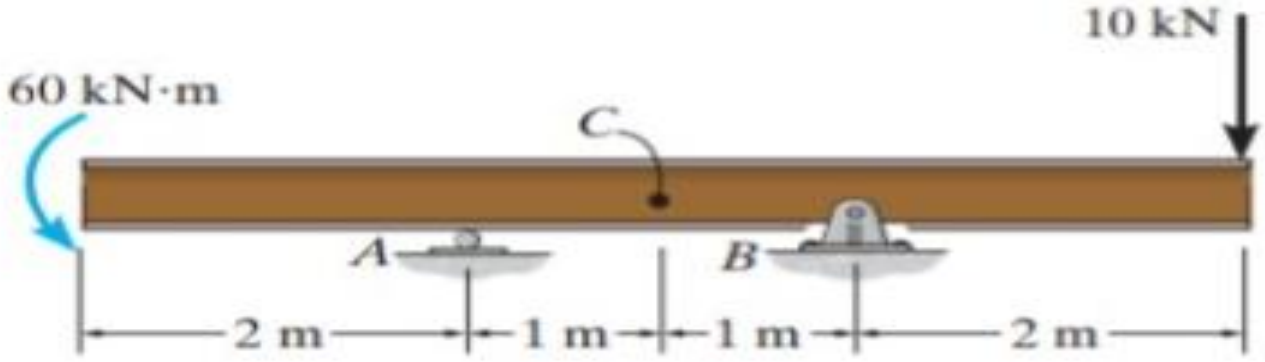
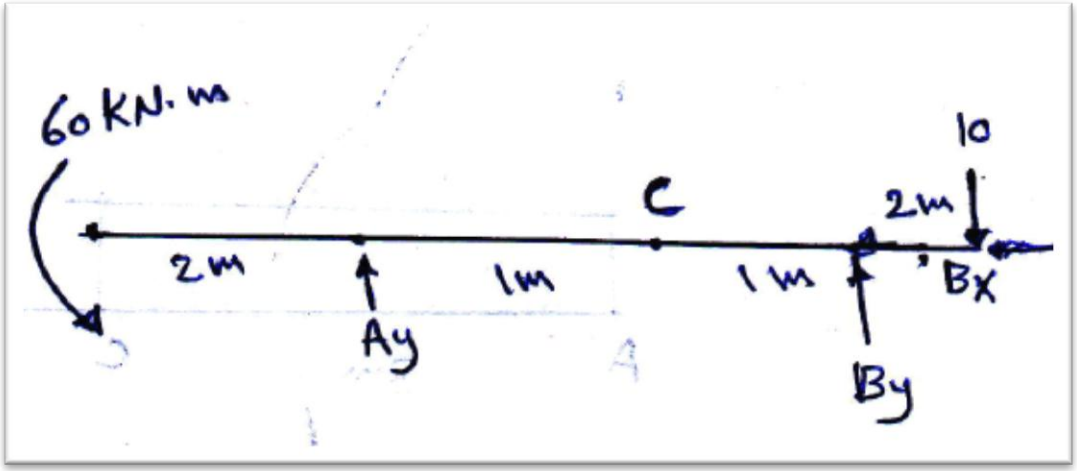
Strength of Materials 1

Presented by : Alhareth Muthanna .A

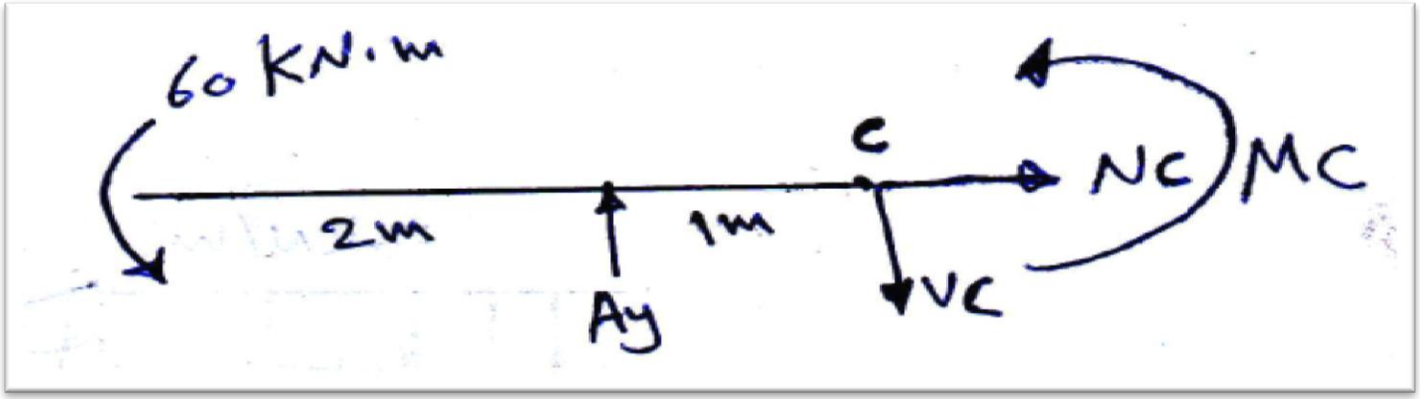
F1–1. Determine the internal normal force, shear force and bending moment at point C in the beam.



