{b}$ are two vectors then the value of $\left(\vec{a}+\vec{b}\right)\times\left(\vec{a}-\vec{b}\right)$ is

A. $2\left(\vec{B}\times\vec{A}\right)$

B. $\left(\vec{B}\times\vec{A}\right)$

C. $2\left(\vec{B}+\vec{A}\right)$

D. $2\left(\vec{B}-\vec{A}\right)$

Answer: A

Watch Video Solution

34. Given $\vec{p} \cdot \left(\vec{P} + \vec{Q}\right) = P^2$ then the angle between $\vec{P}$ and $\vec{Q}$ is

A. 0°

B. 30°

C. 45°

D. 90°

Answer: D

Watch Video Solution

35. Assertion : If dot product and cross product of $\vec{A}$ and $\vec{B}$ are zero, it implies that one of the vector

$\vec{A}$ and $\vec{B}$ must be a null vector.

Reason: Null vector is a vector with zero mangnitude.

A. Assertion is True, Reason is True, Reason is a correct explanation for Assertion

B. Assertion is True, Reason is True, Reason is not a correct explanation for Assertion

C. Assertion is True, Reason is False

D. Assertion is False, Reason is False.

Answer: B

Watch Video Solution

36. 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 A and B.

A. Assertion is True, Reason is True, Reason is a correct explantion for Assertion

B. Assertion is True, Reason is True, Reason is not a correct explanaition for Assertion

C. Assertion is True, Reason is False

D. Assertion is False, Reason is False.

Answer: A

Watch Video Solution

Watch Video Solution

Competitive Thinking

1. Which of the following is a scalar quantity?

A. Displacement

B. Electric field

C. Accerleration

D. Work

Answer: D

Watch Video Solution

2. Can the resultant of two 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.

Answer: C

Watch Video Solution

3. Two vectors $\vec{A}$ and $\vec{B}$ are acting in the same plane and the vector $\vec{C}$ is perpendicular to the plane. The resultant of these vectors.

A. may be zero.

B. can not be zero.

C. lies between $\vec{A}$ and $\vec{B}$

D. lies between $\vec{A}$ and $-\vec{B}$.

Answer: B

Watch Video Solution

4. If $\left|\vec{A}+\vec{B}\right| = \left|\vec{A}\right| + \left|\vec{B}\right|$, then angle between $\vec{A}$ and $\vec{B}$ will be

A. 90°

B. 120°

C. 0°

D. 60°

Answer: C

Watch Video Solution

5. A bird flies from (-3 m,4 m,-3 m) to (7 m, -2 m, -3 m) in XYZ co-ordinates. The bird's displacement in unit vectors is given by

A. $\left(4\hat{i}+\hat{j}-6\hat{k}\right)$

B. $\left(10\hat{i}+6\hat{j}\right)$

C. $\left(10\hat{i}-6\hat{j}\right)$

D. $\left(10\hat{i}+6\hat{j}-6\hat{k}\right)$

Answer: C

Watch Video Solution

6. The magnitudes of vectors $\vec{A}$, $\vec{B}$ and $\vec{C}$ are 3,4 and 5 unit 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. $\frac{\pi}{4}$

Answer: A

Watch Video Solution

7. A person goes 10 km north and 20 km east. What will be the displacement from initial point?

A. 22.36 km

B. 2 km

C. 5 km

D. 20 km

Answer: A

Watch Video Solution

8. A ship A is moving westwards with a speed of $10kmh^{-1}$ and a ship B 100 km south of A, is moving northwards with a speed of $10kmh^{-1}$ The time after which the distance between them becomes shortest, is

A. 0 h

B. 5 h

C. $5\sqrt{2}h$

D. $10\sqrt{2}h$

Answer: B

Watch Video Solution

9. A particle has displacement of 12 m towards east and 5 m towards north then 6 m vertically upwards. The sum of these displacements is

A. 12 m

B. 10.04 m

C. 14.31 m

D. None of these

Answer: C

Watch Video Solution

10. Two equal forces are acting at a point with an angle of 60° between them. If the resultant force is equal to $40\sqrt{3}$ N,

the magnitude of each force is

A. 40 N

B. 20 N

C. 80 N

D. 30 N

Answer: A

Watch Video Solution

11. The resultant force of 5 N and 10 N cannot be

A. 12 N

B. 8 N

C. 4 N

D. 5 N

Answer: C

Watch Video Solution

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

A. 18

B. 16

C. 14

D. 13

Answer: D

Watch Video Solution

13. If $\vec{a} = 4\hat{i} - \hat{j}$, $\vec{b} = -3\hat{i} + 2\hat{j}$ and $\vec{c} = -\hat{k}$. Then the unit vector $\hat{r}$ along the direction of sum of these vectors will be

A. $\hat{r} = \frac{1}{\sqrt{3}}\left(\hat{i} + \hat{j} - \hat{k}\right)a$

B. $\hat{r} = \frac{1}{\sqrt{2}}\left(\hat{i} + \hat{j} - \hat{k}\right)$

C. $\hat{r} = \frac{1}{3}\left(\hat{i} - \hat{j} + \hat{k}\right)$

D. $\hat{r} = \frac{1}{\sqrt{2}}\left(\hat{i} + \hat{j} + \hat{k}\right)$

Answer: A

Watch Video Solution

14. If $A = 3\hat{i} - 2\hat{j} + \hat{k}, B = \hat{i} - 3\hat{j} + 5\hat{k}$ and $C = 2\hat{i} + \hat{j} - 4\hat{k}$ form a right angled triangle, then out of the following which one is satisfed ?

A. $\overrightarrow{A} = \overrightarrow{B} + \overrightarrow{C}$ and $A^2 = B^2 + c^2$

B. $\overrightarrow{A} = \overrightarrow{B} + \overrightarrow{C}$ and $B^2 = A^2 + c^2$

C. $\overrightarrow{B} = \overrightarrow{A} + \overrightarrow{C}$ and $B^2 = A^2 + C^2$

D. $\overrightarrow{B} = \overrightarrow{A} + \overrightarrow{C}$ and $A^2 = B^2 + C^2$

Answer: B

Watch Video Solution

15. The resultant of two forces , one double the other in magnitude is perpendicular to the smaller of the two forces. The angle between the two forces is _____?

A. 60°

B. 120°

C. 150°

D. 90°

Answer: B

Watch Video Solution

16. Two forces are such that the sum of their magnitudes is 18N and their resultant is 12 N which is perpendicular to the

smaller force. Then the magnitude of the forces are

A. 12 N, 8 N

B. 13 N, 5 N

C. 10 N, 8 N

D. 16 N, 2 N

Answer: B

Watch Video Solution

17. Two forces with equal magnitudes F act on a body and the magnitude of the resultant force is F /3. The angle between the two forces is

A. $\cos^{-1}\left(-\frac{17}{18}\right)$

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

C. $\cos^{-1}\left(-\frac{2}{3}\right)$

D. $\cos^{-1}\left(-\frac{8}{9}\right)$

Answer: A

Watch Video Solution

18. Two forces of equal magnitude F are at a point. If θ is the angle between two forces then magnitude of the resultant forces will be

A. $2F\cos\frac{\theta}{2}$

B. $F\cos\frac{\theta}{2}$

C. $2F\cos\theta$

D. $\frac{F}{2}\cos\frac{\theta}{2}$

Answer: C

Watch Video Solution

19. Two equal vectors have a resultant equal to either of them. The between them is

A. 60°

B. 90°

C. 100°

D. 120°

Answer: D

Watch Video Solution

Watch Video Solution

20. The resultant of two forces 3P and 2P is R. If the first force is doubled then resultant is also doubled.The angle between the two forces is

A. 60°

B. 120°

C. 70°

D. 180°

Answer: B

Watch Video Solution

21. 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. 45°

B. 180°

C. 0°

D. 90°

Answer: D

Watch Video Solution

22. If $\left|\vec{V}_1 + \vec{V}_2\right| = \left|\vec{V}_1 - \vec{V}_2\right|$ and V_2 is finite, then

A. V_1 is parallel to V_2

B. $\vec{V}_1 = \vec{V}_2$

C. V_1 and V_2 are mutually perpendicular

D. $\left|\vec{V}_1\right| = \left|\vec{V}_2\right|$

Answer: C

Watch Video Solution

23. Two vector $\vec{V}$ and $\vec{V}$ have equal magnitudes. If magnitude of $\vec{A} + \vec{B}$ is equal to n time the magnitude of $\vec{A} - \vec{B}$, then angel to between $\vec{A}$ and $\vec{B}$ is

A. $\cos^{-1}\left(\frac{n-1}{n+1}\right)$

B. $\cos^{-1}\left(\frac{n^2-1}{n^2+1}\right)$

C. $\sin^{-1}\left(\frac{n-1}{n+1}\right)$

D. $\sin^{-1}\left(\frac{n^2-1}{n^2+1}\right)$

Answer: B

Watch Video Solution

24. A unit vector is represented as $\left(0.8\hat{i}+b\hat{j}+0.4\hat{k}\right)$. Hence the value of 'b' must be

A. 0.4

B. $\sqrt{0.6}$

C. 0.2

D. $\sqrt{0.2}$

Answer: D

Watch Video Solution

25. The angle between two vector A and B is θ. Vector R is the resultant of the two vectors. If R makes an angle $\frac{\theta}{2}$ with A, then

A. A=2B

B. $A = \frac{B}{2}$

C. A = B

D. AB = 1

Answer: C

Watch Video Solution

26. The magnitude of the component of the vector $2\hat{i}+3\hat{j}+\hat{k}$ along $3\hat{i}+4\hat{k}$ is

A. $\frac{1}{2}$

B. $\frac{14}{5}$

C. 2

D. $\frac{6}{5}$

Answer: C

Watch Video Solution

27. $\overrightarrow{A}$ and $\overrightarrow{B}$ are two vectors given by $\overrightarrow{A}=2\hat{i}+3\hat{j}$ and $\overrightarrow{B}=\hat{i}+\hat{j}$. The magnitude of the

component of $\overrightarrow{A}$ along $\overrightarrow{B}$ is

A. $\frac{5}{\sqrt{2}}$

B. $\frac{3}{\sqrt{2}}$

C. $\frac{7}{\sqrt{2}}$

D. $\frac{1}{\sqrt{2}}$

Answer: A

View Text Solution

28. If a vector $2\hat{i}+3\hat{j}+8\hat{k}$ is perpendicular to the vector $4\hat{j}-4\hat{i}+\alpha\hat{k}$. Then the value of α is

A. $-\frac{1}{2}$

B. $\frac{1}{2}$

C. 1

D. -1

Answer: A

Watch Video Solution

29. The vector $\overrightarrow{P} = a\hat{i} + a\hat{j} + 3\hat{k}$ and $\overrightarrow{Q} = a\hat{i} - 2\hat{j} - \hat{k}$ are perpendicular to each other. The positive value of a is

A. 3

B. 4

C. 9

D. 13

Answer: A

Watch Video Solution

30. Three vector $\vec{A} = a\hat{i} + \hat{j} + \hat{k}, \vec{B} = \hat{i} + b\hat{j} + \hat{k}$ and $\vec{C} = \hat{i} + \hat{j} + c\hat{k}$ are mutually perpendicular `(hati , hatj and hatk) unit vectors along X,Y and Z axis respectively). The respective values of a,b and c are

A. 0,0,0

B. $-\frac{1}{2}, -\frac{1}{2}, -\frac{1}{2}$

C. 1,-1,1

D. $\frac{1}{2}, \frac{1}{2}, \frac{1}{2}$

Answer: B

View Text Solution

31. If Vectors $\overrightarrow{A} = \cos\omega\hat{i} + \sin\omega\hat{j}$ and $\overrightarrow{B} = (\cos)\frac{\omega t}{2}\hat{i} + (\sin)\frac{\omega t}{2}\hat{j}$ are functions of time. Then the value of t at which they are orthogonal to each other is

