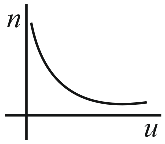
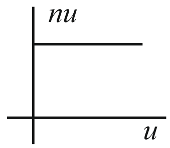
NEET UG (2024)
Physics
Quiz-17

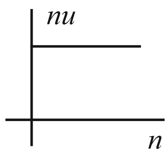
SECTION - A

1. Which of the following graph is correct:

n = magnitude of measurement & u = unit of measurement.

(1) 

(2) 

(3) 

(4) All of these

2. Choose the wrong statement:

(1) A dimensionally correct equation may be correct

(2) A dimensionally incorrect equation must be incorrect

(3) A dimensionally correct equation may be incorrect

(4) A dimensionally incorrect equation may be correct

3. Suppose refractive index μ is given as:

$$\mu = A + \frac{B}{\lambda^2}$$

Where A and B are constants and λ is the wavelength, then dimensions of B are same as that of:

(1) Wavelength (2) Volume

(3) Pressure (4) Area

4. $\alpha = \frac{F}{v^2}\sin(\beta t)$ (where v = velocity,

F = force, t = time)

Find the dimension of α and β respectively

(1) $M^1 L^{-1}T^0, M^1 L^{-1}T^0$

(2) $M^1L^1T^{-2}, M^1L^{-1}T^0$

(3) $M^{-1}L^{-1}T^{-2}, M^1L^1T^{-2}$

(4) $M^1L^{-1}T^0, M^0L^0T^{-1}$

5. Which of the following have unit but does not have dimension?

(1) Strain (2) Speed

(3) Angle (4) Height

6. Vander Waal's gas equation is

$\left(P + \frac{a}{V^2}\right)(V-b) = RT$. The dimensions of constant a as given above are

(1) ML^4T^{-2} (2) ML^5T^{-2}

(3) ML^3T^{-2} (4) ML^2T^{-2}

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

(1) $\hat{i}+\hat{j}+10\hat{k}$ (2) $\hat{i}+\hat{j}+5\hat{k}$

(3) $\hat{i}+\hat{j}$ (4) $2\hat{i}+4\hat{j}+6\hat{k}$

8. The angles which a vector $\hat{i}+\hat{j}+\sqrt{2}\hat{k}$ make with X, Y and Z axes respectively are

(1) 60°, 60° 60° (2) 45°, 45°, 45°

(3) 60°, 60°, 45° (4) 45°, 45°, 60°

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

(1) $\frac{\pi}{2}$ (2) $\frac{\pi}{3}$

(3) π (4) $\frac{\pi}{4}$

10. If a vector $\vec{P}$ making angles α, β and γ respectively with X, Y and Z axes respectively.

Then $\sin^2\alpha + \sin^2\beta + \sin^2\gamma =$

(1) 0 (2) 1

(3) 2 (4) 3

11. 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

(1) 90°

(2) 0°

(3) 60°

(4) 45°

12. The unit vector along $\hat{i}-2\hat{j}$ is :

(1) $\frac{\hat{i}-2\hat{j}}{\sqrt{5}}$ (2) $\hat{i}+\hat{j}$

(3) $\frac{\hat{i}+\hat{j}}{\sqrt{2}}$ (4) $\frac{\hat{i}-\hat{j}}{\sqrt{5}}$

13. If a unit vector is represented by $0.3\hat{i}-0.4\hat{j}+c\hat{k}$, then the value of '$c$' is :

(1) $\sqrt{0.75}$

(2) $\sqrt{0.25}$

(3) $\sqrt{0.01}$

(4) $\sqrt{0.39}$

14. Forces 7 N, 24 N, 25 N act at a point in mutually perpendicular directions. The magnitude of the resultant force is :

(1) 19 N (2) 13 N

(3) 26 N (4) $25\sqrt{2}\ N$

15. A physical quantity A is related to four observable a, b, c and d as follows, $A = \frac{a^2 b^3}{c\sqrt{d}}$, the percentage errors of measurement in a, b, c and d are 1%, 3%, 2% and 2% respectively. What is the percentage error in the quantity A

(1) 12% (2) 7%
(3) 5% (4) 14%

16. If $\vec{P} \cdot \vec{Q} = -PQ$, then angle between $\vec{P}$ and $\vec{Q}$ is :

(1) 0° (2) 180°
(3) 45° (4) 60°

17. A dimensionless quantity

(1) Never has a unit (2) Always has a unit
(3) May have a unit (4) Does not exist

18. A unitless quantity

(1) Does not exist
(2) Always has a nonzero dimension
(3) Never has a nonzero dimension
(4) May have a nonzero dimension

19. If $S = 1/3$ ft^3, f has the dimensions of (S = distance, t = time)

(1) $[M^0L^{-1}T^3]$ (2) $[M^1L^1T^{-3}]$
(3) $[M^0L^1T^{-3}]$ (4) $[M^0L^{-1}T^{-3}]$

20. For $e^{(at+3)}$, the dimensions of a is:

(1) $M^0L^0T^0$ (2) $M^0L^0T^1$
(3) $M^0L^0T^{-1}$ (4) None of these

21. The velocity u of particles is given in terms of time t by the equation $u = at + \frac{b}{t^2 + c}$.

The dimension of a, b and c are:

(1) L^2, T, LT^2 (2) LT^2, LT, L
(3) LT^{-2}, LT, T^2 (4) L, LT, T^2

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

(1) A^2B
(2) Zero
(3) $A^2B \sin\theta$
(4) $A^2B \cos\theta$

23. If two vectors $2\hat{i} + 3\hat{j} - \hat{k}$ and $-4\hat{i} - 6\hat{j} - \lambda\hat{k}$ are parallel to each other then value of λ be

(1) 0 (2) –2
(3) 3 (4) 4

24. If velocity v, acceleration A and force F are chosen as fundamental quantities, then the dimensional formula of angular momentum in terms of v, A and F would be

(1) $FA^{-1}v$ (2) Fv^3A^{-2}
(3) Fv^2A^{-1} (4) $F^2v^2A^{-1}$

25. In the following list, the only pair which have different dimensions, is

(1) Linear momentum and moment of a force
(2) Planck's constant and angular momentum
(3) Pressure and modulus of elasticity
(4) Torque and potential energy

26. In an clockwise system

(1) $\hat{j} \times \hat{k} = \hat{i}$ (2) $\hat{i}.\hat{i} = 0$
(3) $\hat{j} \times \hat{j} = 1$ (4) $\hat{k}.\hat{j} = 1$

27. The linear velocity of a rotating body is given by $\vec{v} = \vec{\omega} \times \vec{r}$, where $\vec{\omega}$ is the angular velocity and $\vec{r}$ is the radius vector. The angular velocity of a body is $\vec{\omega} = \hat{i} - 2\hat{j} + 2\hat{k}$ and the radius vector $\vec{r} = 4\hat{j} - 3\hat{k}$, then $|\vec{v}|$ is

(1) $\sqrt{29}$ units (2) $\sqrt{31}$ units
(3) $\sqrt{37}$ units (4) $\sqrt{41}$ units

28. 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

(1) $\vec{b}$ (2) $\vec{c}$
(3) $\vec{b}.\vec{c}$ (4) $\vec{b} \times \vec{c}$

29. The diagonals of a parallelogram are $2\hat{i}$ and $2\hat{j}$. What is the area of the parallelogram

(1) 0.5 units (2) 1 unit
(3) 2 units (4) 4 units

30. What is the unit vector perpendicular to the following vectors $2\hat{i} + 2\hat{j} - \hat{k}$ and $6\hat{i} - 3\hat{j} + 2\hat{k}$

(1) $\frac{\hat{i} + 10\hat{j} - 18\hat{k}}{5\sqrt{17}}$ (2) $\frac{\hat{i} - 10\hat{j} + 18\hat{k}}{5\sqrt{17}}$
(3) $\frac{\hat{i} - 10\hat{j} - 18\hat{k}}{5\sqrt{17}}$ (4) $\frac{\hat{i} + 10\hat{j} + 18\hat{k}}{5\sqrt{17}}$

31. cos 150°

(1) $\frac{1}{2}$ (2) $-\frac{1}{2}$
(3) $\frac{\sqrt{3}}{2}$ (4) $-\frac{\sqrt{3}}{2}$