F1–1

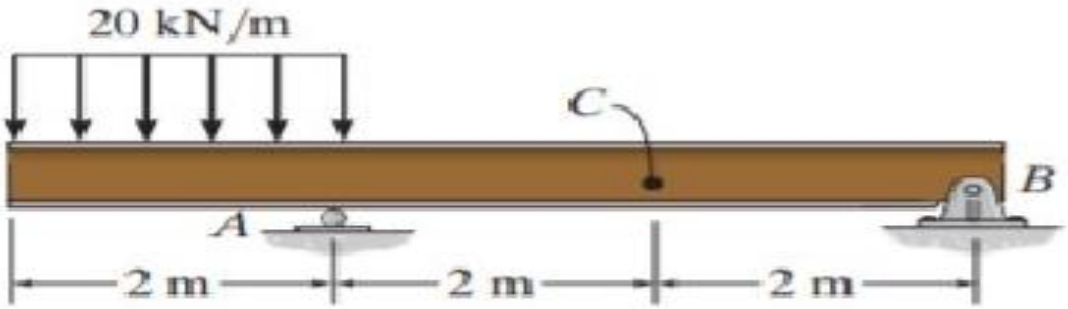


- $\sum M_{B=0}$
- 60-10*(2)- A_y*(2)=0
- A_y=20 K_N



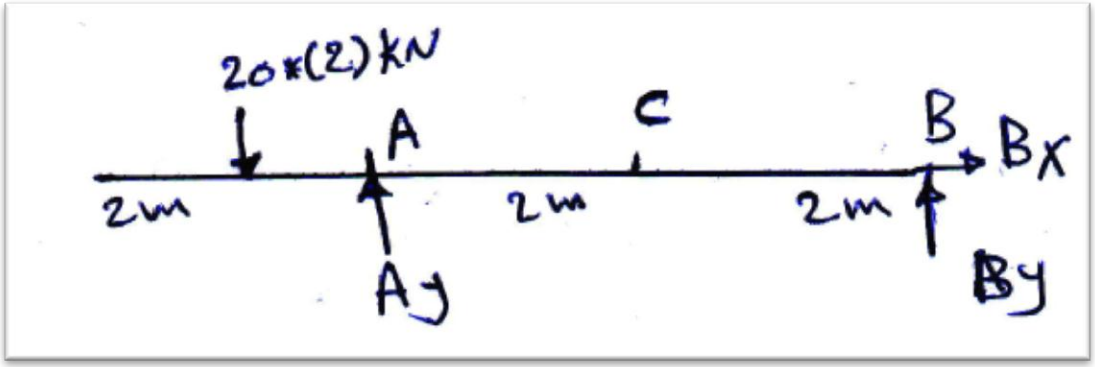
- $\sum f_x$ =0
- The normal reaction at C=0
- $\sum f_y$=0
- A_y-V_c=0
- 20-V_c=0
- $\boldsymbol{V_c}$=20 $\boldsymbol{K_N}$

F1–3. Determine the internal normal force, shear force, and bending moment at point C in the beam.

