

ANSWERS

1.1. (a)	1.2. (a)	1.3. (d)	1.4. (c)	1.5. (c)	1.6. (b)	1.7. (d)	1.8. (b)	1.9. (*)	1.10. (a)
1.11. (d)	1.12. (b)	1.13. (a)	1.14. (c)	1.15. (b)	1.16. (a)	1.17. (b)	1.18. (c)	1.19. (b)	1.20. (d)
1.21. (c)	1.22. (b)	1.23. (d)	1.24. (b)	1.25. (d)					
2.1. (b)	2.2. (d)	2.3. (c)	2.4. (a)	2.5. (d)	2.6. (d)	2.7. (c)	2.8. (b)	2.9. (b)	2.10. (d)
2.11. (b)	2.12. (d)	2.13. (a)	2.14. (d)	2.15. (c)	2.16. (d)	2.17. (a)	2.18. (b)	2.19. (*)	2.20. (d)
2.21. (b)	2.22. (d)	2.23. (b)	2.24. (c)	2.25. (b)					

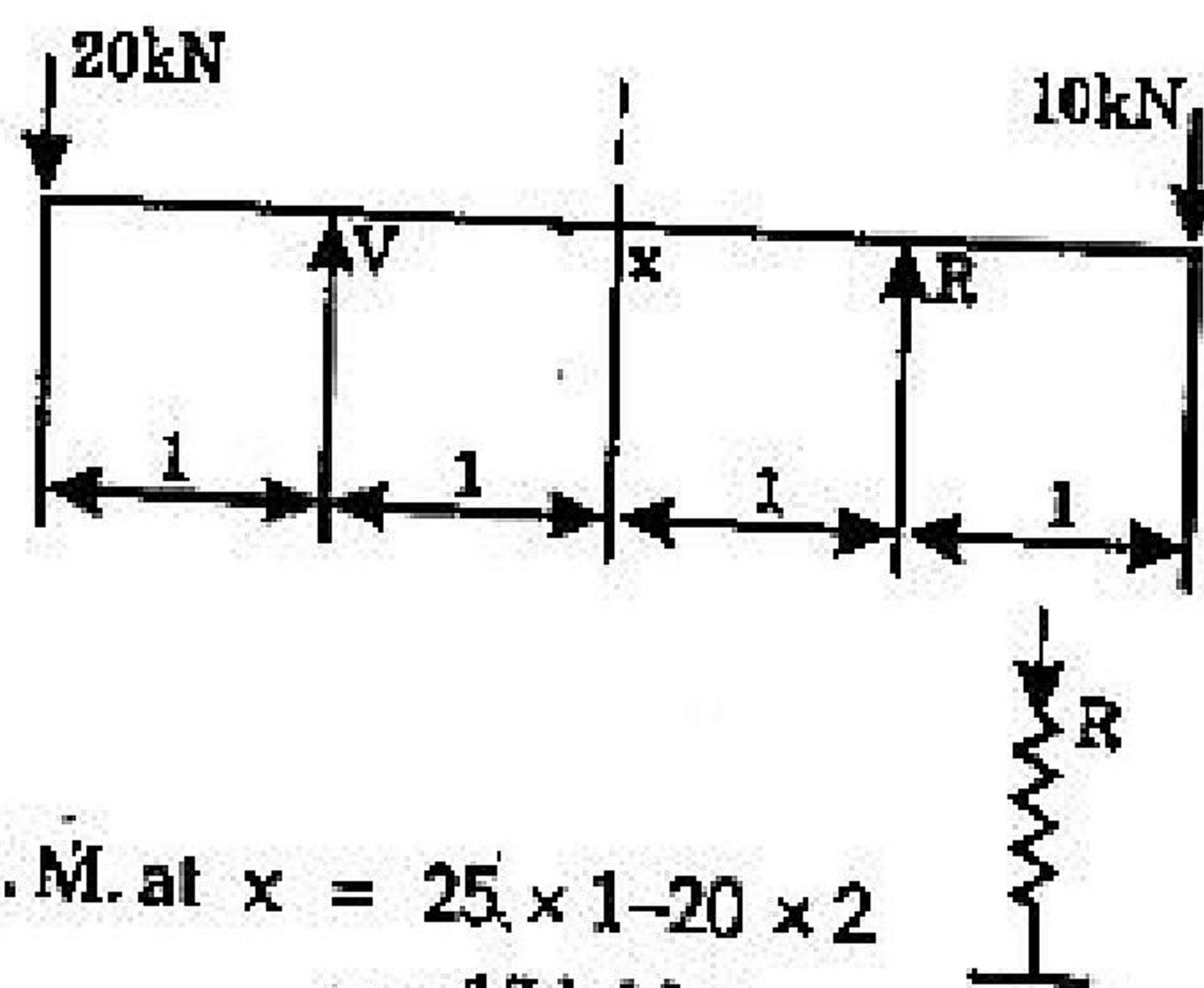
EXPLANATIONS

$$\begin{aligned}
 1.2 \quad I &= \int_0^{\pi/4} \cos^2 x \cdot dx = \int_0^{\pi/4} \frac{1 + \cos 2x}{2} dx \\
 &= \int_0^{\pi/4} \frac{dx}{2} + \int_0^{\pi/4} \frac{\cos 2x}{2} dx \\
 &= \frac{1}{2} [x]_0^{\pi/4} + \frac{1}{2} \left[\frac{\sin 2x}{2} \right]_0^{\pi/4} \\
 &= \frac{\pi}{8} + \frac{1}{4} \left[\sin \frac{\pi}{2} - \sin x \right] \\
 &= \frac{\pi}{8} + \frac{1}{4} \times \frac{\pi}{8} + \frac{1}{4}
 \end{aligned}$$

$$1.3 \quad \lim_{x \rightarrow \frac{\pi}{2}} f(x) = \lim_{x \rightarrow \frac{\pi}{2}} \sin x = 1.$$

$$\begin{aligned}
 1.4 \quad N_s &= 3L - R \\
 &= 3 \times 2 - 2 = 4 \\
 N_x &= 3J - e \\
 &= 3 \times 6 - (3 + 2 + 2) = 6
 \end{aligned}$$

$$\begin{aligned}
 1.5 \quad R + V &= 30 \\
 \text{Now } V \times 2 - 20 \times 3 + 10 \times 1 &= 0 \\
 \text{or } V &= \frac{60 - 10}{2} = 25 \text{ kN} \\
 \therefore R &= 5 \text{ kN}
 \end{aligned}$$

