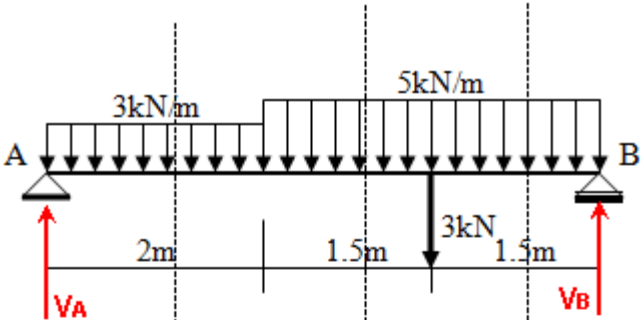
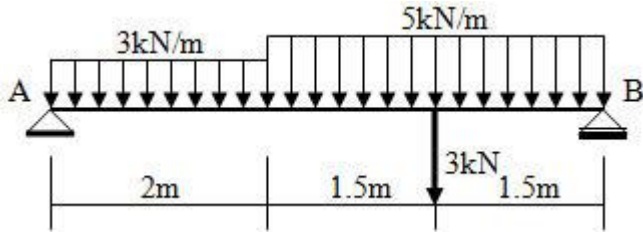
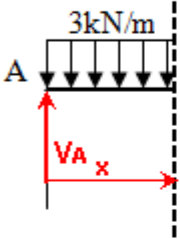


تصحيح اختبار الفصل الثاني للسنة الثالثة:

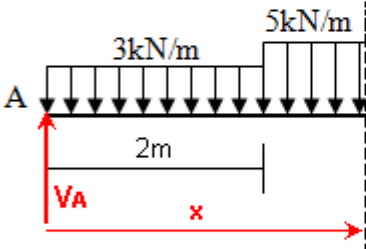
التعمين الاول



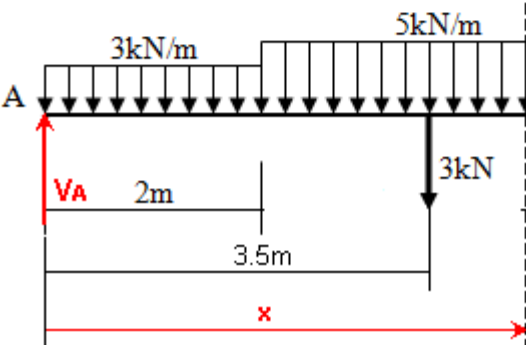
$$0 \leq x \leq 2$$



$$2 \leq x \leq 3,5$$



$$3,5 \leq x \leq 5$$



$$\sum M /_B = 0 \Rightarrow 5V_A - 3(2)(4) - 5(3)(1,5) - 3(1,5) = 0$$

$$\Rightarrow V_A = \frac{24 + 22,5 + 4,5}{5} = 10,2 \text{ kN}$$

$$\sum F /_y = 0 \Rightarrow V_A + V_B - 6 - 15 - 3 = 0$$

$$\Rightarrow V_B = 6 + 15 + 3 - 10,2 = 13,8 \text{ kN}$$

$$T(x) = V_A - 3x = -3x + 10,2$$

$$T(0) = 10,2 \text{ kN}; T(2) = 4,2 \text{ kN}$$

$$M(x) = V_A x - \frac{3}{2} x^2 = -1,5x^2 + 10,2x$$

$$M(0) = 0; M(2) = 14,4 \text{ kN.m}$$

$$T(x) = V_A - 3(2) - 5(x - 2) = 10,2 - 6 - 5x + 10$$

$$T(x) = -5x + 14,2$$

$$T(2) = 4,2 \text{ kN}; T(3,5) = -3,3 \text{ kN}$$

$$M(x) = V_A x - 3(2)(x - 1) - \frac{5}{2}(x - 2)^2$$

$$M(x) = 10,2x - 6x + 6 - 2,5(x^2 - 4x + 4)$$

$$M(x) = 10,2x - 6x + 6 - 2,5x^2 + 10x - 10$$

$$M(x) = -2,5x^2 + 14,2x - 4$$

$$M(2) = 14,4 \text{ kN.m}; M(3,5) = 15,08 \text{ kN.m}$$

$$T(x) = 0 \Rightarrow -5x + 14,2 = 0 \Rightarrow x = \frac{14,2}{5} = 2,84$$

$$M(2,84) = -2,5(2,84)^2 + 14,2(2,84) - 4 = 16,16 \text{ kN.m}$$

$$T(x) = V_A - 3(2) - 5(x - 2) - 3$$

$$T(x) = 10,2 - 6 - 5x + 10 - 3$$

$$T(x) = -5x + 11,2$$

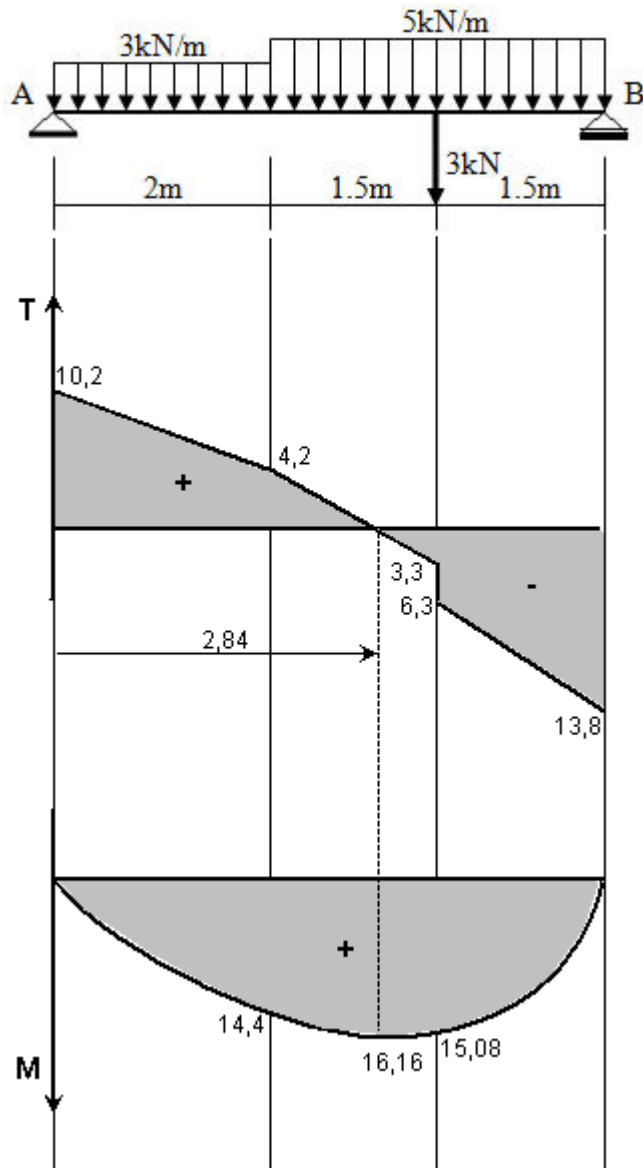
$$T(3,5) = -6,3 \text{ kN}; T(5) = -13,8 \text{ kN}$$

$$M(x) = V_A x - 3(2)(x - 1) - \frac{5}{2}(x - 2)^2 - 3(x - 3,5)$$

$$M(x) = 10,2x - 6x + 6 - 2,5x^2 + 10x - 10 - 3x + 10,5$$

$$M(x) = -2,5x^2 + 11,2x + 6,5$$

$$M(3,5) = 15,08 \text{ kN.m}; M(5) = 0$$

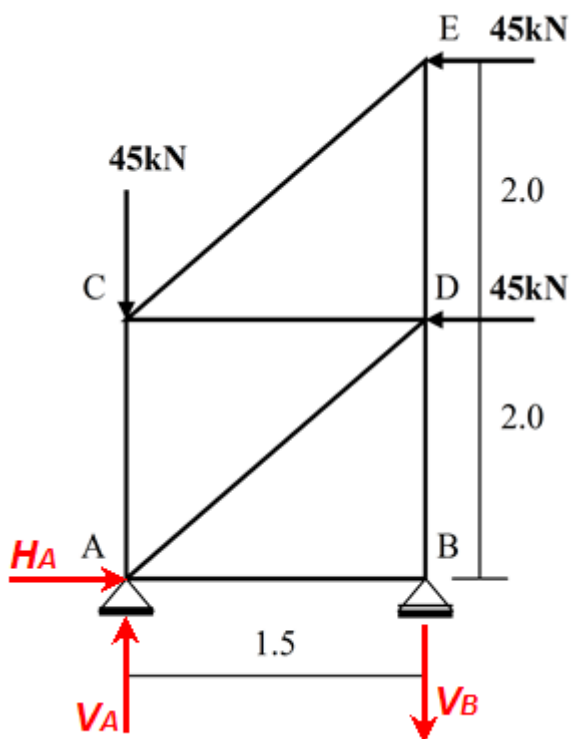


$$\sigma_{\max} = \frac{M_{\max}}{W_{xx}} \leq \bar{\sigma} \Rightarrow W_{xx} \geq \frac{M_{\max}}{\bar{\sigma}}$$

$$W_{xx} \geq \frac{161600}{755.49} \Rightarrow W_{xx} = 214,00 \text{ cm}^3$$

\Rightarrow IPN 200

التمرين الثاني:



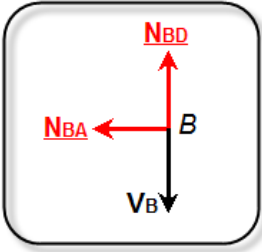
$$\sum M /_B = 0 \Rightarrow 1,5V_A - 1,5(45) - 4(45) - 2(45) = 0$$

$$V_A = \frac{7,5(45)}{1,5} = 225 \text{ kN}$$

$$\sum F /_x = 0 \Rightarrow H_A - 45 - 45 = 0 \Rightarrow H_A = 90 \text{ kN}$$

$$\sum F /_y = 0 \Rightarrow V_A - V_B - 45 = 0 \Rightarrow V_B = V_A - 45$$

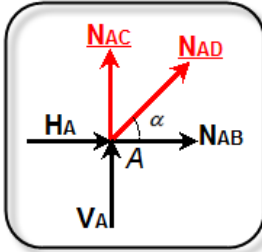
$$V_B = 225 - 45 = 180 \text{ kN}$$



$$\Sigma F /_x = 0 \Rightarrow N_{AB} = 0$$

$$\Sigma F /_y = 0 \Rightarrow N_{BD} - V_B = 0$$

$$N_{BD} = V_B = 180kN$$

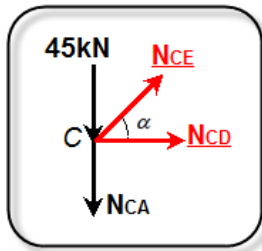


$$\Sigma F /_x = 0 \Rightarrow H_A + N_{AB} + N_{AD} \cos \alpha = 0$$

$$N_{AD} = -\frac{H_A + N_{AB}}{\cos \alpha} = -\frac{90+0}{0.6} = -150kN$$

$$\Sigma F /_y = 0 \Rightarrow N_{AC} + V_A + N_{AD} \sin \alpha = 0$$

$$N_{AC} = -V_A - N_{AD} \sin \alpha = -225 + 150(0,8) = -105kN$$

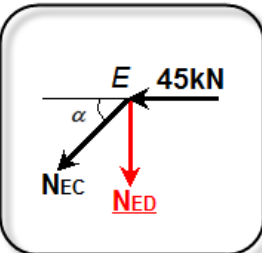


$$\Sigma F /_y = 0 \Rightarrow N_{CE} \sin \alpha - 45 - N_{AC} = 0$$

$$N_{CE} = \frac{45 + N_{AC}}{\sin \alpha} = \frac{45 - 105}{0,8} = -75kN$$

$$\Sigma F /_x = 0 \Rightarrow N_{CD} + N_{CE} \cos \alpha = 0$$

$$N_{CD} = -N_{CE} \cos \alpha = 75(0,6) = 45kN$$



$$\Sigma F /_y = 0 \Rightarrow -N_{ED} - N_{CE} \sin \alpha = 0$$

$$N_{ED} = -N_{CE} \sin \alpha = 75(0,8) = 60kN$$

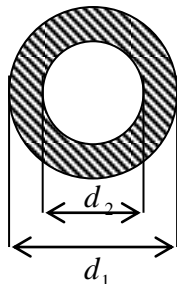
$$\sigma = \frac{N_{BD}}{S} \leq \bar{\sigma} \Rightarrow S \geq \frac{N_{BD}}{\bar{\sigma}}$$

$$S \geq \frac{18000}{1146,48} = 15,7cm^2$$

$$\frac{\pi}{4}(d_1^2 - d_2^2) = 15,7$$

$$(d_1^2 - d_2^2) = \frac{4(15,7)}{3,14} = 20$$

$$\left. \begin{cases} d_1^2 - d_2^2 = 20 \\ d_1 - d_2 = 2 \end{cases} \right\} \Rightarrow d_1 = 6cm : d_2 = 4cm$$



الطبيعة	الشدة	القضبان
تركبي	0	AB
ضغط	105	AC
ضغط	150	AD
شد	180	BD
شد	45	CD
ضغط	75	CE
شد	60	DE

التمرين الثالث :

الرقم	X(m)	Y(m)
A	57.00	76.00
B	52.00	99.00
C	81.00	98.00
D	80.00	77.00

$$S = \frac{1}{2} \sum [x_n (y_{n-1} - y_{n+1})]$$

$$S = \frac{1}{2} [x_A (y_D - y_B) + x_B (y_A - y_C) + x_C (y_B - y_D) + x_D (y_C - y_A)]$$

$$S = \frac{1}{2} [57(77 - 99) + 52(76 - 98) + 81(99 - 77) + 80(98 - 76)]$$

$$S = \frac{1}{2} [-57(22) - 52(22) + 81(22) + 80(22)]$$

$$S = \frac{1}{2} [22(-57 - 52 + 81 + 80)]$$

$$S = \frac{1}{2} (22)(52) = (11)(52) = 572m^2$$

التمرين الرابع:

