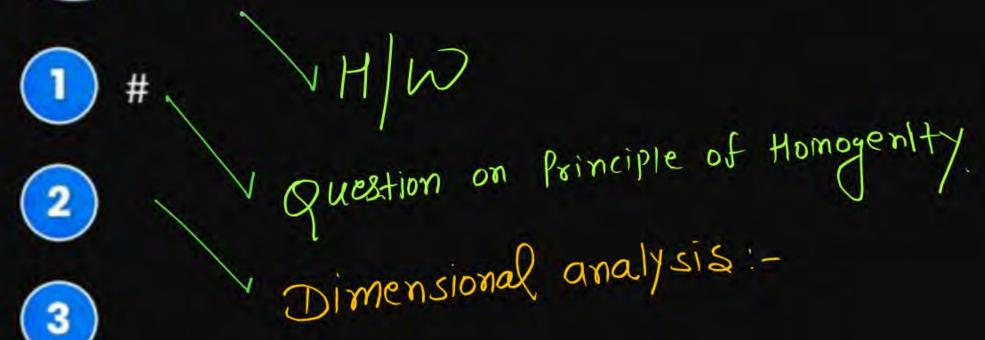




Topics to be covered







Vector Ka Maha-monthan

301M.

Sargha avent

160

Home work video solution seprete, II class Ke sath. Need Top-2001 (a) class ke sath. seprate. allsignmet -50-60 JEE Advan JEF Udvance A (selection

Aegnis Physically Must be A egn is physically Physically physically Physiculy workt. Correct rorrect wrong. Aegn is dmensionaly dimensionaly -> may or Dimensionally may not be dimensionally Must be correct. correct correct Not correct (wrong Correct

Angular relativy + frequency

La Dimensionally correct

but not Physically correct

Torque = work + Energy

林

W= u+at

Jim correct

S= u+a

Physicular correct

S= u+a

Aim wrong

I I I I=L

Physicular correct

> physicul

$$S = U + \frac{1}{2}Q$$

$$S = U + \frac{1}{2}Q$$

$$S = U + \frac{1}{2}a(1)^{2}$$

$$S = U + \frac{1}{2}[a(1)^{2}]$$

MR*

gf any equation is

given in chaptes

and we use to

solve question, hence

it is physically correct,

hence dim' must be

(urrect,

(A) all Physically correct must be dimensionally correct -> True

1 Dimensionally wrong may be Physically lossect -> fulse

Physically wrong, must be dimensionally correct -> folse

D) Physically wrong may be dimensionally correct - True

(Toque + work).



Assertion: Work = Torque is dimensionally correct but not physically.

Reason: Dimensional correctness of an equation ensures its physical correctness.

- If both Assertion & Reason are True & the Reason is a correct explanation of the Assertion.
- If both Assertion & Reason are True but Reason is not a correct explanation of the Assertion.
- If Assertion is True but the Reason is False.
- 4 If both Assertion & Reason are false.



The density of a material in CGS system of units is 4 g cm⁻³. In a system of units in which unit of length is 10 cm and unit of mass is 100 g, the value of density of material will be

[Mains 2011]

- 0.04
- 2 0.4
- 3 40
- 400

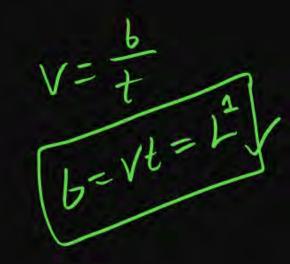


The velocity v of a particle at time t is given by $v = at + \frac{b}{t+c}$ where a, b and c are constants. The dimensions of a, b and c are (2006)

- 1 [L], [LT] and [LT-2] X
- 2 [LT-2], [L] and [T]
- $[L^2]$, [T] and $[LT^{-2}]$
- 4 [LT⁻²], [LT] and [L]

$$V = at + \frac{b}{t+c}$$

$$V = at = \frac{b}{t-c}$$





An equation is given here $\left(P + \frac{a}{v^2}\right) = b \frac{\theta}{V}$ where P = Pressure, V = Volume and $\theta = \text{Absolute temperature}$. If a and b are constants, the dimensions of a will be

- 1 [MT-5 T-1]
- 2 [MT⁵ T¹]
- 3 [MT⁵ T⁻²]
- 4 [M-1 L5 T2]

$$\left(P + \frac{a}{V^2}\right) = 6\frac{\Theta}{V}$$

$$P = \frac{a}{v^2} = \frac{bo}{\sqrt{a}}$$

$$P = \frac{60}{V}$$

$$b = \frac{PV}{Q_{K}} = \frac{mL^{2}T^{2}K^{2}}{ML^{2}}$$



The time dependence of a physical quantity p is given by $p = p_0 \exp(-at^2)$, where a is a constant and t is the time. The constant a (1993)

- 1 is dimensionless
- 2 has dimensions [T-2]
- 3 has dimensions [T²]
- 4 has dimensions of p

$$P = P_0 exp(-at^2)$$

 $P = P_0 e^{-at^2}$

$$- lemgle = L^{1}$$

$$4m-3m=1m$$

$$at^2 = 1$$

$$a = \frac{1}{t^2} = \frac{1}{t^2}$$



Assertion: The unit vectors \hat{i} , \hat{j} and \hat{k} have units of distance and dimensions $[M^0 L^1 T^0]$

Reason: The product of a scalar and a vector is a new scalar.