32. If $\sin\theta = \cos\theta$, then the value of θ will be:

(1) 0° (2) 45°
(3) 30° (4) 90°

33. Given that, $\sin A = \frac{1}{2}$ and $\cos B = \frac{1}{\sqrt{2}}$ then value of $(A + B)$ will be:

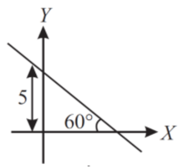
(1) 30° (2) 45°
(3) 75° (4) 15°

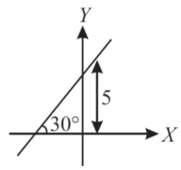
34. What is the value of linear velocity, if $\vec{\omega} = 3\hat{i} - 4\hat{j} + \hat{k}$ and $\vec{r} = 5\hat{i} - 6\hat{j} + 6\hat{k}$

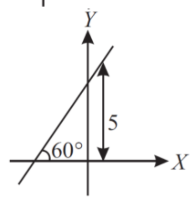
(1) $6\hat{i} - 2\hat{j} + 3\hat{k}$ (2) $6\hat{i} - 2\hat{j} + 8\hat{k}$

(3) $4\hat{i} - 13\hat{j} + 6\hat{k}$ (4) $-18\hat{i} - 13\hat{j} + 2\hat{k}$

35. Plot the graph of given equation, $Y = \sqrt{3}X + 5$

(1) 

(2) 

(3) 

(4) None of the above

SECTION - B

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

(1) –1 (2) $\frac{1}{2}$

(3) $-\frac{1}{2}$ (4) 1

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

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

(2) $A + B$

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

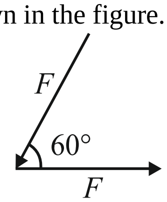
(4) $\left(A^2 + B^2 + AB\right)^{1/2}$

38. If the magnitudes of vectors $\vec{A}$, $\vec{B}$ and $\vec{C}$ are 12, 5, and 13 units respectively and $\vec{A} + \vec{B} = \vec{C}$, the angle between vectors *A* and *B* is:

(1) 0 (2) π

(3) $\frac{\pi}{2}$ (4) $\frac{\pi}{4}$

39. Two forces, each numerically equal to 5 *N*, are acting as shown in the figure. Then the resultant is



(1) 2.5 N (2) 5 N

(3) $5\sqrt{3}$ N (4) 10 N

40. Unit of power is

(1) *Kilowatt* (2) *Kilowatt-hour*

(3) *Dyne* (4) *Joule*

41. The dimensional formula for impulse is

(1) MLT^{-2} (2) MLT^{-1}

(3) ML^2T^{-1} (4) M^2LT^{-1}

42. The dimensional formula for Planck's constant (*h*) is

(1) $ML^{-2}T^{-3}$ (2) ML^2T^{-2}

(3) ML^2T^{-1} (4) $ML^{-2}T^{-2}$

43. The dimensional formula for Boltzmann's constant is

(1) $[ML^2T^{-2}\theta^{-1}]$ (2) $[ML^2T^{-2}]$

(3) $[ML^0T^{-2}\theta^{-1}]$ (4) $[ML^{-2}T^{-1}\theta^{-1}]$

44. Let $\vec{C} = \vec{A} + \vec{B}$ then

(1) $|\vec{C}|$ is always greater than $|\vec{A}|$

(2) It is possible to have $|\vec{C}| < |\vec{A}|$ and $|\vec{C}| < |\vec{B}|$

(3) *C* is always equal to *A* + *B*

(4) *C* is never equal to *A* + *B*

45. A force $\vec{F} = (5\hat{i} + 3\hat{j})$ Newton is applied over a particle which displaces it from its origin to the point $\vec{r} = (2\hat{i} - 1\hat{j})$ *metres*. The work done on the particle is

(1) – 7 *J* (2) +13 *J*

(3) +7 *J* (4) +11 *J*

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

(1) $\sqrt{2}$ (2) $\sqrt{3}$

(3) $\frac{1}{\sqrt{2}}$ (4) $\sqrt{5}$

47. The vectors from origin to the points *A* and *B* are $\vec{A} = 3\hat{i} - 6j + 2k$ and $\vec{B} = 2\hat{i} + \hat{j} - 2\hat{k}$ respectively. The area of the triangle *OAB* be