A. t = 0

B. $t = \frac{\pi}{4\omega}$

C. $t = \frac{\pi}{2\omega}$

D. $t = \frac{\pi}{\omega}$

Answer: D

Watch Video Solution

32. Consider two vector $\overrightarrow{F_1} = 2\hat{j} + 5\hat{k}$ and $\overrightarrow{F_2} = 3\hat{j} + 4\hat{k}$.

The magnitude of the scalar product of these vector is

A. 20

B. 23

C. $5\sqrt{33}$

D. 26

Answer: D

Watch Video Solution

33. A particle moves from (1,0,3) to the point (-3,4,5), when a force $\overrightarrow{F} = \left(\hat{i} + 5\hat{k}\right)$ acts on it. Amount of work done in

joule is

A. 14

B. 10

C. 6

D. 15

Answer: C

View Text Solution

34. A force $\left(4\hat{i}+\hat{j}-2\hat{k}\right)ms^{-1}$ The power exerted is

A. 4 W

B. 5 W

C. 2 W

D. 8 W

Answer: A

Watch Video Solution

35. A body of mass 1 kg begins to move under the action of a time dependent force $F = \left(2t\hat{i} + 3t^2\hat{j}\right)N$, where $\hat{i}$ and $\hat{j}$ are unit vector along x and y axis. What power will be developed by the force at the time?

A. $\left(2t^3 + 3t^4\right)W$

B. $\left(2t^3 + 3t^5\right)W$

C. $\left(2t^2 + 3t^2\right)W$

D. $\left(2t^2 + 3t^4\right)W$

Answer: B

Watch Video Solution

36. When $\vec{A} \cdot \vec{B} = -\left|\vec{A}\right|\left|\vec{B}\right|$, 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.

Answer: C

View Text Solution

37. The angle between the two vectors, $\left(\vec{A} = 3\hat{i} + 4\hat{j} + 5\hat{k}\right)$ and $\left(\vec{B} = 3\hat{i} + 4\hat{j} - 5\hat{k}\right)$ will be

A. zero

B. 45°

C. 90°

D. 180°

Answer: C

Watch Video Solution

38. The angle θ between the vector $\vec{p} = \hat{i} + \hat{j} + \hat{k}$ and unit vector along X-axis is

A. $\cos^{-1}\left(\frac{1}{\sqrt{3}}\right)$

B. $\cos^{-1}\left(\frac{1}{\sqrt{2}}\right)$

C. $\cos^{-1}\left(\frac{\sqrt{3}}{2}\right)$

D. $\cos^{-1}\left(\frac{1}{2}\right)$

Answer: A

View Text Solution

39. Angle between the vectors $\left(\hat{i}+\hat{j}\right)$ and $\left(\hat{j}-\hat{k}\right)$ is

A. 30°

B. 45°

C. 60°

D. 90°

Answer: C

Watch Video Solution

40. A particle moves in the x-y plane under the action of a force $\vec{F}$ such that the value of its linear momentum $\vec{P}$ at any time t is $P_x = 2\cos t$ and $p_y = 2\sin t$. What is the angle θ between $\vec{F}$ and P at a given time t?

A. $\theta = 0^\circ$

B. $\theta = 30^\circ$

C. $\theta = 90^\circ$

D. $\theta = 180^\circ$

Answer: C

Watch Video Solution

41. In a triangle ABC, the sides AB and AC represented by the vector $3\hat{i}+\hat{j}+\hat{k}$ and $\hat{i}+2\hat{j}+\hat{k}$ respectively. Calcutate the angle $\angle ABC$.

A. $\cos^{-1}\left(\sqrt{\frac{5}{11}}\right)$

B. $\cos^{-1}\left(\sqrt{\frac{6}{11}}\right)$

C. $90^\circ - \cos^{-1}\left(\sqrt{\frac{5}{11}}\right)$

D. $180^\circ - \cos^{-1}\left(\sqrt{\frac{5}{11}}\right)$

Answer: A

Watch Video Solution

42. In a clockwise system :-

A. $\hat{i} \cdot \hat{i} = 0$

B. $\hat{i} \cdot \hat{i} = 0$

C. $\hat{j} \times \hat{j} = \hat{i}$

D. $\hat{k} \cdot \hat{j} = 1$

Answer: A

Watch Video Solution

43. For vectors $\overrightarrow{A}$ and $\overrightarrow{B}$ making an angle θ which one of the following relation is correct?

