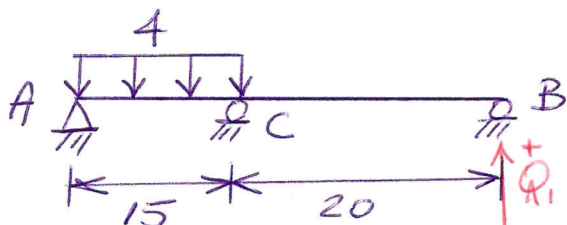


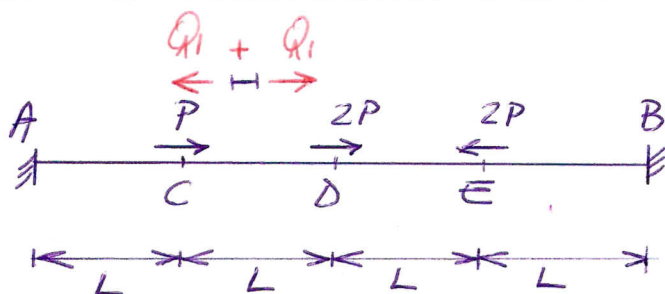
IGNORE ONLY SHEAR DEFORMATIONS AND INCLUDE ALL OTHERS



Problem 1 (25 Points)

Determine all the reactions for Beam AB. Use the reaction at B as the redundant with upward direction as positive. Any other choice of redundant will not count for any points.

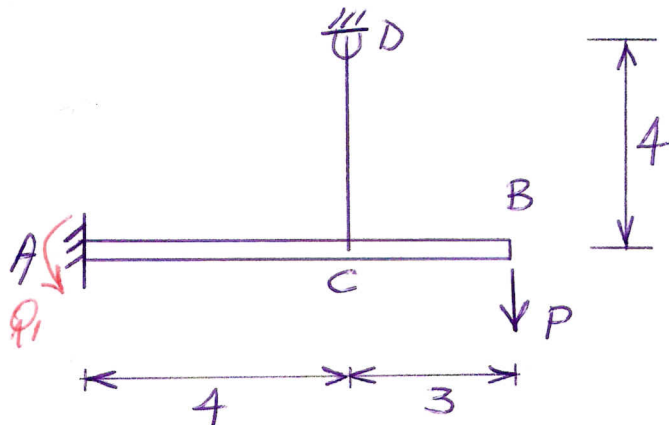
Properties are: E , A and I .



Problem 2 (25 Points)

Draw P-diagram of bar AB. Use the axial force in segment CD as the redundant with tension as positive. Any other choice of redundant will not count for any points.

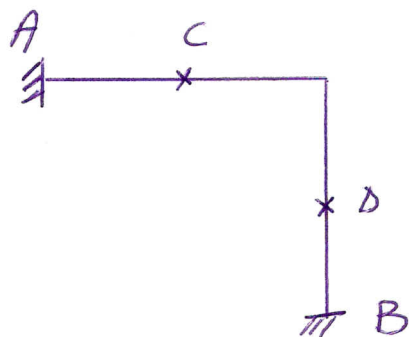
Properties are: E , A and I .



Problem 3 (25 Points)

Beam AB is connected to truss CD at C. Draw the M-diagram of AB. Use the moment at A as the redundant with counter clockwise direction as positive. Any other choice of redundant will not count for any points.

Properties are: $E = 1$, $A = \frac{1}{4}$ and $I = \frac{1}{3}$.

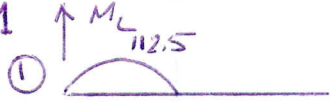


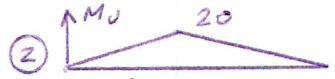
Problem 4 (25 Points: 5 for each case)

For each case draw the released structure. Points C and D are located at the \times mark.

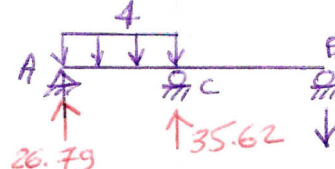
Case	Redundants		
1	M_A	M_B	M_C
2	A_X	A_Y	M_A
3	P_D	V_D	M_D
4	V_C	V_D	M_B
5	A_Y	B_X	M_C

1

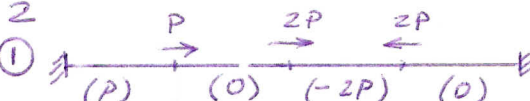
①  $\frac{R}{1} \frac{V}{2}$ $D_{QL1} = \frac{15}{3} (112.5 \times 20) \frac{1}{EI} = \frac{11250}{EI}$

