

Concordia University  
Faculty of Engineering and Computer Science  
ENGR 242/2 Statics Section V

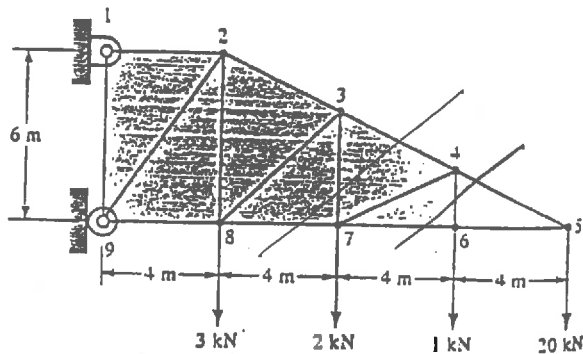
Test #3

Please, attempt all questions, only calculators permitted.

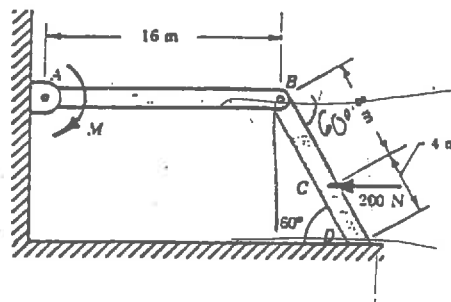
Time: 60 Minutes

Marks

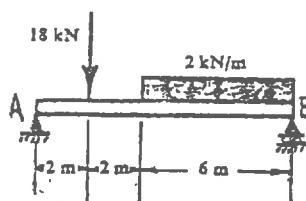
- 30      1) Determine the forces in the members 3-7 and 4-6 for the truss shown.



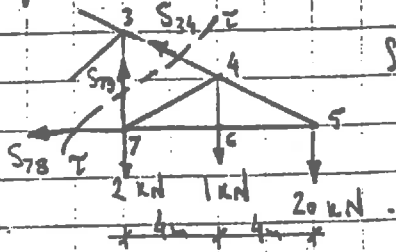
- 35      2) A horizontal 200-N force is applied to the sloping member BCD, whose bottom rests on a smooth horizontal plane. Its upper end is pinned at B to the horizontal member AB. What couple M must be applied to the member AB to hold the system in equilibrium? What is the magnitude of the pin reaction at B?



- 35      3) Draw the shear force and bending moment diagrams of the simply supported beam shown.

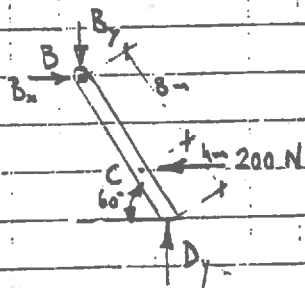


Q.1) Joint 6  $\rightarrow \sum F_y = 0 \Rightarrow S_{4-6} = 1 \text{ kN (T)}$



Section TC :  $(\sum M)_5 = 0 = S_{2-3} \times 8 - 1 \times 4 - 2 \times 8 \Rightarrow S_{2-3} = 2.5 \text{ kN}$

Q.2)



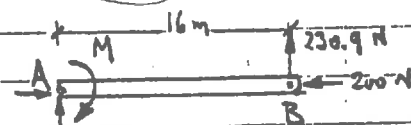
Member BCD :  $B_x = 200 \text{ N}$   $\sum F_y = 0 \Rightarrow D_y = B_y$

$\sum M_B = 0 = D_y \times 12 \cos 60^\circ - 200 \times 8 \sin 30^\circ \Rightarrow D_y = 230.9 \text{ N} = B_y$

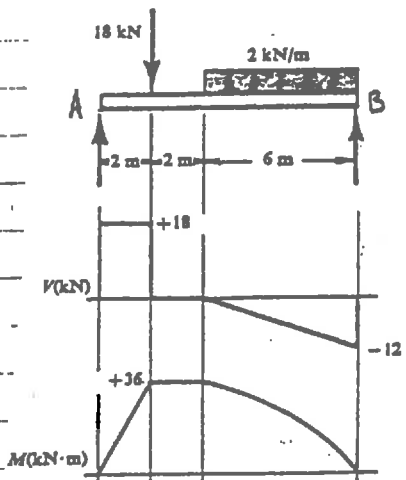
$B = \sqrt{B_x^2 + B_y^2} = 305.5 \text{ N}$

Member AB :  $\sum M_A = 0 = M - 230.9 \times 16$

$\therefore M = 3694.5 \text{ N}\cdot\text{m}$



Q.3)



$\sum M_B = 0 = A \times 10 - 18 \times 7 - 2 \times 6 \times 3 \Rightarrow A = 18 \text{ kN}$   
 $B = 12 \text{ kN}$

For  $4 \leq x < 10$  :  $M = 18x - 18(x-3) - \frac{2(x-4)^2}{2} = 36 - x^2 - 16 + 8x = 20 + 8x - x^2 \text{ (kN}\cdot\text{m)}$

3)  $\sum F_y = 0 = 18 - 18 - 2(x-4) - B_y$

$P_y = 2x + 8$

$\sum M_p = 0 = -18x + 18(x-2) + \frac{2(x-4)(x-4)}{2} + M$

$M = -18x + 18x - 36 + x^2 - 8x + 16 = -x^2 + 8x - 20$

PLEASE : LEARN FROM YOUR MISTAKES !