

DEPARTMENT OF CIVIL ENGINEERING
CE-222 STRUCTURAL MECHANICS I
 Quiz-1 6/2/09

Problem 1

Draw the Axial Force, Shear Force, and Bending Moment Diagram for the frame shown in **Fig. 1**. Then, use this to sketch the Qualitative Deflected Shapes.

Problem 2

Draw the Influence Line diagram for shear at point *F* on the beam shown in **Fig. 2**. Then, use this to find the maximum positive and maximum negative shear due to the load train shown.

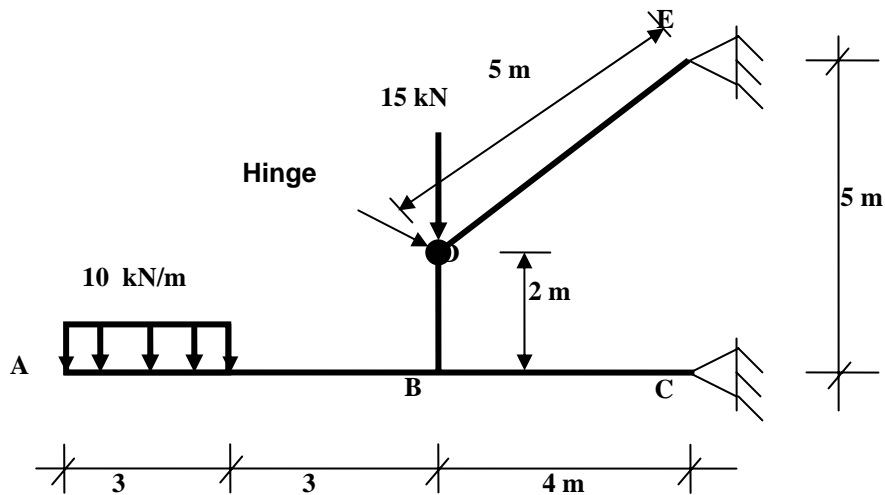


Fig. 1

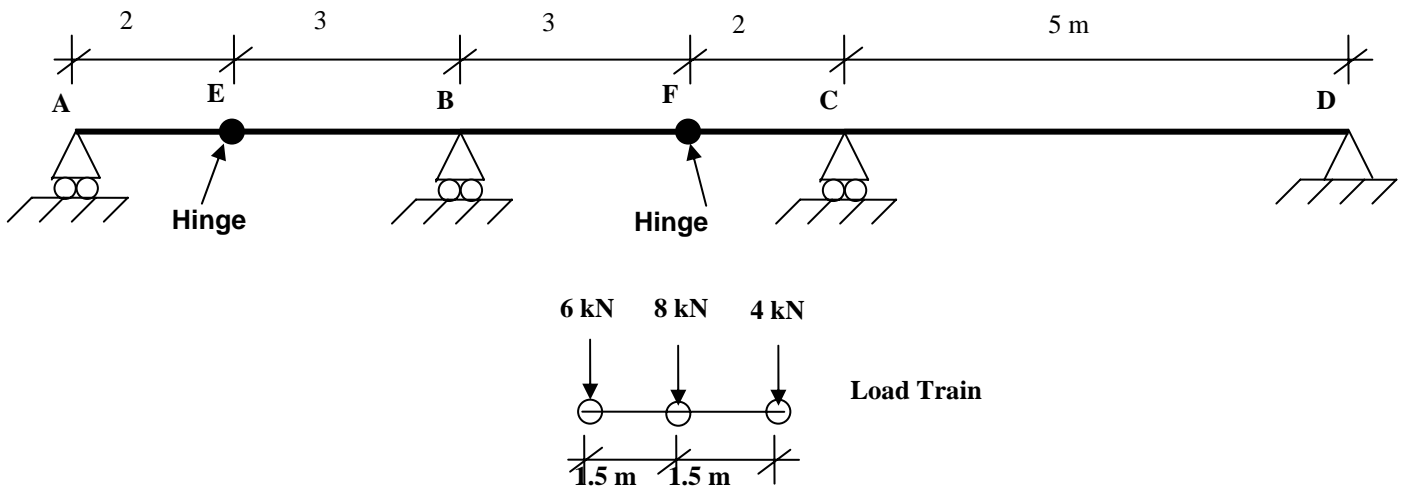
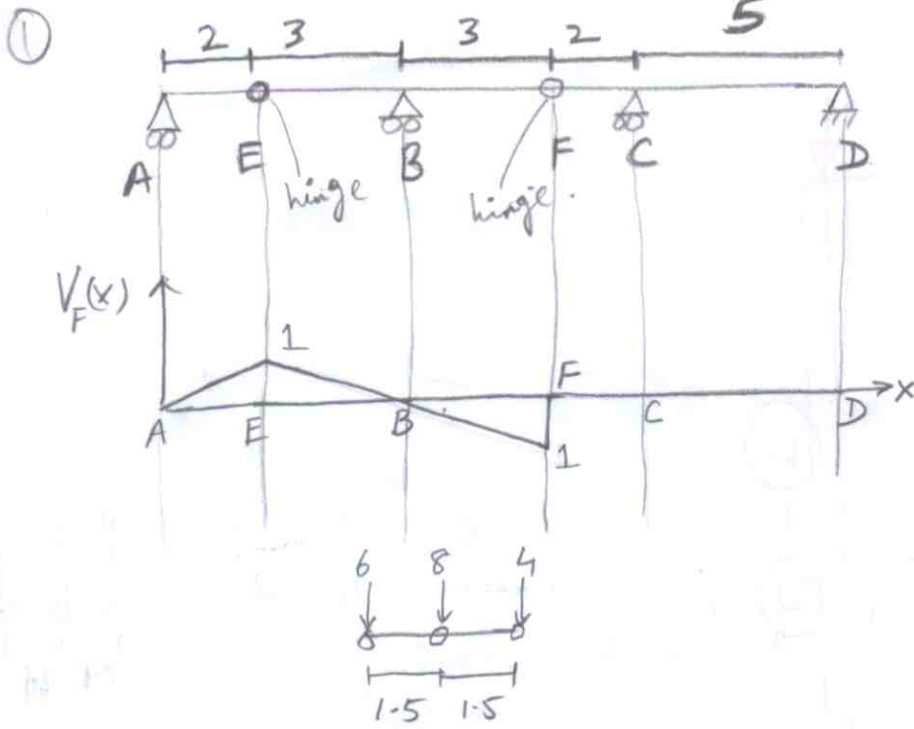


Fig. 2



Max +ve (travel R to L)

$$V_{max} = 8(1) + 6(0.5) + 4(1 - \frac{1.5}{2})$$

$$V_{max} = 12$$

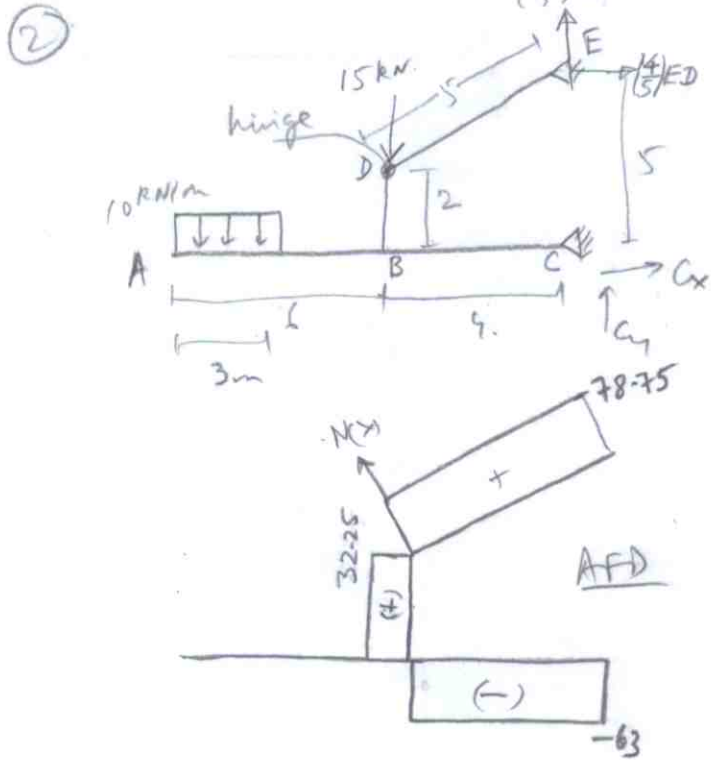
Max -ve (travel L to R)

