YAKEEN NEET 2.0

2026

Units and Measurements

Physics | Lecture - 3

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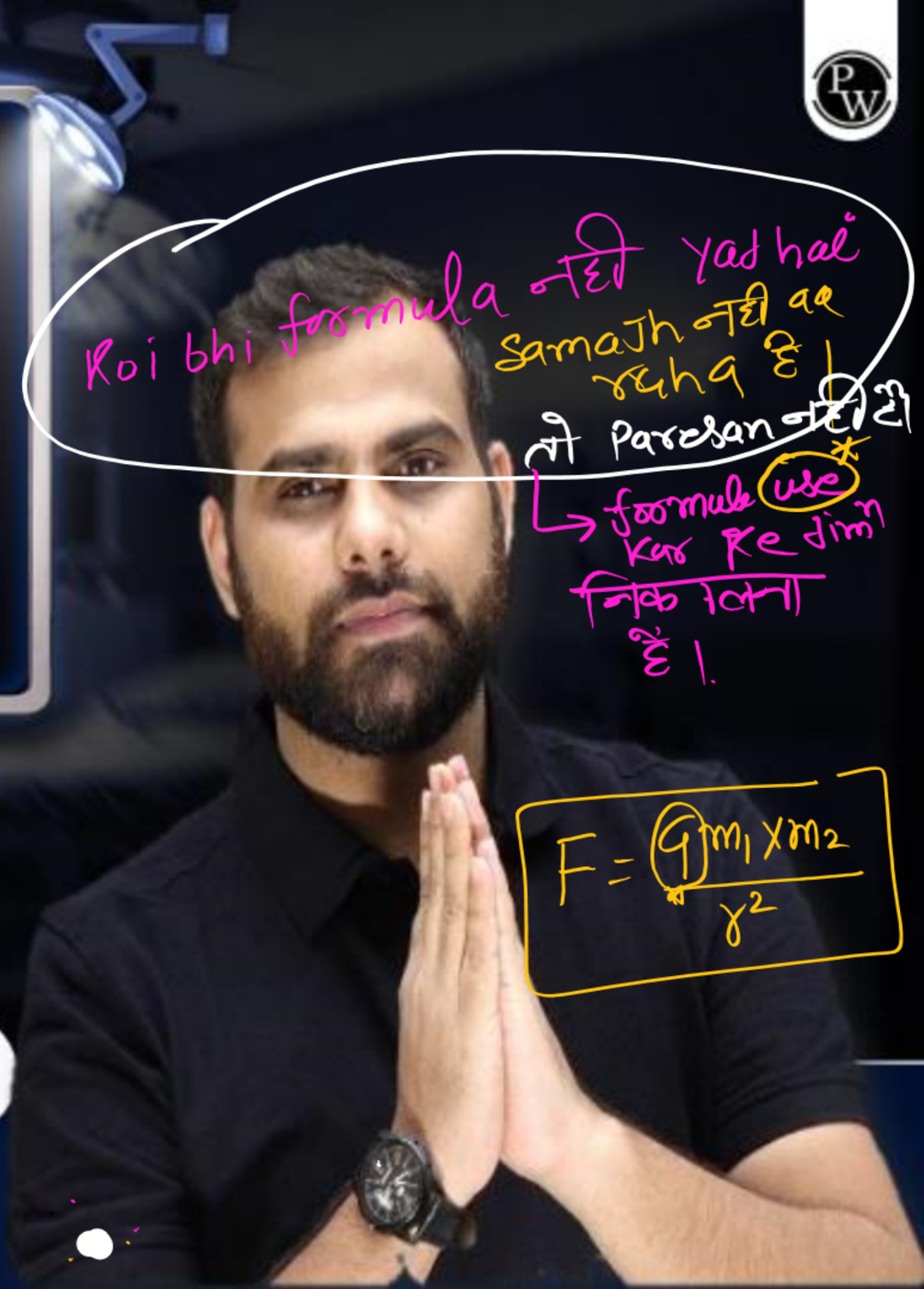


Topics to be covered

1. #
2.
3.
4.