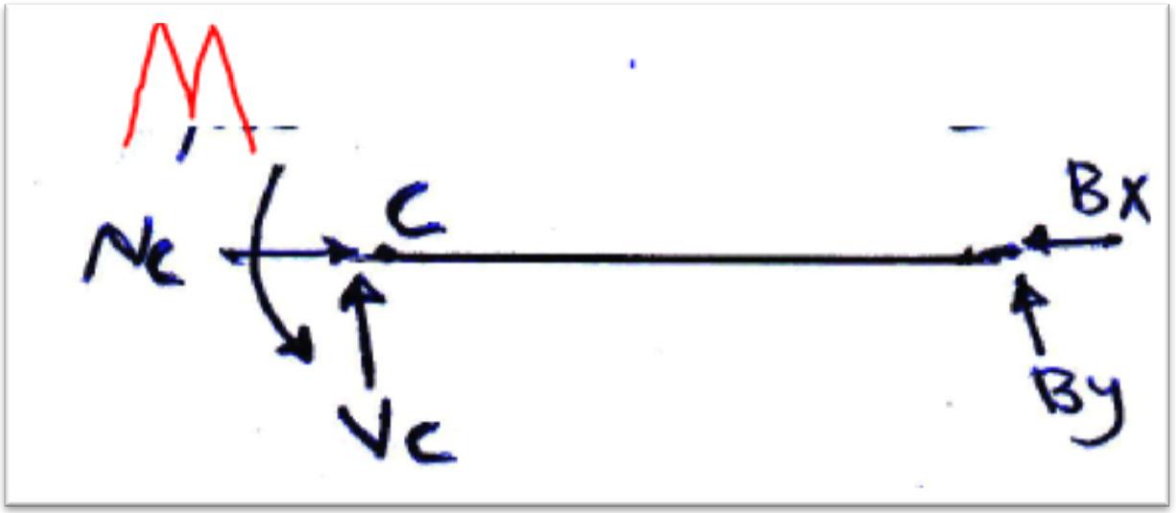


F1–3

The F.B.D



- $\sum M_A$ =0
- 20*(2)*($\frac{1}{2}$*2) +B_y*4=0
- B_y *4 +40=0
- B_y= -10 K_N



$\sum f_x$=0

B_x=0

$\sum f_x$=0

N_c-B_X=0

B_x=N_c

$\boldsymbol{N_c}$ is internal force substitute for $\boldsymbol{B_x}$

The internal reaction force at c is 0

$\sum f_y$=0

V_c + B_y=0

V_c is shear force

V_c + (-10) =0

V_c= 10 K_N

The shear force at c is 10 K_N

$\sum M_C$=0

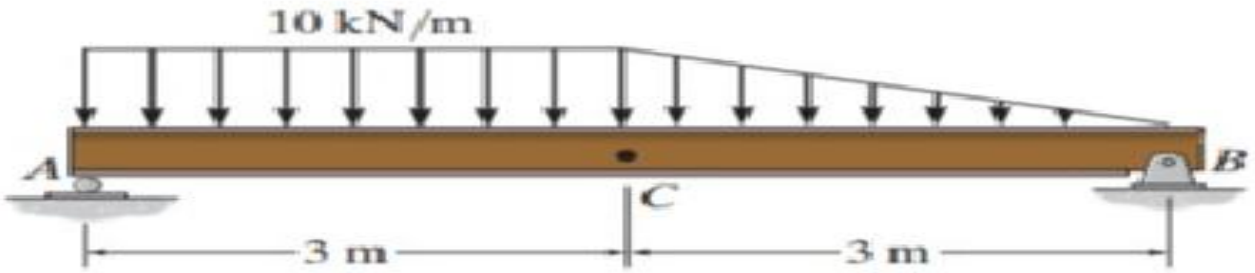
M_c+B_y*(2) =0

M_c+ (-10)*(2) =0

M_c=20 K_N.m

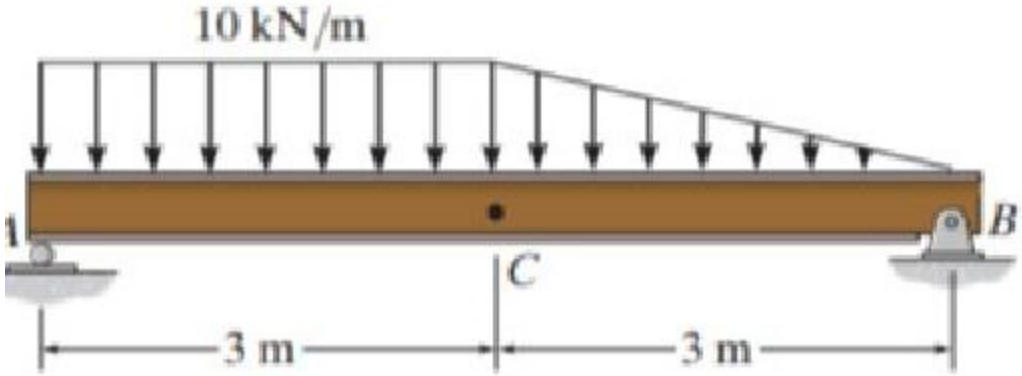
The bending moment at point c is 20

F1–4. Determine the internal normal force, shear force, and bending moment at point C in the beam.