A. $\vec{A} \times \vec{B} = \vec{B} \times \vec{A}$

B. $\vec{A} \times \vec{B} = AB \sin \theta$

C. $\vec{A} \times \vec{B} = AB \cos \theta$

D. $\vec{A} \times \vec{B} = -\vec{B} \times \vec{A}$

Answer: D

Watch Video Solution

44. A vector $\vec{A}$ points verically 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

Answer: B

Watch Video Solution

45. Which of the following relation is not correct?

A. $\overrightarrow{v} = \overrightarrow{\omega} \times \overrightarrow{r}$

B. $\overrightarrow{v} = \overrightarrow{\omega} \times \overrightarrow{r}$

C. $\overrightarrow{\delta s} = \overrightarrow{\delta\theta} \times \overrightarrow{r}$

D. $v = r\omega$

Answer: A

Watch Video Solution

46. What is the value of linear velocity. If $\vec{\omega} = 3\hat{i} - 4\hat{j} + \hat{k}$ and $\vec{r} = 5\hat{i} - 6\hat{j} + 6\hat{k}$?

A. $6\hat{i} - 2\hat{j} + 3\hat{k}$

B. $6\hat{i} - 2\hat{j} + 8\hat{k}$

C. $6\hat{i} - 13\hat{j} + 6\hat{k}$

D. $18\hat{i} + 13\hat{j} - 2\hat{k}$

Answer: D

Watch Video Solution

47. If $\vec{A} \times \vec{B} = \vec{B} \times \vec{A}$, then the angle between $\vec{A}$ and $\vec{B}$ is-

A. π

B. $\pi/3$

C. $\pi/2$

D. $\pi/4$

Answer: A

Watch Video Solution

48. The moment of the force, $\vec{A} \times \vec{B} = \vec{B} \times \vec{A}$, at (2,0,-3), about the point (2,-2,-2) is given by

A. $-8\hat{i} - 4\hat{j} - 7\hat{k}$

B. $-4\hat{i} - \hat{j} - 8\hat{k}$

C. $-7\hat{i} - 8\hat{j} - 4\hat{k}$

D. $-7\hat{i}-4\hat{j}-8\hat{k}$

Answer: D

View Text Solution

49. A force $\overrightarrow{F}=\propto \hat{i}+3\hat{j}+6\hat{k}$ is acting at a point $\overrightarrow{r}=2\hat{i}-6\hat{j}-12\hat{k}$. The value of $\propto$ for which angular momentum about origin is conserved is.

A. 1

B. -1

C. 2

D. zero

Answer: B

Watch Video Solution

50. The velocity of a particle of mass m is $\vec{v} = 5\hat{i} + 4\hat{j} + 6\hat{k}$ when at $\vec{r} = -2\hat{i} + 4\hat{j} + 6\hat{k}$.

The angular momentum of the particle about the origin is

A. 42 m

B. $m\left(42\hat{j} - 28\hat{k}\right)$

C. $m\left(42\hat{i} - 28\hat{j}\right)$

D. $m\left(42\hat{k} - 28\hat{i}\right)$

Answer: B

Watch Video Solution

51. Two adjacent sides of a parallelogram are respectively by the two vectors $\hat{i} + 2\hat{j} + 3\hat{k}$ and $3\hat{i} - 2\hat{j} + \hat{k}$. What is the area of parallelogram?

A. 8

B. $8\sqrt{3}$

C. $3\sqrt{8}$

D. 192

Answer: B

Watch Video Solution

52. Three vector $\vec{A}, \vec{B}, \vec{C}$ satisfy the relation $\vec{A} \cdot \vec{B} = 0$and $\vec{A} . \vec{C} = 0$. The vector $\vec{A}$ is parallel to

A. $\vec{B} \times \vec{C}$

B. $\vec{B} . \vec{C}$

C. $\vec{C}$

D. $\vec{B}$

Answer: A

Watch Video Solution

53. The component of a vector r along X-axis will have maximum value if

A. $\vec{r}$ is along $+$ ve x - axis.

B. $\vec{r}$ is along $+$ ve y - axis

C. $\vec{r}$ is along $-$ ve y - axis

D. $\vec{r}$ make as angle of 45° with the x-axis.

Answer: A

Watch Video Solution

54. If $\left|\vec{A} \times \vec{B}\right| = \sqrt{3}\vec{A} \cdot \vec{B}$, then the value of $\left|\vec{A} + \vec{B}\right|$ 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. $\left(A^2 + B^2 + AB\right)^{1/2}$