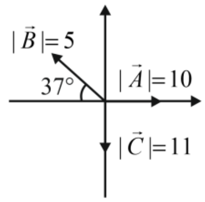
(1) $\frac{5}{2}\sqrt{17}$ sq. units

(2) $\frac{2}{5}\sqrt{17}$ sq. units

(3) $\frac{3}{5}\sqrt{17}$ sq. units

(4) $\frac{5}{3}\sqrt{17}$ sq. units

48. Find the resultant of following vectors



(1) 8 (2) 6
(3) 10 (4) 20

49. The frequency of vibration f of a mass m suspended from a spring of spring constant K is given by a relation of this type $f = C m^x K^y$; where C is a dimensionless quantity. The value of x and y are

(1) $x=\frac{1}{2}, y=\frac{1}{2}$ (2) $x=-\frac{1}{2}, y=-\frac{1}{2}$
(3) $x=\frac{1}{2}, y=-\frac{1}{2}$ (4) $x=-\frac{1}{2}, y=\frac{1}{2}$

50. The velocity of water waves v may depend upon their wavelength λ, the density of water ρ and the acceleration due to gravity g. The method of dimensions gives the relation between these quantities as

(1) $v^2 \propto g$ (2) $v^2 \propto g\lambda\rho$
(3) $v^2 \propto g\lambda$ (3) $v^2 \propto g^{-1}\lambda^{-3}$

Solution

1. **(4)**
Relation between unit and magnitude
(nu = constant).

2. **(4)**
A dimensionally incorrect equation may be correct.

3. **(4)**
λ = wavelength
$[\lambda] = L$

$$\mu = (A) + \left(\frac{B}{\lambda^2}\right) \Rightarrow \left[\frac{B}{\lambda^2}\right] = M^0L^0T^0$$

$$\boxed{[B] = M^0L^2T^0}$$

B = S.I. unit (m^2)

4. **(4)**

$$\alpha = \frac{F}{v^2}\sin(\beta t)$$

dimensionless   dimensionless

So $\alpha = \frac{[F]}{[v^2]} = \frac{[M^1L^1T^{-2}]}{[L^1T^{-1}]^2} = M^1L^{-1}T^0$

$$\beta = \frac{1}{[t]} = \frac{1}{[T]} = M^0L^0T^{-1}$$

5. **(3)**

$$\theta = \frac{l}{r} = \frac{[L]}{[L]} = [M^\circ L^\circ T^\circ]$$

and the S.I unit of angle is radian

6. **(2)**
$P \rightarrow$ Pressure
$V \rightarrow$ Volume
$T \rightarrow$ Temperature
$R \rightarrow$ const

$$P = \frac{a}{V^2} \Rightarrow ML^{-1}T^{-2} = \frac{a}{(L^3)^2}$$

$a = ML^{-1}T^{-2}L^6 = [M^1L^5T^{-2}]$

7. **(3)**
Displacement vector $\vec{r} = \Delta x\hat{i} + \Delta y\hat{j} + \Delta z\hat{k}$

$$= (3-2)\hat{i} + (4-3)\hat{j} + (5-5)\hat{k} = \hat{i} + \hat{j}$$

8. **(3)**
$\vec{R} = \hat{i} + \hat{j} + \sqrt{2}\hat{k}$
Comparing the given vector with
$R = R_x\hat{i} + R_y\hat{j} + R_z\hat{k}$
$R_x = 1, R_y = 1, R_z = \sqrt{2}$
and $|\vec{R}| = \sqrt{R_x^2 + R_y^2 + R_z^2} = 2$

$$\cos\alpha = \frac{R_x}{R} = \frac{1}{2} \Rightarrow \alpha = 60^\circ$$

$$\cos\beta = \frac{R_y}{R} = \frac{1}{2} \Rightarrow \beta = 60^\circ$$

$$\cos\gamma = \frac{R_z}{R} = \frac{1}{\sqrt{2}} \Rightarrow \gamma = 45^\circ$$

9. **(3)**
We know that $\vec{A} \times \vec{B} = -(\vec{B} \times \vec{A})$ because the angle between these two is always 90°.
But if the angle between $\vec{A}$ and $\vec{B}$ is 0 or π. Then $\vec{A} \times \vec{B} = \vec{B} \times \vec{A} = 0$.