- If both Assertion & Reason are True & the Reason is a correct explanation of the Assertion.
- If both Assertion & Reason are True but Reason is not a correct explanation of the Assertion.
- If Assertion is True but the Reason is False.
- If both Assertion & Reason are false.



Assertion: Force is not added with pressure.

Reason: Quantities having different dimension are not added or subtracted.

- If both Assertion & Reason are True & the Reason is a correct explanation of the Assertion.
- If both Assertion & Reason are True but Reason is not a correct explanation of the Assertion.
- If Assertion is True but the Reason is False.
- 4 If both Assertion & Reason are false.



Y = A sin ($\omega t - kx + \phi$), find dimension of A, ω , k and ϕ where y and x is position.

$$y = A \sin(\omega t - \kappa x + \phi)$$

$$Y = A \times 1$$

$$A = Y = L^{1}$$
As

Angle
$$\Theta = \omega t - \kappa x + \phi$$
 $\theta = \omega t = \kappa n = \phi$
 $m^0 e^0 = 1 = \omega t = \kappa n = \phi$
 $\omega t = 1 = \kappa n = \phi$
 $\omega t = 1 = \kappa n = 1$
 $\omega t = 1 = \kappa n = 1$
 $\omega t = 1 = \kappa n = 1$



If velocity $v = \alpha t + \beta x - \gamma x t$, then find dimension of α , β and γ .

$$V = \forall t = \beta x = \beta x + 1$$

$$V = \forall t = \beta x = 1$$

$$V = \beta x$$



Velocity $V = \frac{\alpha}{\beta}e^{-\alpha t}$ then find dimension of α and β .

$$V = \frac{\alpha}{\beta}$$

$$V = \frac{\alpha}{\beta}$$

$$At = 1$$

$$A = \frac{1}{\sqrt{1 - 1}}$$

$$A = \frac{1}{\sqrt{1 - 1}}$$

$$A = \frac{1}{\sqrt{1 - 1}}$$





Momentum of object is given as $P = \propto t \left[1 - \beta e^{tx}\right]$ then, find dimension of α , β and γ . Where t is time x is position.



If $Y = A \sin \left[\frac{2\pi}{\lambda} (ct - x) \right]$. Find dimension of c.

$$y = A \sin \left[\frac{2\pi}{\pi}(ct-x)\right]$$

$$ct = x$$

$$c = \frac{x}{t} = LT' A$$

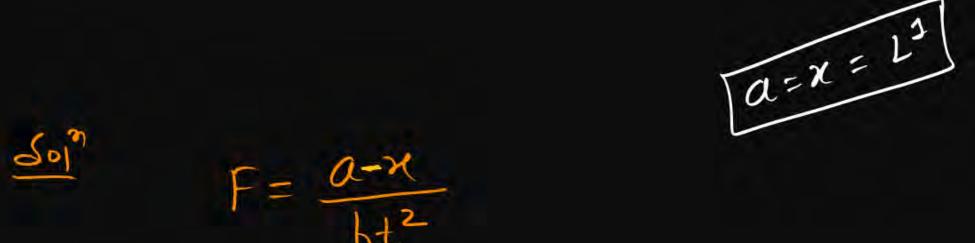
97 force
$$f = 2e^{\beta(x-8t)}$$

 $f = 2e^{\beta(x-8t)}$
 $f = 2e^{\beta(x-8t)}$

(a) 9f
$$\left(p+\frac{a}{v}\right)\cdot\left(\gamma-\frac{b}{p}\right)=\frac{at}{a}$$



Equation of force $F = \frac{a - x}{bt^2}$ then find dimension of a and b.



$$\sqrt{\frac{1}{4m-2m-2m}}$$

$$F = \frac{a = x}{b + 2}$$

$$F = \frac{x}{b + 2}$$

$$b = \frac{x}{FT^2} = \frac{L}{MLT^2T^2} = M^{-1}$$

Dimension of diffrential Term

Ly dimension of change in y is same as y

$$\Rightarrow \frac{dy}{dx} = \frac{x}{x} \left(\text{dimensionally} \right)$$

$$\frac{1}{\sqrt{2}} = \frac{y}{\sqrt{2}}$$

$$= \frac{1}{\sqrt{2}} = \frac{y}{\sqrt{2}}$$

$$= \frac{1}{\sqrt{2}} = \frac{y}{\sqrt{2}}$$

$$= \frac{1}{\sqrt{2}} = \frac{y}{\sqrt{2}}$$

$$= \frac{1}{\sqrt{2}} = \frac{y}{\sqrt{2}}$$

(a) 9f y is force and (x is time) then find dimension of $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$

Dimension of Integral term.