Answer: D

Watch Video Solution

55. Sum of magitude of two fores is 25 N. The resultant of these forces is normal to the smaller force and has a magnitude of 10 N. Then the two forces are

A. $14.5N$, $10.5N$

B. 16 N, 9 N

C. 13 N, 12 N

D. 20 N , 5 N

Answer: A

Watch Video Solution

56. Consider a particle on which constant forces $\overrightarrow{F} = \hat{i} + 2\hat{j} + 3\hat{k}$ N and $\overrightarrow{F_2} = 4\hat{i} - 5\hat{j} - 2\hat{k}$ N act together resulting in a displacement from position $\overrightarrow{r_1} = 20\hat{i} + 15\hat{j}$ cm to $\overrightarrow{r_2} = 7\hat{k}$ cm. The total work done on the particle is

A. $-0.48j$

B. $+0.48j$

C. $-4.8j$

D. `+ 4.8 j

Answer: A

Watch Video Solution

57. A particle moves from a point $\left(-2\hat{i}+5\hat{j}\right)$ to $\left(4\hat{j}+3\hat{k}\right)$ when a force of $\left(4\hat{i}+3\hat{j}\right)$ N is force?

A. 2 j

B. 8 j

C. 11 j

D. 5 j

Answer: D

Watch Video Solution

58. A force $F=-K\left(y\hat{i}+x\hat{j}\right)$ (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 force F on the particle is

A. $-2Ka^2$

B. $2Ka^2$

C. $-Ka^2$

D. Ka^2

Answer: C

Watch Video Solution

59. The vector sum of two forces is perpendicular to their vector difference. In that case, the forces :

A. are not equal other in magnitude.

B. cannot be predicted.

C. are equal to each other.

D. are equal to each other is magnitude.

Answer: D

Watch Video Solution

60. Which of the following statement is true?

A. When the coordinate axes are translated the component of a vector in a plane changes.

B. When the coordinate axes are rotated through some angle components of the vector change but the

vector's magnitude remains constant.

C. Sum of $\vec{a}$ and $\vec{b}$ is $\vec{R}$. If the magnitude of $\vec{a}$ alone is increased, angle between $\vec{b}$ and $\vec{R}$ decreases.

D. The cross product of $3\hat{i}$ and $4\hat{j}$ is 12.

Answer: B

Watch Video Solution

61. If $\vec{a}$ and $\vec{b}$ are two vectors then the value of $\left(\vec{a}+\vec{b}\right)\times\left(\vec{a}-\vec{b}\right)$ is

A. $2\left(\vec{b}\times\vec{a}\right)$

B. $-2\left(\vec{b}\times\vec{a}\right)$

C. $\left(\vec{b}\times\vec{a}\right)$

D. $\vec{a} \times \vec{b}$

Answer: A

Watch Video Solution

62. The angle between the vector $\vec{A}$ and $\vec{B}$ is θ. Find the value of triple product $\vec{A} . \left(\vec{B} \times \vec{A}\right)$.

A. $A^2 B$

B. Zero

C. $A^2 B \sin\theta$

D. $A^2 B \cos\theta$

Answer: B

Watch Video Solution

63. The vector $\vec{A}, \vec{B}$ and $\vec{C}$ are such that $\left|\vec{A}\right| = \left|\vec{B}\right|, \left|\vec{C}\right| = \sqrt{2}\left|\vec{A}\right|$ and $\vec{A} + \vec{B} + \vec{C} = 0.$ The angles between $\vec{A}$ and $\vec{B}$, $\vec{B}$ and $\vec{C}$ respectively are

A. $45^\circ, 90^\circ$

B. $90^\circ, 135^\circ$

C. $90^\circ, 45^\circ$

D. $45^\circ, 135^\circ$

Answer: B

Watch Video Solution

64. The position of a particle is given by $\overrightarrow{r} = 3t\hat{i} - 4t^2\hat{j} + 5\hat{k}$. Then the magnitude of the velocity of the particle at t = 2 s is