10. **(3)**

$$\sin^2\alpha + \sin^2\beta + \sin\gamma$$

$$= 1 - \cos^2\alpha + 1 - \cos^2\beta + 1 - \cos^2\gamma$$

$$= 3 - (\cos^2\alpha + \cos^2\beta + \cos^2\gamma) = 3 - 1 = 2$$

11. **(1)**

$$\cos\theta = \frac{\vec{A}\cdot\vec{B}}{|A||B|} = \frac{(3\hat{i} + 4\hat{j} + 5\hat{k})(3\hat{i} + 4\hat{j} - 5\hat{k})}{\sqrt{9+16+25}\sqrt{9+16+25}}$$

$$= \frac{9+16-25}{50} = 0$$

$\Rightarrow \cos\theta = 0, \therefore \theta = 90^\circ$

12. **(1)**

13. **(1)**

14. **(4)**

15. **(4)**
Percentage error in A

$$= \left(2\times1 + 3\times3 + 1\times2 + \frac{1}{2}\times2\right)\% = 14\%$$

16. **(2)**

17. **(3)**

18. **(3)**

19. **(3)**

20. **(3)**

21. **(3)**
$[a] = [LT^{-2}]$
$[b] = [LT]$
$[c] = [T^2]$
$[u] = [LT^{-1}]$
$[a][T] = [LT^{-1}]$
$[a] = [LT^{-2}]$

22. **(2)**

23. **(2)**

Let $\vec{A} = 2\hat{i} + 3\hat{j} - \hat{k}$ and $\vec{B} = -4\hat{i} - 6\hat{j} - \lambda\hat{k}$

$\vec{A}$ and $\vec{B}$ are parallel to each other

$\frac{a_1}{b_1} = \frac{a_2}{b_2} = \frac{a_3}{b_3}$ *i.e.* $\frac{2}{-4} = \frac{3}{-6} = \frac{-1}{-\lambda} \Rightarrow \lambda = -2$.

24. **(2)**

$L \propto v^x A^y F^z \Rightarrow L = kv^x A^y F^z$

Putting the dimensions in the above relation

$[ML^2T^{-1}] = k[LT^{-1}]^x [LT^{-2}]^y [MLT^{-2}]^z$

$\Rightarrow [ML^2T^{-1}] = k[M^z L^{x+y+z} T^{-x-2y-2z}]$

Comparing the powers of M, L and T

$z = 1$ …(i)

$x + y + z = 2$ …(ii)

$-x - 2y - 2z = -1$ …(iii)

On solving (i), (ii) and (iii) $x = 3, y = -2, z = 1$

So dimension of L in terms of v, A and f

$[L] = [Fv^3 A^{-2}]$

25. **(1)**

Linear momentum = Mass $\times$ Velocity

= $[MLT^{-1}]$

Moment of a force = Force $\times$ Distance

= $[ML^2T^{-2}]$

26. **(1)**

27. **(1)**

$$\vec{v} = \vec{\omega} \times \vec{r} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 1 & -2 & 2 \\ 0 & 4 & -3 \end{vmatrix} = \hat{i}(6-8) - \hat{j}(-3) + 4\hat{k}$$

$-2\vec{i} + 3\vec{j} + 4\vec{k}$

$|\vec{v}| = \sqrt{(-2)^2 + (3)^2 + 4^2} = \sqrt{29}$ *unit*

28. **(4)**

$\vec{a}.\vec{b} = 0$ *i.e.* $\vec{a}$ and $\vec{b}$ will be perpendicular to each other

$\vec{a}.\vec{c} = 0$ *i.e.* $\vec{a}$ and $\vec{c}$ will be perpendicular to each other

$\vec{b} \times \vec{c}$ will be a vector perpendicular to both $\vec{b}$ and $\vec{c}$

So, $\vec{a}$ is parallel to $\vec{b} \times \vec{c}$

29. **(3)**

Area $= \frac{|2\hat{i} \times 2\hat{j}|}{2} = \frac{|4\hat{k}|}{2} = 2$ unit.

$\vec{}$ $\vec{B}$ $i - j + k$

$\vec{C} = \vec{A} \times \vec{B} = (2\hat{i} + 2\hat{j} - \hat{k}) \times (6\hat{i} - 3\hat{j} + 2\hat{k})$

$$= \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 2 & 2 & -1 \\ 6 & -3 & 2 \end{vmatrix} = \hat{i} - 10\hat{j} - 18\hat{k}$$

Unit vector perpendicular to both $\vec{A}$ and $\vec{B}$

$= \frac{\hat{i} - 10\hat{j} - 18\hat{k}}{\sqrt{1^2 + 10^2 + 18^2}} = \frac{\hat{i} - 10\hat{j} - 18\hat{k}}{5\sqrt{17}}$

31. **(4)**

32. **(2)**

33. **(3)**

34. **(4)**

$$\vec{v} = \vec{\omega} \times \vec{r} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 3 & -4 & 1 \\ 5 & -6 & 6 \end{vmatrix} = -18\hat{i} - 13\hat{j} + 2\hat{k}$$

35. **(3)**

36. **(2)**

37. **(4)**

$|\vec{A} \times \vec{B}| = \sqrt{3}\vec{A}.\vec{B}$

$AB \sin\theta = \sqrt{3} AB \cos\theta$

$\tan\theta = \sqrt{3}$

$\theta = 60°$, then

$R = (A^2 + B^2 + 2AB\cos 60°)^{1/2}$

$= (A^2 + B^2 + AB)^{1/2}$

38. **(3)**

$\vec{C} = \vec{A} + \vec{B}$

$|\vec{C}| = |\vec{A} + \vec{B}|$

$C^2 = A^2 + B^2 + 2AB\cos\theta$

$13^2 = 12^2 + 5^2 + 2 \times 12 \times 5 \cos\theta$

$169 = 144 + 25 + 120\cos\theta$

$\theta = \frac{\pi}{2}$

39. **(2)**

40. **(1)**

41. **(2)**

Impulse = Force $\times$ Time =

$[MLT^{-2}][T] = [MLT^{-1}]$

42. **(3)**

$E = h\nu \Rightarrow [ML^2T^{-2}] = [h][T^{-1}] \Rightarrow [h] = [ML^2T^{-1}]$

43. **(1)**

$k = \left[\frac{R}{N}\right] = [ML^2T^{-2}\theta^{-1}]$

44. **(2)**

45. **(3)**

$W = \vec{F}.\vec{r} = (5\hat{i} + 3\hat{j})(2\hat{i} - \hat{j}) = 10 - 3 = 7\,J$.

46. **(2)**

Let n_1 and n_2 are the two unit vectors, then the sum is

$\vec{n}_s = n_1 + n_2$ or $n_s^2 = n_1^2 + n_2^2 + 2n_1n_2\cos\theta$

Since it is given that n_s is also a unit vector, therefore

$1 = 1 + 1 + 2\cos\theta \Rightarrow \cos\theta = -\frac{1}{2} \therefore \theta = 120°$

Now the difference vector is

$n_d = n_1 - n_2$ or $n_d^2 = n_1^2 + n_2^2 - 2n_1n_2\cos\theta$

$= 1 + 1 - 2\cos 120°$

$\therefore\ n_d^2 = 2 - 2\left(-\frac{1}{2}\right) = 2 + 1 = 3$

$\Rightarrow\ n_d = \sqrt{3}$

47. **(1)**

Given $\overrightarrow{OA} = \vec{a} = 3\hat{i} - 6j + 2k$ and

$\overrightarrow{OB} = \vec{b} = 2\hat{i} + j - 2k$

$\therefore\ \left(\vec{a}\times\vec{b}\right) = \begin{vmatrix} \hat{i} & j & k \\ 3 & -6 & 2 \\ 2 & 1 & -2 \end{vmatrix}$

$= (12 - 2)\hat{i} + (4 + 6)j + (3 + 12)k$

$= 10\hat{i} + 10j + 15k \Rightarrow \left|\vec{a}\times\vec{b}\right| = \sqrt{10^2 + 10^2 + 15^2}$

$= \sqrt{425} = 5\sqrt{17}$

Area of $\Delta OAB = \frac{1}{2}\left|\vec{a}\times\vec{b}\right| = \frac{5\sqrt{17}}{2}$ sq. units

48. **(3)**

49. **(4)**

By putting the dimensions of each quantity both the sides we get $[T^{-1}] = [M]^x[MT^{-2}]^y$

Now, comparing the dimensions of quantities in both sides we get $x + y = 0$ and $2y = 1$ $\therefore$

$x = -\frac{1}{2},\ y = \frac{1}{2}$

50. **(3)**

Let $v = k\,g^y\lambda^z\rho^\delta$. Now by substituting the dimensions of each quantities and equating the powers of M, L and T we get $\delta = 0$ and $y = \frac{1}{2},\ z = \frac{1}{2}$.