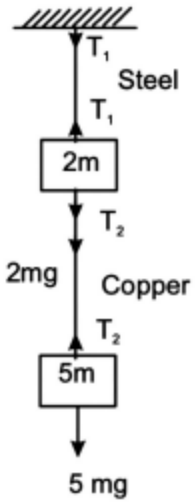
CHAPTER - 08

MECHANICAL PROPERTIES OF SOLIDS & FLUIDS

1. D

2. C $\text{ratio} \propto \left(\frac{A_2}{A_1}\right)^2 = \frac{16}{1}$

3. A



$$\frac{d_1}{d_2} = P$$

$$A = \frac{\pi}{4} d^2$$

$$\frac{A_1}{A_2} = \left(\frac{d_1}{d_2}\right)^2$$

$$\frac{L_1}{L_2} = q$$

$$\frac{Y_1}{Y_2} = S$$

$T_2 = mg$

$T_1 = 5\ mg + 2\ mg = 7\ mg$

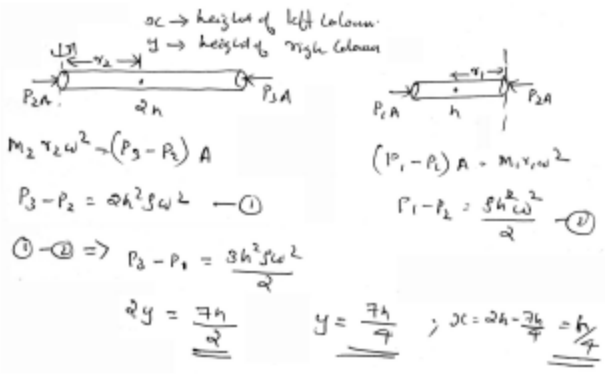
$$\frac{T_1}{T_2} = \frac{7}{5}$$

$$\frac{\Delta L_1}{\Delta L_2} = \left(\frac{F_1}{F_2}\right)\left(\frac{L_1}{L_2}\right)\left(\frac{A_2}{A_1}\right)\left(\frac{Y_2}{Y_1}\right)$$

$$= \frac{7}{5}q\left(\frac{1}{P^2}\right)\frac{1}{s} = \frac{7q}{5p^2s}$$

4. A
5. A
6. D
7. C
8. B
9. A
10. A
11. A
12. A
13. B
14. B
15. B
16. A
17. B
18. B
19. B
20. D
21. D
22. 0.5
23. 10
24. A
25. A
26. C

27. AB



$m_2 r_2 \omega^2 = (P_3 - P_2) A$

$(P_1 - P_2) A = m_1 r_1 \omega^2$

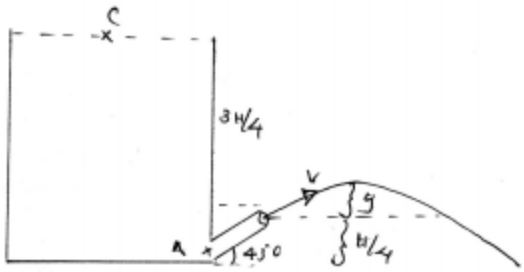
$P_3 - P_2 = 2h^2 \rho \omega^2$ —①

$P_1 - P_2 = \frac{\rho h^2 \omega^2}{2}$ —②

① − ② ⇒ $P_3 - P_1 = \frac{3h^2 \rho \omega^2}{2}$

$2y = \frac{7h}{2}$ $\quad y = \frac{7h}{4}$; $x = 2h - \frac{7h}{4} = \frac{h}{4}$

28. ABD



$\frac{du}{dt} = av$

$\frac{dm}{dt} = \rho av$

$F_{SL} = (V_{rel})_x (\rho av)$

$F_{SL} = \frac{\rho a v^2}{\sqrt{2}}$

$P_0 + \left(\frac{3H}{4} \rho g\right) = P_0 + \frac{1}{2} \rho v^2$

$v^2 = \frac{3Hg}{2}$

$F_{SL} = \frac{3\rho a g H}{2\sqrt{2}}$

At equilibrium.

$$F_{sc} = kx$$

$$x = \frac{3\rho_a g H}{2\sqrt{2}\, k}$$

$$v_A = v_B = v$$

$$P_A + \frac{1}{2}\rho v^2 = P_0 + \frac{H}{4}\rho g + \frac{1}{2}\rho v^2$$

$$P_A = P_0 + \frac{H}{4}\rho g$$

$$y = \frac{v^2 \sin^2 45^\circ}{2g} = \frac{3H}{8}$$

$$h_{max} = y + \frac{H}{4} = \frac{5H}{8}$$

29. ACD
30. ABC
31. AB
32. D
33. 120
34. 6