



ME-233 (Mechanics of Materials-I)

Problem Sheet #5 (Analysis & Design of Beams for Bending)

- Pb.5.1** For the timber beam and loading shown in Fig.5.1, draw the shear and bending-moment diagrams and determine the maximum normal stress due to bending.
- Pb.5.2** Draw the shear and bending-moment diagrams. Also determine the equations of shear & bending moment curves for the beam and given loading shown in Figs. 5.2 (a - f).
- Pb.5.3** For the timber beam and loading shown in Fig.5.3 (a) & (b), draw the shear and bending-moment diagrams and determine the absolute value of (i) the shear (ii) the bending moment.
- Pb.5.4** For the beam and loading shown in Fig.5.4, determine the maximum normal stress on a transverse section at C.
- Pb.5.5** For the beam and loading shown, determine the maximum normal stress on a transverse section at Center of the beam.
- Pb.5.6** For the beam and loading shown, determine the maximum normal stress on a-a.
- Pb.5.7** Draw the shear and bending-moment diagrams for the beam and loading shown in Fig. 5.7 (a) & (b), and determine the maximum normal stress due to bending.
- Pb.5.8** Determine (a) the distance 'a' for which the maximum absolute value of the bending moment in the beam is as small as possible, (b) the corresponding maximum normal stress due to bending.(Hint: Draw the bending moment diagram and then equate the absolute value of the largest positive and negative bending moments obtained).
- Pb.5.9** A solid steel bar has a square cross section of side b and is supported as shown. Knowing that for steel $\rho = 7860 \text{ kg/m}^3$, determine the dimension b of the bar which the maximum normal stress due to bending is (a) 10MPa, (b) 50MPa.

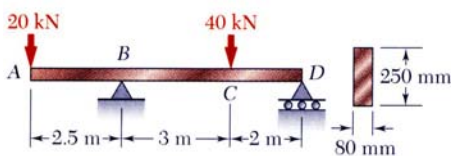


Fig.5.1

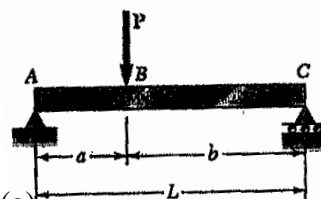


Fig.5.2 (a)



Fig.5.2 (b)



DEPARTMENT OF MECHANICAL ENGINEERING, University of Engineering & Technology, Lahore (KSK- Campus)

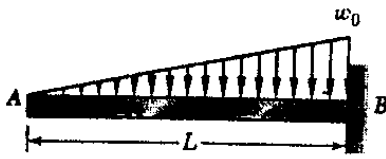


Fig.5.2 (c)

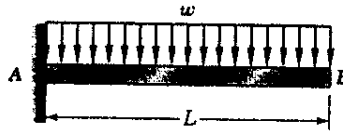


Fig.5.2 (d)

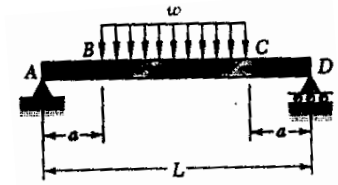


Fig.5.2 (e)

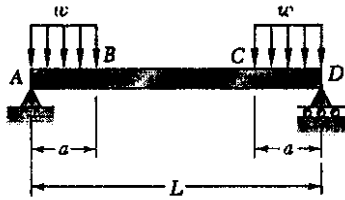


Fig. 5.2 (f)

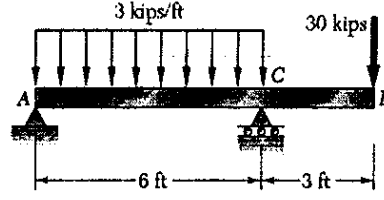
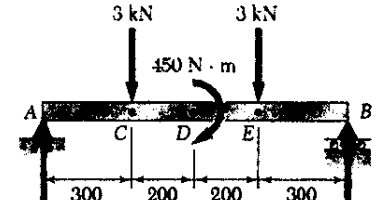


Fig. 5.3 (a)



Dimensions in mm
Fig. 5.3 (b)

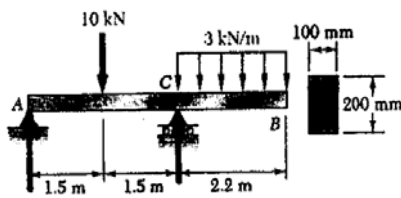


Fig. 5.4

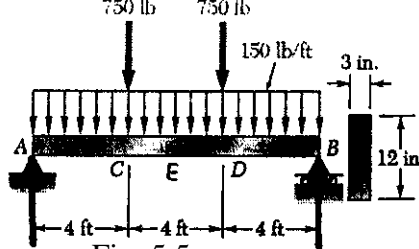


Fig. 5.5

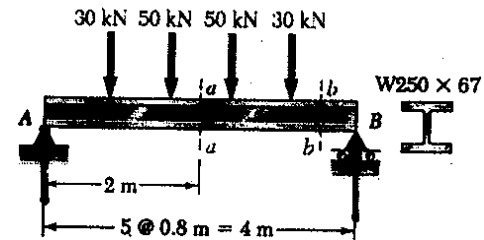


Fig. 5.6

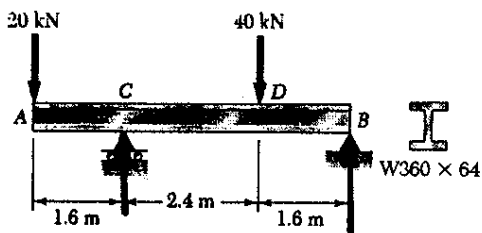


Fig. 5.7 (a)

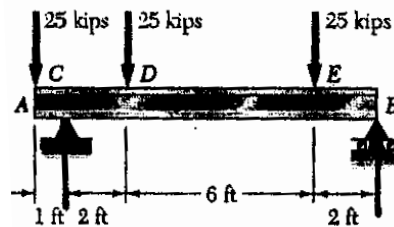


Fig.5.7 (b)

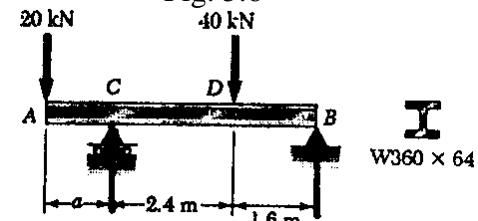


Fig.5.8

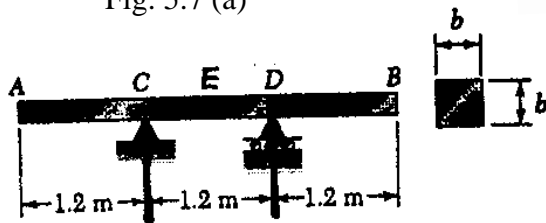


Fig.5.9

Prepared By:

Mr. Muhammad Farooq
Assistant Professor,
Mechanical Engineering Department,
UET Lahore (KSK-Campus).