(you = you

(sind do = m°1°T°

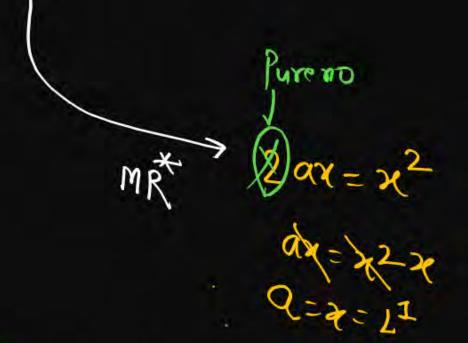
9f y= velocity and x is time then find dimension of Sydx =??

AB



$$\int \frac{dx}{\sqrt{2ax-x^2}} = b$$
; find dimension of *a* and *b* if *x* is distance.

$$\int \frac{dx}{\sqrt{2ax-x^2}} = b$$



$$\frac{2}{\sqrt{2ax}} = \frac{1}{\sqrt{2ax}}$$



Assertion: If x and y are the distances along x and y axes respectively then the

dimensions of $\frac{d^3y}{dx^3}$ is M⁰ L⁻² T⁰.

 $\frac{d^{3}y}{d^{3}} = \frac{y}{\chi^{3}} = \frac{1}{2} = \frac{1}{2} = \frac{1}{2}$

Reason: Dimensions of $\int_a^b y \, dx$ is $M^0L^2T^0$.

- If both Assertion & Reason are True & the Reason is a correct explanation of the Assertion.
- If both Assertion & Reason are True but Reason is not a correct explanation of the Assertion.
- If Assertion is True but the Reason is False.
- 4 If both Assertion & Reason are false.



Force acting on object is proportional to square of velocity then find dimension of proportional constant.

$$F = KV^{2}$$

$$F = KV^{2}$$

$$K = \frac{F}{V^{2}} = \frac{MLT^{2}}{L^{2}T^{2}} = ML^{-1}$$
Propotion Quantum Cost M

(a) Force acting on object is given as
$$F = 5 \text{ V then find}$$
(b) $5 = M^{\circ}L^{\circ} + {\circ} \text{ (dim les)}$

$$F = 5 \text{ V then find}$$

$$S = vd + \sqrt{2}nd^{2}$$

$$F = 5 V$$

$$S = \frac{mLT^{2}}{V}$$

$$= mT^{1}$$

$$A_{P}$$

Soin

Application of dimensional analysis: -

- 1) 9f Time Period of simple Pendulum depends on length of Pendulum I and are due to gravity of them derive relation of time in terms of 13g.
- 2) 9f we conside length (1) and acen (9) is taken as fundamental P.Q. then find dimension time interms of 189.
- 3) 9f in new system of unit unit of length is 10m & unit of accn is 5 m/s2 then dind unit of time.

soul three are
diffrent question
but all have same solution.

Application of dimensional analysis: -

9f Time Period of simple Pendulum depends on length of Pendulum I and are due to gravity of then derive relation of time in torms of Isg. Putr N1/ T = 2/2 g = 1/g T= 2×3× Talx Taly Time Ka Pows $M^{\circ}L^{\circ}T^{1} = L^{\times}(L\bar{T}^{2})^{\vee}$ m° 1° 7° = L LY T2Y 1=-2 M° 2° T¹ = L^{xty} T^{2y}

Jim's Same compair power of L

Jim's Same T=KUT 2-dimiles ソンタ



If maximum acceleration of oscillating particle is α and maximum velocity is β , then find time period [NEET 2013]

- $\frac{1}{2\pi} \frac{\alpha}{\beta}$
- 2 2παβ
- $3 \quad 2\pi \frac{\beta}{\alpha}$
- $\frac{2\pi\alpha^2}{\beta^2}$ $\frac{2\pi\alpha^2}{\beta^2}$ $\frac{2\pi\alpha^2}{\beta^2}$



If force (F), acceleration (a) and time t is used as a fundamental P.Q. then find dimension of length in terms of them:

- \int F⁰ a¹ T²
- 2 F a² T²
- F a² T⁰
- 4 F⁰ a T

Try Karo to this Nahito no Jay to this Nahito Kal is xa butti bna denge



If force, acceleration and time are basic fundamental P.Q. then find dimension of energy.

- 1 F² A⁻¹ T
- 2 FAT2
- 3 FAT-2
- 4 F A-1 T

Kal Iska batti Wo bna denge.



If energy E, velocity V and time T are taken as fundamental units, the dimensional formula for surface tension is

- 1 [E V-2 T-2]
- 2 [E⁻² V T⁻²]
- 3 [E-2 V T-2]
- (4) [E-2 V-2 T²]



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