A. $\sqrt{265}m/s$

B. $\sqrt{276}m/s$

C. $\sqrt{246}m/s$

D. $\sqrt{255}m/s$

Answer: A

Watch Video Solution

Evaluation Test

1. A force $\vec{F} = 4\hat{i} + 3\hat{j} - 2\hat{k}$ is passing through the origin.

Its moment about point (1,1,0) is

A. $-\hat{i} + \hat{j} + \hat{k}$

B. zero

C. $2\hat{i} + 3\hat{j}$

D. $2\hat{i} + 2\hat{j} - \hat{k}$

Answer: D

Watch Video Solution

2. Assertion: If $\vec{a} = \hat{i} + 2\hat{j} - 2\hat{k}$, $\vec{b} = 2\hat{i} + \hat{j} - \hat{k}$, *then* $\left|\vec{a}\right| \neq \left|\vec{b}\right|$.

Reason: Two unequal vectors can never have same magnitude.

A. Assertion is True, Reason is True, Reason is a correct explanation for Assertion.

B. Assertion is True, Reason is True, Reason is not a correct explanation for Assertion.

C. Assertion is True, Reason is False.

D. Assertion is False, Reason is True.

Answer: C

 Watch Video Solution

3. Two forces of magnitudes 3 N and 5 N act at the same point on an object. Which one of the following equations will satisfy the magnitude of the resultant force R in newtons?

A. $2 \leq R \leq 5$

B. $2 \leq R \leq 8$

C. $3 \leq R \leq 5$

D. $2 \leq R \leq 3$

Answer: B

Watch Video Solution

4. If $\vec{A}$ is a vector of magnitude 3 units due east. What is the magnitude and direction of a vector $-4\vec{A}$?

A. 3 units due east

B. 4 units due east

C. 12 units due east

D. 12 units due west

Answer: D

Watch Video Solution

5. A body constrained to move in Y direction, is subjected to a force given by $\vec{F} = \left(-2\hat{i} + 15\hat{j} + 6\hat{k} \right) N$. What is the work done by this force is moving the body through a distance of 1 m along Z axis?

A. 190 j

B. 60 j

C. 150 j

D. 20 j

Answer: B

View Text Solution

6. Choose the incorrect option.

The two vectors $\vec{P}$ and (Q) are drawn from a common point and $\vec{R} = (P) + (Q)$, then angle between (P) and (Q) is

A. 90° if $R^2 = P^2 + Q^2$

B. less than 90° if $R^2 > P^2 + Q^2$

C. greater than 90° if $R^2 < P^2 + Q^2$

D. greater than 90° if $R^2 > P^2 + Q^2$

Answer: D

Watch Video Solution

7. When vector $\hat{n} = a\hat{i} + b\hat{j}$ is perpendicular to $\left(2\hat{i} + \hat{j}\right)$, then a and b are

A. $\frac{1}{\sqrt{5}}, \frac{-2}{\sqrt{5}}$

B. $-2, 0$

C. 0,-2

D. $\frac{1}{\sqrt{2}}, -\frac{1}{\sqrt{2}}$

Answer: C

Watch Video Solution

8. A force of $-4F\widehat{K}$ acts O, the origin of the coordinate system. The torque about the point $(1, -1)$ is

A. $-4F\left(\hat{i}-\hat{j}\right)$

B. $4F\left(\hat{i}-\hat{j}\right)$

C. $-4F\left(\hat{i}+\hat{j}\right)$

D. $4F\left(\hat{i}+\hat{j}\right)$

Answer: D

Watch Video Solution

9. If $\hat{i}, \hat{j}$ and $\hat{k}$ are unit vectors along x,y and z-axis respectively, the angle θ between the vector $\hat{i}+\hat{j}+\hat{k}$ and vector $\hat{j}$ is given by

