3 **JEE Main 2021 (Online) 31st August Morning Shift**

MCQ (Single Correct Answer)

Which of the following equations is dimensionally incorrect?

Where t = time, h = height, s = surface tension, θ = angle, ρ = density, a, r = radius, g = acceleration due to gravity, v = volume, p = pressure, W = work done, T = torque, $\in$ = permittivity, E = electric field, J = current density, L = length.

A $v = \frac{\pi p a^4}{8\eta L}$

B $h = \frac{2s\cos\theta}{\rho r g}$

C $J = \in \frac{\partial E}{\partial t}$

D $W = \Gamma\theta$

Explanation

(a) $\frac{\pi p a^4}{8\eta L} = \frac{dv}{dt}$ = Volumetric flow rate (Poiseuille's law)

(b) $h\rho g = \frac{2s}{r}\cos\theta$

(c) $\varepsilon \times \frac{1}{4\pi\varepsilon_0}\frac{a}{r^2} \times \frac{1}{\varepsilon} = \frac{q}{t} \times \frac{1}{r^2}$

$= \frac{1}{L^2} = IL^{-2}$

LHS

$T = \frac{I}{A} = IL^{-2}$

(d) W = $\tau\theta$

Option (a)