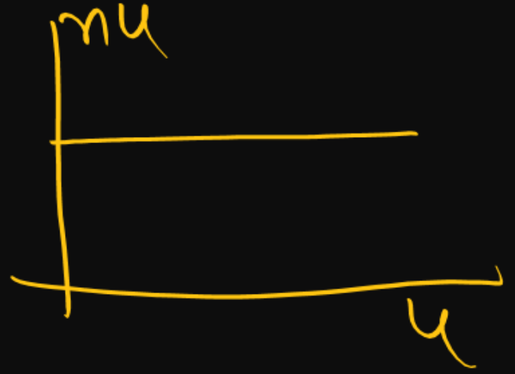
PhD on dimension ✓

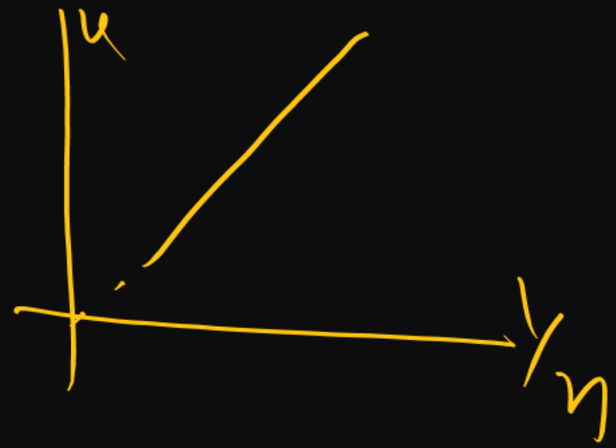
Recap of previous lecture

1
2
3
4

$nu = \text{constant}$

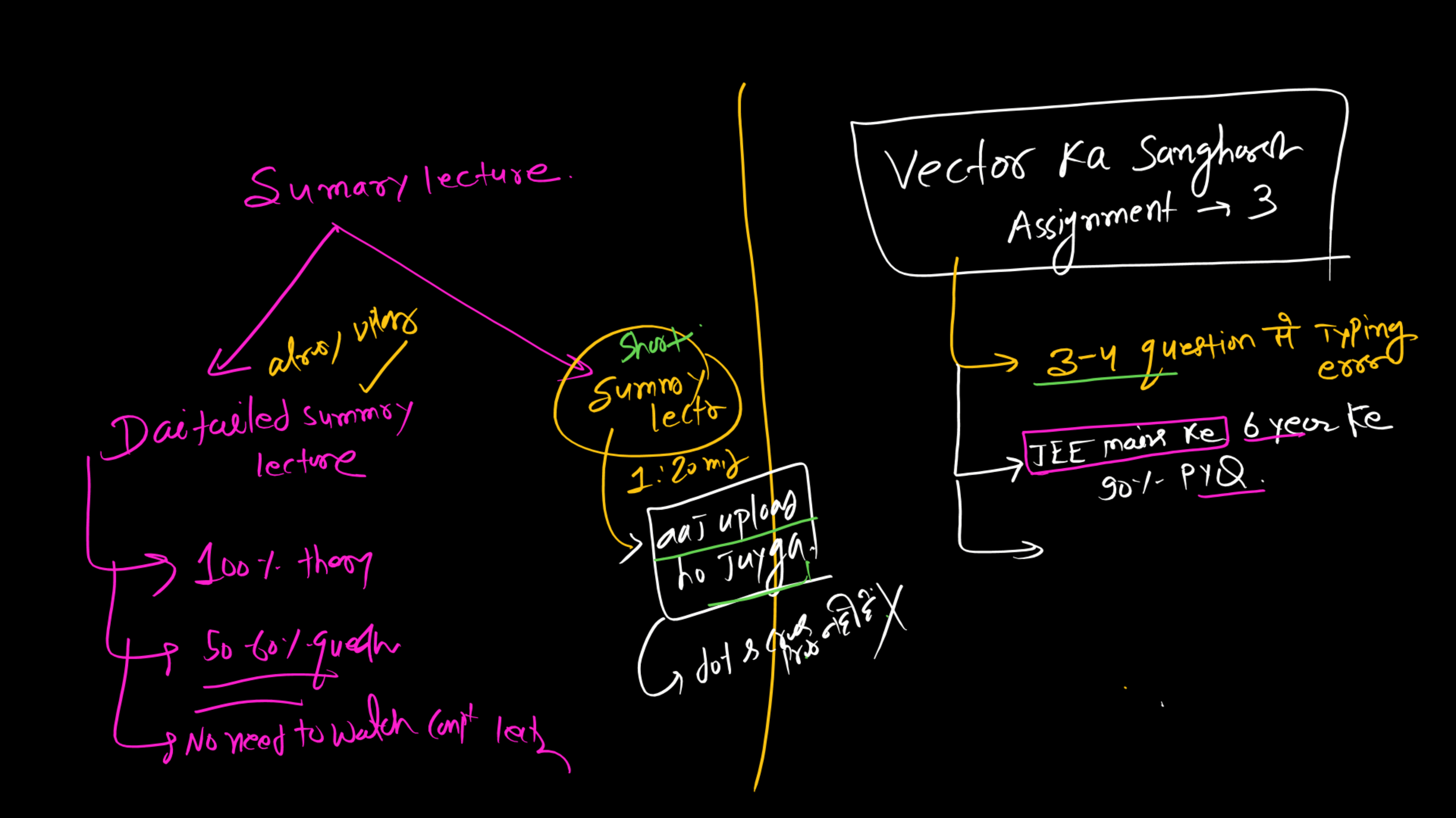
$n_1 u_1 = n_2 u_2$





(*) 5N → Force = $5\ kgm/s^2$

unit of force in new system = $\frac{kg^1 m^1}{s^{-2}}$


Summary lecture.
Detailed summary lecture
100% theory
50 to 60% questn
No need to watch Compl lect
Short Summary lecture
1:20 min
aaj upload ho jayga!
Vector Ka Sanghaarsh
Assignment → 3
3-4 question में Typing error
JEE mains ke 6 year ke
90% PYQ.

Dimension of Angular Term

Angular displacement/distⁿ $= \theta = M^0L^0T^0$ dimⁿ less.

Angular velocity $\omega = \frac{\theta}{T} = \frac{M^0L^0T^0}{T^1} = T^{-1}$ (same as frequency)

$f = \frac{1}{T}$ *

- Angular accⁿ $\alpha = \frac{\omega}{T} = \frac{T^{-1}}{T^1} = T^{-2}$
- Moment of Inertia. $I = MR^2$

$M.O.I = M^1L^2$

* Two different P.Q. can have same dimension → yes.

* If Two P.Q. have same dimension then that two P.Q. must be physically same → No

Torque $\vec{\tau} = r \times F = L(MLT^{-2})$

$= ML^2T^{-2}$ ← Same as work & energy.

Angular moment $\vec{L} = rp = L(MLT^{-1})$

$= ML^2T^{-1}$

(Angular impulse)

Dimension of gradiant Term :-

5N - 2N = 3N ✓

↳ change in any P.Q. w.r.t. distance / Length.

- Force gradiant ⟶ change in force w.r.t. length. $= \frac{\text{force}}{L}$

$$= \frac{MLT^{-2}}{L}$$

$$= MT^{-2}$$

energy gradiant $= \frac{E}{L} = \frac{ML^2T^{-2}}{L}$

$$= MLT^{-2}$$

- Gradient → Change per unit length
- Velocity gradient $= \frac{V}{L} = \frac{LT^{-1}}{L} = T^{-1}$ (same as frequency)
- (Temperature) gradient $= \frac{\text{Tempr}}{\text{Leng}} = \frac{K}{L} = K^{1}L^{-1}$
- Length gradient $= \frac{\text{Length}}{\text{Length}} = M^0L^0T^0$
- Time gradient $= \frac{T}{L} = T^1L^{-1}$

Dimension of density

linear mass density $\lambda = \frac{M}{L} = M^1 L^{-1} T^0$

Areal mass density $\sigma = \frac{m}{Area} = \frac{M}{L^2} = M L^{-2}$

density $= \frac{m}{Volum} = m L^{-3}$

(Volume mass density)

• linear charge density $= \frac{Q}{\ell} = \frac{IT}{\ell}$

• Volume charge density $= \frac{Q}{Volum} = \frac{IT}{L^3} = A^1 T^1 L^{-1}$

$= A^1 T^1 L^{-3}$

Amp

(Q) Can Current derived using charge & time??