A. $\theta = \cos^{-1}\left(\frac{1}{\sqrt{3}}\right)$

B. $\theta = \sin^{-1}\left(\frac{1}{\sqrt{3}}\right)$

C. $\theta = \cos^{-1}\left(\frac{\sqrt{3}}{2}\right)$

D. $\theta = \sin^{-1}\left(\frac{\sqrt{3}}{2}\right)$

Answer: A

Watch Video Solution

10. $\vec{A}$ and $\vec{B}$ are the two vectors such that ratio their dot product to magnitude of their cross product is $\frac{1}{\sqrt{3}}$. Then the angle between $\vec{A}$ and $\vec{B}$ is

A. $\frac{\pi^c}{2}$

B. $\frac{\pi^c}{3}$

C. 0^c

D. $\frac{\pi^c}{6}$

Answer: B

Watch Video Solution

11. Two vectors $\vec{A}$ and $\vec{B}$ lie in 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. must be zero

C. lies in the same plane as $\vec{P}$ or $\vec{Q}$

D. lies in the plane different from any of the three vectors.

Answer: D

Watch Video Solution

12. A particle acted upon by constant forces $5\hat{i} + \hat{j} - 2\hat{k}$ and $2\hat{i} + \hat{j} - 2\hat{k}$ is displaced from the point

$2\hat{i}+2\hat{j}-4\hat{k}$ to point $6\hat{i}+4\hat{j}-2\hat{k}$. The total work done by the forces in SI unit is

A. $20\sqrt{2}$

B. 47

C. 24

D. 33

Answer: C

View Text Solution

13. The x and y components of vectors $\vec{A}$ are 4 m and 6 m respectively. The x and y components of vector $\left(\vec{A}+\vec{B}\right)$ are 12 m and 10 m respectively. Then what are the x and y component . of vector $\vec{B}$?

A. 8 m, 4m

B. 3 m,6m

C. 4 m, 8m

D. 4 m, 6m

Answer: A

Watch Video Solution

14. The angel subtended by the vector $A = 6\hat{i} + 3\hat{j} + 4\hat{k}$ with the y-axis is

A. $\sin^{-1}\left(\frac{3}{61}\right)$

B. $\sin^{-1}\left(\frac{3}{\sqrt{61}}\right)$

C. $\cos^{-1}\left(\frac{3}{\sqrt{61}}\right)$

D. $\cos^{-1}\left(\frac{4}{\sqrt{61}}\right)$

Answer: B

View Text Solution

15. A particle moves in the x-y plane under the action of a force $\vec{F}$ such that the components of its linear momentum $\vec{P}$ at any time t are $p_x = \cos t$ and $p_y = 3\sin t$. What is the magnitude of the vector $\vec{F}$?

A. $2\sqrt{2}$

B. 5

C. 3

D. 4

Answer: C

View Text Solution

16. Given $\vec{A} = 3\hat{i} + 2\hat{j}$ and $\vec{B} = \hat{i} + \hat{j}$. The component of vector $\vec{A}$ along vector $\vec{B}$ is

A. $\frac{1}{\sqrt{2}}$

B. $\frac{3}{\sqrt{2}}$

C. $\frac{5}{\sqrt{2}}$

D. $\frac{7}{\sqrt{2}}$

Answer: C

Watch Video Solution

17. A vector $\overrightarrow{A}$ is along the positive x-axis and its vector product with another vector $\overrightarrow{B}$ is zero, then vector $\overrightarrow{B}$ could be

A. $\hat{i}+\hat{j}$

B. $4\hat{i}$

C. $\hat{j}+\hat{k}$

D. $-7\hat{k}$

Answer: B

View Text Solution

18. What is the area of the triangle formed by sides $\overrightarrow{A}=2\hat{i}-3\hat{j}+4\hat{k}$ and $\overrightarrow{B}=\hat{i}-2\hat{k}$?

A. $\sqrt{13.5}\text{units}$

B. 13.5units

C. $\sqrt{109}\text{units}$

D. 5.22units

Answer: D

Watch Video Solution

19. The component of vector $\vec{A} = a_x\hat{i} + a_y\hat{j} + a_z\hat{k}$ along the direction of $\hat{j} - \hat{k}$ is

A. $a_x - a_y + a_z$

B. $a_z - a_y$

C. $\left(a_x - a_y\right)/\sqrt{2}$

D. $\frac{a_y - a_z}{\sqrt{2}}$

Answer: D

Watch Video Solution