$$V = -[4(1) + 8(0.5)]$$

or

$$V = -[8(1) + 6(0.5)]$$

$$V_{max} = 11$$



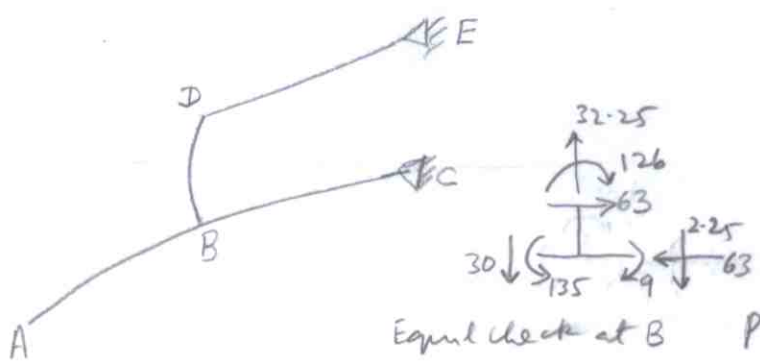
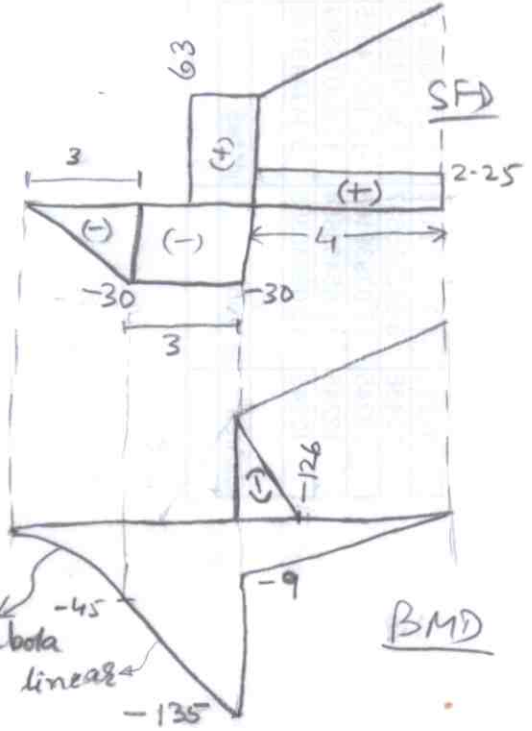
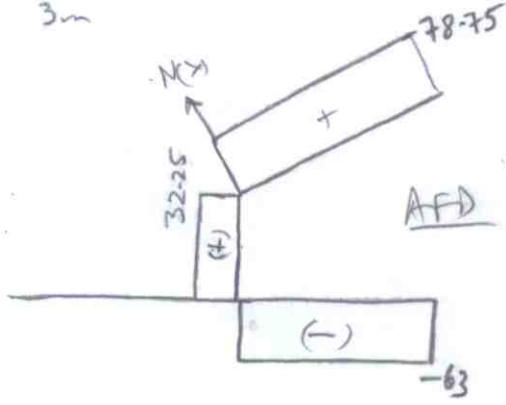
Draw AFD, SFD, BMD

$$\sum M_D = 0 \Rightarrow (30)(8.5) + (15)(4) - ED\left(\frac{4}{5}\right) \times 5 = 0$$

$$ED = 78.75 \text{ (T)}$$

$$C_x = -ED\left(\frac{4}{5}\right) = -63$$

$$C_y = 30 + 15 - ED\left(\frac{3}{5}\right) = -2.25$$



parabola linear