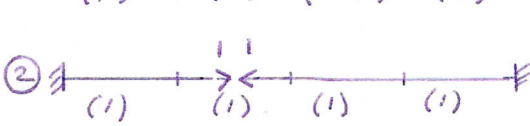
②  $\frac{R}{2} \frac{V}{2}$ $F_{11} = \frac{15}{6EI} (2 \times 20 \times 20) + \frac{20}{6EI} (2 \times 20 \times 20) = \frac{14000}{3EI}$

$0 = \frac{11250}{EI} + \frac{14000}{3EI} Q_1 \Rightarrow Q_1 = -2.41$

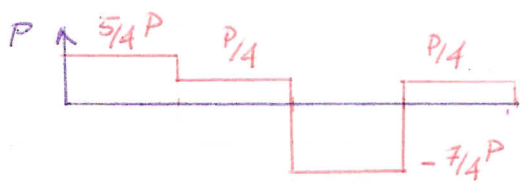
 $26.79 \uparrow$ $35.62 \uparrow$ $2.41 \downarrow$

2

①  $\frac{R}{1} \frac{V}{2}$ $D_{QL1} = \frac{(1)(P)}{EA} L + \frac{(1)(-2P)}{EA} L = -\frac{PL}{EA}$

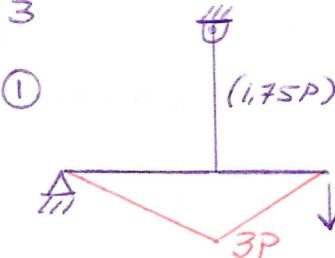
②  $\frac{R}{2} \frac{V}{2}$ $F_{11} = \frac{(1)(1)}{EA} 4L$

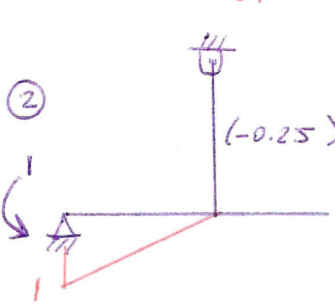
$0 = -\frac{PL}{EA} + \frac{4L}{EA} Q_1 \Rightarrow Q_1 = \frac{P}{4}$

 $P \uparrow$ $5P/4$ $P/4$ $P/4$ $-7P/4$

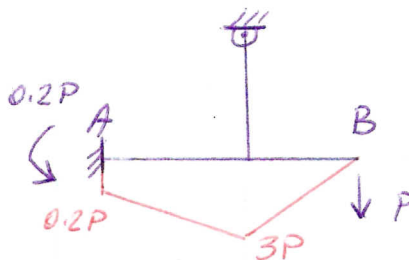
$\sum F_x = 0: A + P + P/4 = 0, A = -5P/4$

3

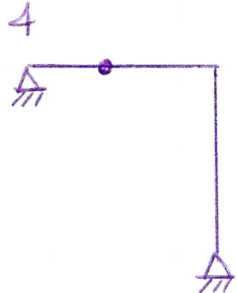
①  $\frac{R}{1} \frac{V}{2}$ $D_{QL1} = \frac{1}{6EI} (1 \times 3P) + \frac{(-0.25)(1.75P)(4)}{EA} = -\frac{P}{EA}$

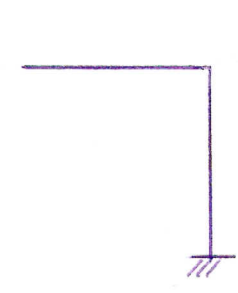
②  $\frac{R}{2} \frac{V}{2}$ $F_{11} = \frac{1}{6EI} (2 \times 1 \times 1) + \frac{(0.25)(0.25)(4)}{EA} = \frac{5}{EA}$

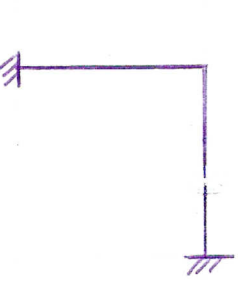
$0 = -P + 5Q_1 \Rightarrow Q_1 = 0.2P$

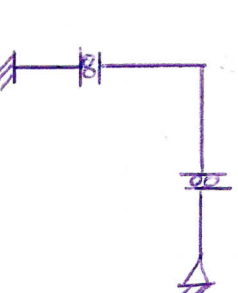
 $0.2P$ $3P$

4

(1) 

(2) 

(3) 

(4) 

(5) 