F1–4

- $\sum M_B$=0
- 10*(3) *($\frac{3}{2}$+3) + $\frac{1}{2}$*(10)*3*($\frac{2}{3}$*3)-A_y*(6) =0
- A_y= 27.5 K_N

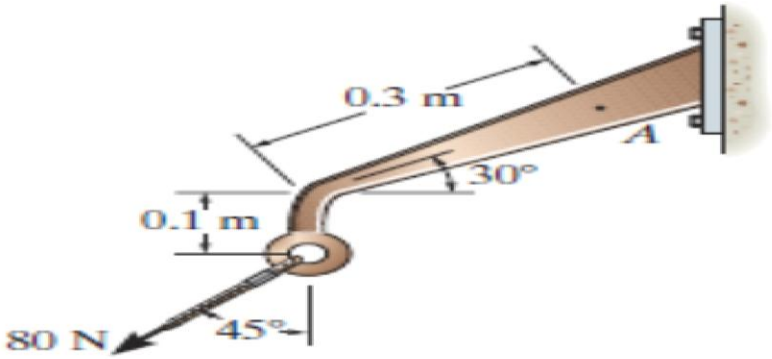


F1–4

- $\sum f_x$=0
- C_x=0
- $\sum f_y$=0
- A_y-10*3+V_c=0

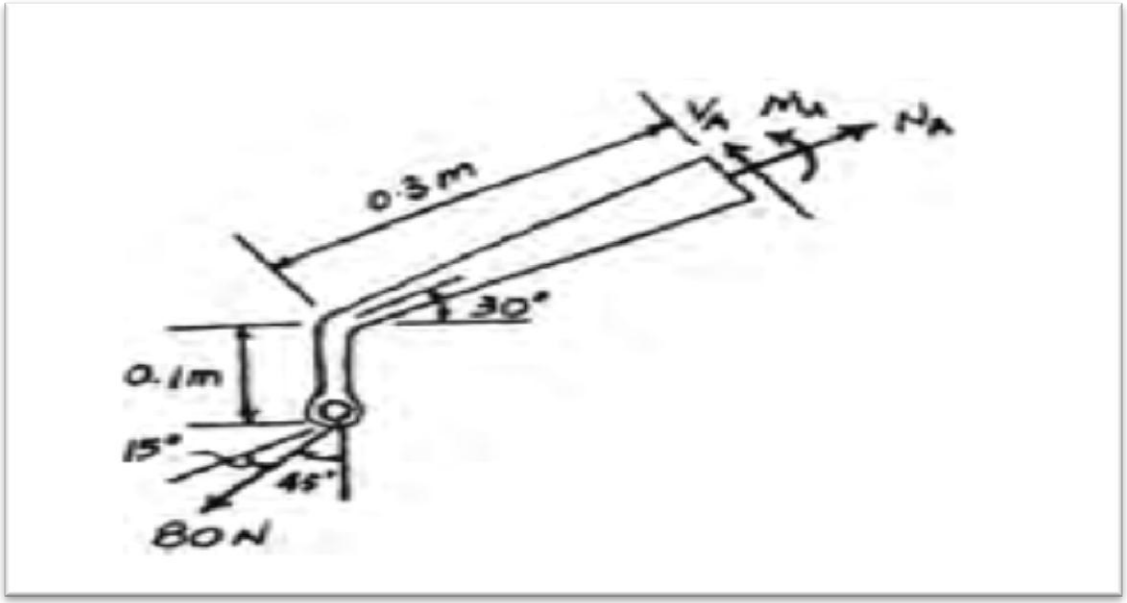
- 27.5-10*3 + V_c=0
- V_c= -2.5 K_N
- $\sum M_c$=0
- A_y*3_10*(3)*($\frac{3}{2}$) - M_c=0
- M_c=37.5 K_N.m

*1–4. A force of 80 N is supported by the bracket as shown. Determine the resultant internal loadings acting on the section through point *A*.



Prob. 1–4

- Equation of equilibrium



- $\sum f_x$=0
- N_A-80cos_{15}=0
- N_A=77.27 K_N
- $\sum f_y$=0
- V_A-80*sin_{15}=0
- V_A=20.7 N
- $\sum M_A$=0
- M_A+80 sin_{15} * (0.3+0.1*sin_{30}) – 80(0.1* cos_{30})=0
- M_A=-0.555 N.m