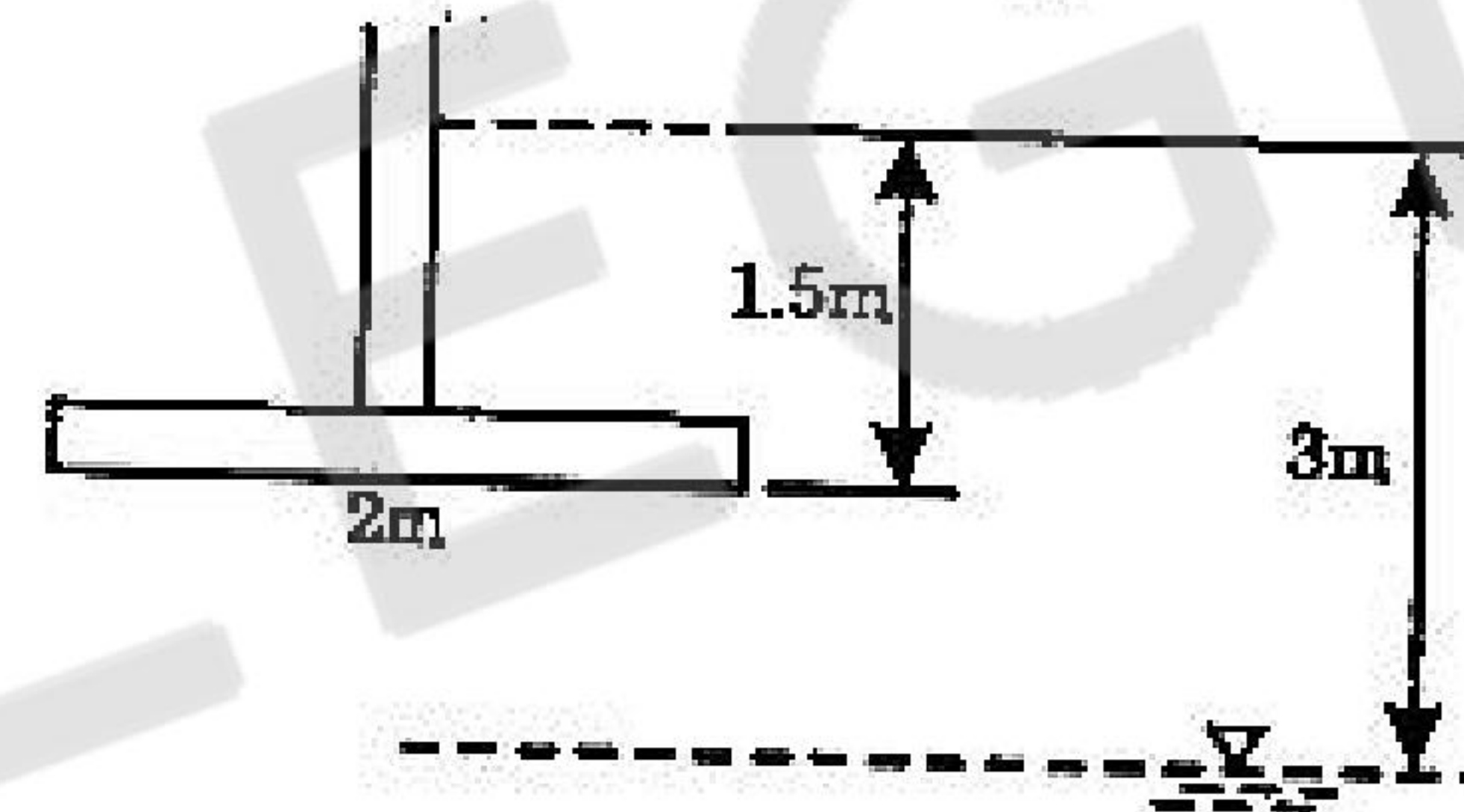


$$\begin{aligned}
 \text{B.M. at } x &= 25 \times 1 - 20 \times 2 \\
 &= -15 \text{ kNm}
 \end{aligned}$$

1.9. All options are false.

$$\begin{aligned}
 1.12. \quad q_u &= cN_c + \gamma D_f N_q + 0.5\gamma B N_q \\
 \text{For pure along evil,} \\
 \phi &= 0, \\
 N_c &= 5.7, \\
 N_q &= 1, N_v = 0 \\
 \therefore q_u &= cN_c + \gamma D_f \\
 q_{un} &= cN_c + \gamma D_f - \gamma D_f \\
 &= cN_c
 \end{aligned}$$

$$1.13. \quad W\gamma = 0.5 + 0.5 \frac{b}{B}$$



$$\begin{aligned}
 &= 0.5 + 0.5 \times \frac{1.5}{2} \\
 &= 0.875
 \end{aligned}$$

$$1.14. \quad \text{Given, } e = 0.65, \quad G = 2.72, \quad w = 20\%$$

$$\text{From } e = \frac{wG}{S},$$

$$\therefore S = \frac{wG}{e} = \frac{0.2 \times 2.72}{0.65} = 0.84 \text{ or } 84\%$$

$$\begin{aligned}
 2.1. \quad \begin{bmatrix} 5 & 3 & 2 \\ 1 & 2 & 6 \\ 3 & 5 & 10 \end{bmatrix} &= 5(20 - 30) - 3(10 - 18) + 2(5 - 6) \\
 &= -50 + 24 - 2 = -28
 \end{aligned}$$

$$2.2. \quad \frac{1}{S(S+2)} = \left[\frac{1}{S} - \frac{1}{S+2} \right] = \frac{1}{2} [1 - e^{-2x}]$$

$$2.3. \quad \frac{dy}{dx} = \frac{3x^2}{2} - 2x + C_1$$

Integrating, we get,

$$y = \frac{3x^3}{6} - \frac{2x^2}{2} + C_1 x + C_2$$

$$\therefore y(0) = 2 = 0 + 10 + C_2$$