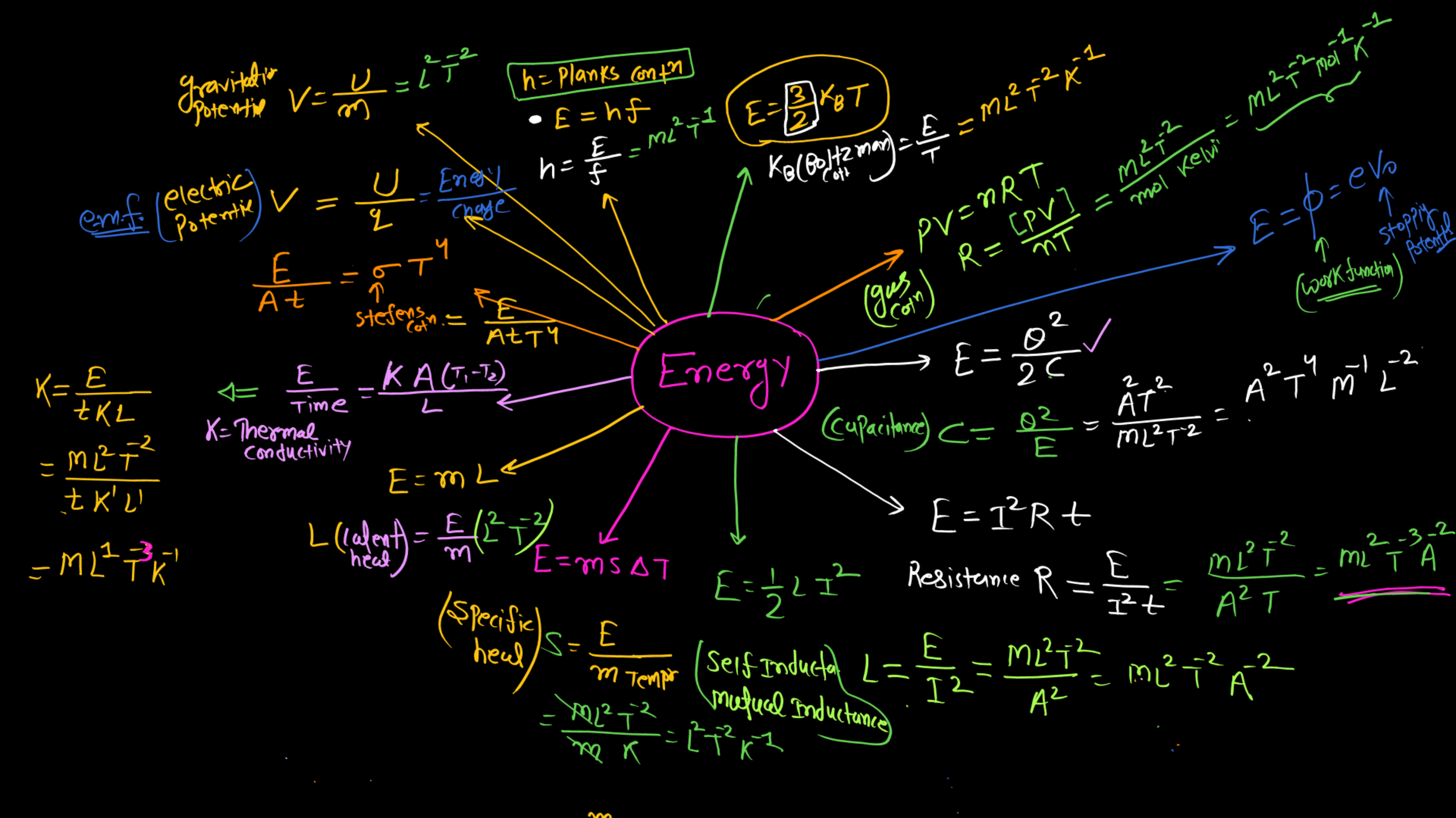
↳ NO

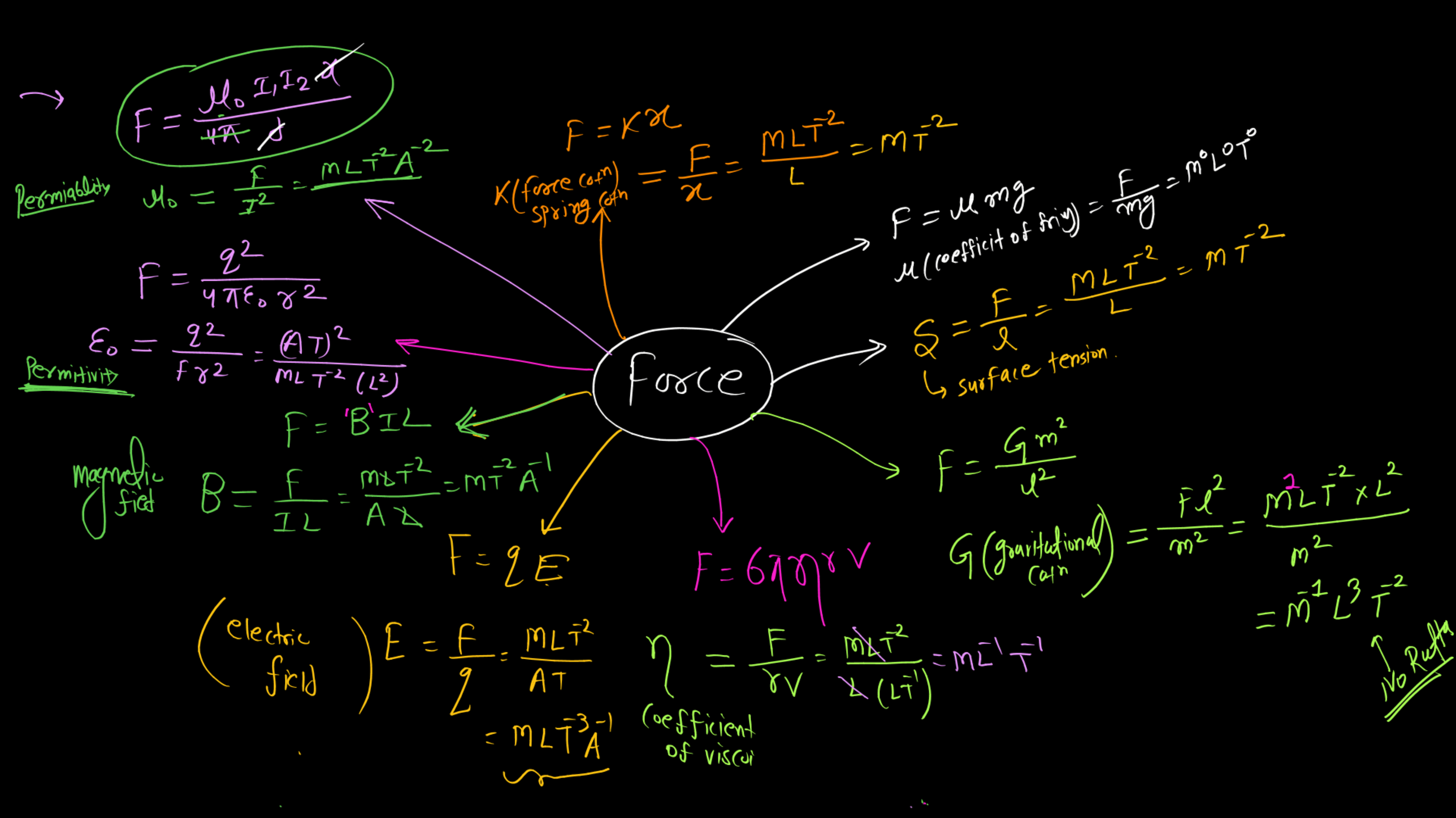
because current is fundament

$I = \frac{Q}{t}$

$Q = I \times T$

charge


Energy
gravitational Potential $V = \frac{U}{m} = L^2 T^{-2}$
emf (electric Potential) $V = \frac{U}{q} = \frac{\text{Energy}}{\text{charge}}$
h = Planks constn
• $E = hf$
$h = \frac{E}{f} = ML^2T^{-1}$
$E = \frac{3}{2} K_B T$
K_B (Boltzmann constn) $= \frac{E}{T} = ML^2T^{-2}K^{-1}$
$\frac{E}{At} = \sigma T^4$
Stefens constn $\sigma = \frac{E}{AtT^4}$
$PV = nRT$
$R = \frac{[PV]}{nT} = \frac{ML^2T^{-2}}{\text{mol Kelvin}} = ML^2T^{-2}\text{mol}^{-1}K^{-1}$
(gas constn)
$E = \phi = eV_0$
(work function)
Stopping Potential
$K = \frac{E}{tKL}$
$= \frac{ML^2T^{-2}}{tK'L'}$
$= ML^1T^{-3}K^{-1}$
$\Leftarrow \frac{E}{\text{Time}} = \frac{KA(T_1 - T_2)}{L}$
K = Thermal conductivity
$E = \frac{\theta^2}{2C}$ ✓
(Capacitance) $C = \frac{\theta^2}{E} = \frac{A^2T^2}{ML^2T^{-2}} = A^2T^4M^{-1}L^{-2}$
$E = mL$
L (latent heat) $= \frac{E}{m}(L^2T^{-2})$
$E = mS\Delta T$
$E = I^2Rt$
$E = \frac{1}{2}LI^2$
Resistance $R = \frac{E}{I^2t} = \frac{ML^2T^{-2}}{A^2T} = ML^2T^{-3}A^{-2}$
(Specific heat) $S = \frac{E}{m\,\text{Temp}}$
$= \frac{ML^2T^{-2}}{mK} = L^2T^{-2}K^{-1}$
(Self Inductance, mutual Inductance) $L = \frac{E}{I^2} = \frac{ML^2T^{-2}}{A^2} = ML^2T^{-2}A^{-2}$


Force
$F = \frac{\mu_0 I_1 I_2 \ell}{4\pi d}$
Permiability $\mu_0 = \frac{F}{I^2} = \frac{MLT^{-2}A^{-2}}{}$
$F = Kx$
K (force cotn / spring cotn) $= \frac{F}{x} = \frac{MLT^{-2}}{L} = MT^{-2}$
$F = \mu mg$
μ (coefficit of friy) $= \frac{F}{mg} = m^0L^0T^0$
$S = \frac{F}{\ell} = \frac{MLT^{-2}}{L} = MT^{-2}$
↳ surface tension.
$F = \frac{q^2}{4\pi\varepsilon_0 r^2}$
$\varepsilon_0 = \frac{q^2}{F r^2} = \frac{(AT)^2}{MLT^{-2}(L^2)}$
Permitivity
$F = 'B' IL$
magnetic field $B = \frac{F}{IL} = \frac{MLT^{-2}}{AL} = MT^{-2}A^{-1}$
$F = \frac{G m^2}{d^2}$
G (gravitational cotn) $= \frac{Fd^2}{m^2} = \frac{MLT^{-2} \times L^2}{m^2}$
$= M^{-1}L^3T^{-2}$
No Rufta
$F = qE$
$F = 6\pi\eta r v$
(electric field) $E = \frac{F}{q} = \frac{MLT^{-2}}{AT}$
$= MLT^{-3}A^{-1}$
$\eta = \frac{F}{rv} = \frac{MLT^{-2}}{L(LT^{-1})} = ML^{-1}T^{-1}$
η coefficient of viscu

Pressure x volume $(PV) = ML^{-1}T^{-2} \times L^3 = ML^2T^{-2}$

- Pressure (stress) $= \frac{f}{\text{Area}} = \frac{MLT^{-2}}{L^2}$

$= ML^{-1}T^{-2}$

- energy density $= \frac{E}{\text{Volume}} = \frac{ML^2T^{-2}}{L^3}$

energy density $= ML^{-1}T^{-2}$

- Stress $= Y$ Strain $\left(\frac{\Delta l}{l}\right)$

← Young modulus

$ML^{-1}T^{-2} = Y$ ← Young modulus / Bulk modulus / modulus of rigidity (Shear modulus)

- energy density $= \frac{1}{2}\varepsilon_0 E^2 = \frac{B^2}{2\mu_0}$

↑ IVD Ratio

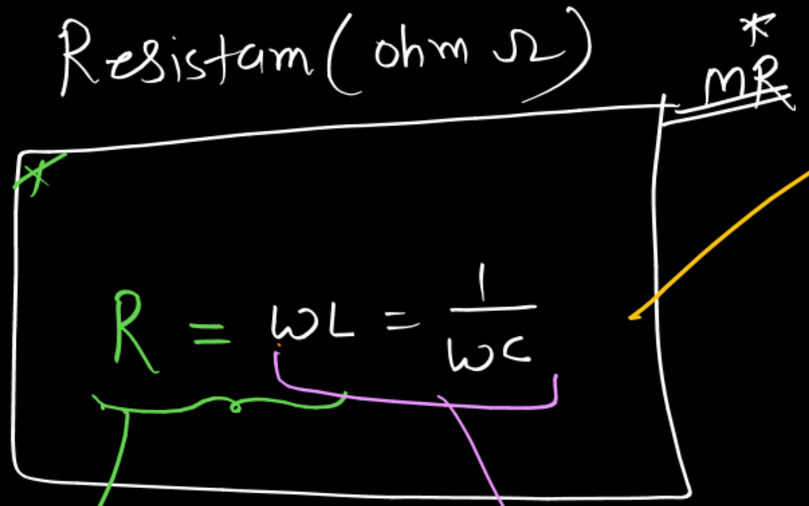
CHARGE

- **Electric Potential →** $V = \frac{E}{Q}$

- **Gravitational Potential →** $V = E/m$

$\mu = \frac{v_d}{E}$

Mobility



$R = \frac{1}{\omega C}$

$RC = \frac{1}{\omega}$

$T = RC$

$f = \frac{1}{RC}$

$R = \omega L$

$\omega = \frac{R}{L}$

$f = \frac{R}{L}$

$f = \frac{R}{L}$

$T = L/R$

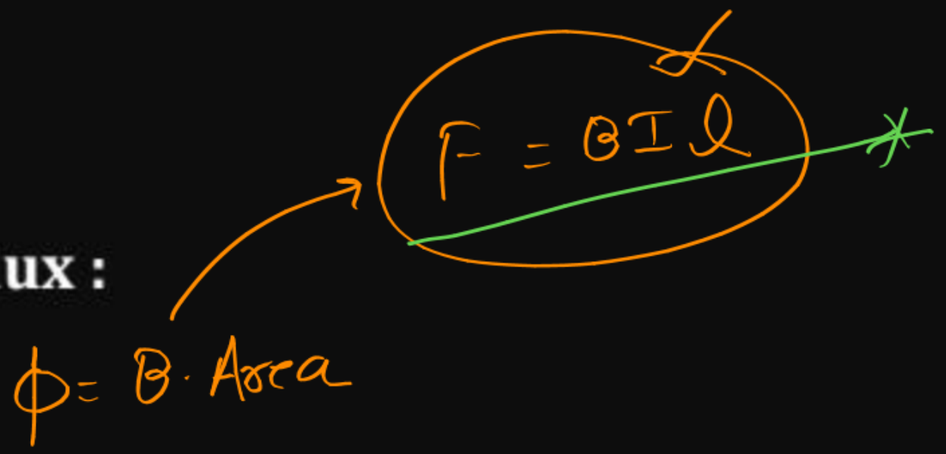
$\omega L = \frac{1}{\omega C}$

$\omega^2 = \frac{1}{LC}$

$f = \frac{1}{\sqrt{LC}}$

$T = \sqrt{LC}$

- **Magnetic Flux :**



- **Electric Flux :**

(*) Redberg Cotn

$$R = \frac{1}{\lambda} = L^{-1}$$

$$\frac{1}{\lambda} = R\left(\frac{1}{n_1^2} - \frac{1}{n_2^2}\right)$$

numbr have no dimn

$$R = \rho \frac{\ell}{A L}$$

ρ = R Lengn

↳ Resistiv

मिश्रलना आता है

(#) Solar Cotn

$$S = \frac{E}{At} = \frac{\text{energy per unit Area per unit time}}{}$$

$$S = \frac{ML^2T^{-2}}{L^2T^1} = MT^{-3}$$

Intensity $= \left(\frac{E}{At}\right)$ = Slar Cot

(*) Wind Cotn

$$\lambda = \frac{b}{T}$$

$$b = \lambda T = L^1 K^2$$

$L = \gamma P = L(MLT^{-1}) = ML^2T^{-1}$

$E = hf$

$h = \frac{E}{f} = \frac{ML^2T^{-2}}{T^{-1}} = ML^2T^{-1}$ ✱

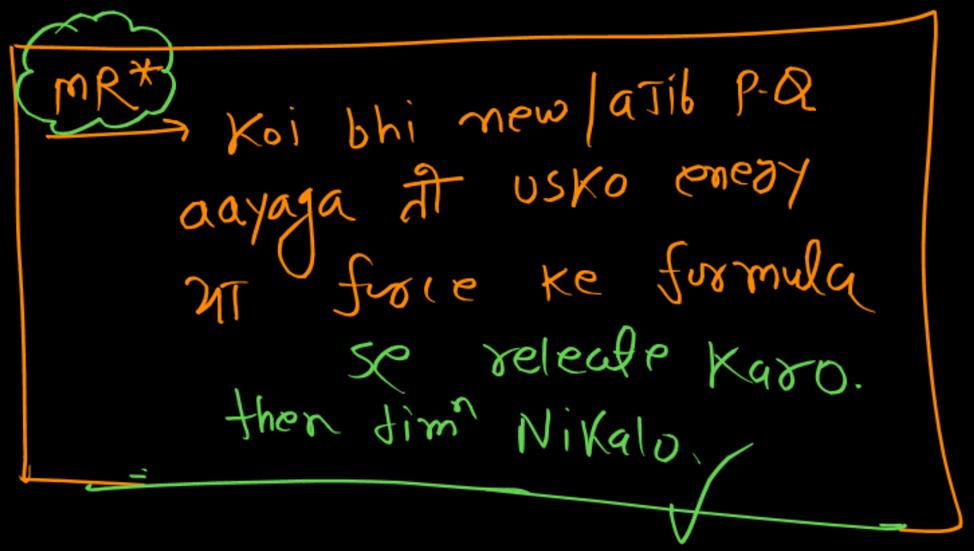
- Angular momentum and Plank's constant have same dimensional formula $[ML^2L^{-1}]$
- Electric field and potential gradient have same dimensional formula $[MLT^{-3}A^{-1}]$
- Surface tension, force gradient and spring constant have same dimensional formula $[ML^0T^{-2}]$
- Acceleration and gravitational field intensity have same dimensional formula $[M^0LT^{-2}]$

$I = F/m = a^{cc^n}$

JEE PYQ Ka garda uda दो।

Jinka time ho gaya hai
wo chale Jay.

H/W Kar ke solution दिखाना होगा।।


MR*
Koi bhi new/ajib P-Q aayaga to usko energy or force ke formula se relate karo. then dimn Nikalo.

Question

[JEE Main 2022]

The dimension of mutual inductance is:

1. $[ML^2 T^{-2} A^{-1}]$
2. $[ML^2 T^{-3} A^{-1}]$
3. $[ML^2 T^{-2} A^{-2}]$ ✓
4. $[ML^2 T^{-3} A^{-2}]$

$$E = \frac{1}{2} L I^2$$

$$L = \frac{E}{I^2} = \frac{ML^2 T^{-2}}{A^2} = ML^2 T^{-2} A^{-2}$$

Question

The SI unit of a physical quantity is pascal-second. The dimensional formula of this quantity will be

[JEE Main 2022]

1. $[ML^{-1}T^{-1}]$
2. $[ML^{-1}T^{-2}]$
3. $[ML^{2}T^{-1}]$
4. $[M^{-1}L^{3}T^{0}]$

Pressure × time

$(ML^{-1}T^{-2}) \times T^{1}$

$ML^{-1}T^{-2}$

Question

[JEE Main 2023]

Match List-I with List-II:

	List-I		List-II
A.	Planck's constant (h)	I.	$[M^1 L^2 T^{-2}]$
B.	Stopping potential (Vs)	II.	$[M^1 L^1 T^{-1}]$
C.	Work function (ϕ)	III.	$[M^1 L^2 T^{-1}]$
D.	Momentum (p)	IV.	$[M^1 L^2 T^{-3} A^{-1}]$

1. A-III, B-I, C-II, D-IV
2. A-III, B-IV, C-I, D-II
3. A-II, B-IV, C-III, D-I
4. A-I, B-III, C-IV, D-II

Question

Match List-I with List-II:

Choose the correct answer from the options given below: **[JEE Main 2023]**

1. A-IV, B-III, C-II, D-I
2. A-IV, B-III, C-I, D-II
3. A-III, B-IV, C-I, D-II
4. A-II, B-I, C-III, D-IV

List-I		List-II	
A.	Surface tension	I.	$Kg\ m^{-1}\ s^{-1}$
B.	Pressure $= \frac{f}{A} = \frac{kgm}{m^2 s^2} = kgm^{-1}s^{-2}$	II.	$Kg\ m^{+1} s^{-1}$
C.	Viscosity	III.	$Kg\ m^{-1}\ s^{-2}$
D.	Impulse (Momentum)	IV.	$Kg\ s^{-2}$

(A) $S = \frac{F}{\ell} = \frac{kgm/s^2}{m} = kgs^{-2}$

(B) $P = \frac{F}{A} = \frac{kgms^{-2}}{m^2} = kgm^{-1}s^{-2}$

(D) $P = mv = kgms^{-1}$

(C) $F = 6\pi\eta r v$

$\eta = \frac{F}{rv} = \frac{kgms^{-2}}{m\ ms^{-1}} = kgm^{-1}s^{-1}$

Question

Match List-I with List-II:

Choose the correct answer from the options given below: **[JEE Main 2023]**

	List-I		List-II
A.	Young's Modulus (Y)	I.	$[M\ L^{-1}\ T^{-1}]$
B.	Co-efficient of Viscosity (η)	II.	$[M\ L^{2}\ T^{-1}]$
C.	Planck's Constant (h)	III.	$[M\ L^{-1}\ T^{-2}]$
D.	Work Function (ϕ) = energy	IV.	$[M\ L^{2}\ T^{-2}]$

1. A-II, B-III, C-IV, D-I
2. A-III, B-I, C-II, D-IV
3. A-I, B-III, C-IV, D-II
4. A-I, B-II, C-III, D-IV

83%

Y = Pressure = $ML^{-1}T^{-2}$

Question

Match List-I with List-II:

Choose the correct answer from the options given below: [JEE Main 2023]

1. A-III, B-II, C-I, D-IV
2. A-II, B-III, C-IV, D-I
3. A-III, B-II, C-IV, D-I
4. A-II, B-III, C-I, D-IV

List-I (Quantity)		List-II (Dimensional Formula)	
A.	Pressure gradient	I.	$[M^0 L^2 T^{-2}]$
B.	Energy density	II.	$[M^{+1} L^{-1} T^{-2}]$
C.	Electric field	III.	$[M^1 L^{-2} T^{-2}]$
D.	Latent heat	IV.	$[M^1 L^1 T^{-3} A^{-1}]$

$= \frac{F}{A \times L}$

$= \frac{MLT^{-2}}{L^3}$

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

$F = qE$

$E = \frac{F}{q} = \frac{MLT^{-2}}{AT} = MLT^{-3}A^{-1}$

$Q = mL$

$L = \frac{E}{m} = \frac{ML^2T^{-2}}{M}$

मज़दूरी से दूरी MR^2

Bhot Jayda Jarur

Question

Match List-I with List-II:

Choose the correct answer from the options given below: **[JEE Main 2023]**

List-I		List-II	
A.	Angular momentum	I.	$[ML^2 T^{-2}]$
B.	Torque	II.	$[ML^{-2} T^{-2}]$
C.	Stress	III.	$[ML^2 T^{-1}]$
D.	Pressure gradient	IV.	$[ML^{-1} T^{-2}]$

1. A-I, B-IV, C-III, D-II
2. A-III, B-I, C-IV, D-II
3. A-II, B-III, C-IV, D-I
4. A-IV, B-II, C-I, D-III

Question

Match List-I with List-II:

Choose the correct answer from the options given below: **[JEE Main 2023]**

List-I		List-II	
A.	Torque	I.	Nms^{-1}
B. (iv)	Stress = F/Area = N/m^2	II.	$J\,kg^{-1}$
C.	Latent Heat	III.	Nm^{+1}
D. (i)	Power → $\frac{E}{t} = \frac{F \times dist}{t} = \frac{Nm}{sec}$	IV.	Nm^{-2}

$E = mL$

$L = \frac{E}{m} = J/kg$

1. A-III, B-II, C-I, D-IV
2. A-III, B-IV, C-II, D-I
3. A-IV, B-I, C-III, D-II
4. A-II, B-III, C-I, D-IV

(A) Torque = F × len

= Nm

(B) stress = F/Area = N/m^2

(C) $Q = mL$

$L = \frac{energy}{mass}$

H/W

$3kg + 4m = ??$

$4J + 3N = ??$

$4kg > 4sec$

$4g < 4se.$

$8m - 3s = ??$

$4m + 6J + 3s - 4kg$

THANK YOU