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

# ME-233 (Mechanics of Materials-I) Session 2010

## Problem Sheet #4 (Pure Bending)

**Pb.4.1** Knowing that the couple shown in Fig. 4.1 (a) & (b) acts in a vertical plane Determine the stress at (a) point A, (b) point B.

**Pb.4.2** The wide flanged beam shown is made of a high-strength, low alloy steel for which $\sigma_y$ = 345MPa and $\sigma_u$ = 450MPa. Using a factor of safety of 3, determine the largest couple that can be applied to the beam when it is bent about the z axis. Neglect the effect of fillets. Also solve the Problem, assuming that the beam is bent about the y axis.

**Pb.4.3** A nylon spacing bar has the cross section shown in Fg. (4.3). Knowing that the allowable stress for the nylon used is 24MPa, determine the largest couple $M_z$ that can be applied to the bar.

**Pb.4.4** Knowing that for the extruded beams shown in Fig 4.4 (a) & (b) the allowable stress is 120MPa in tension and 150MPa in compression, determine the largest couple M that can be applied.

**Pb.4.5** Knowing that $\sigma_{all}$ = 24ksi for the steel strip AB, determine (a) the largest couple M that can be applied, (b) the corresponding radius of curvature. Use E = 29x $10^6$psi.

**Pb.4.6** It is observed that a thin steel strip of 0.06-in. width as shown in Fig. 4.6 can be bent into a circle of ¾ in. diameter without any resulting permanent deformations. Knowing that E= 29x$10^6$psi determine (a) the maximum stress in the bent strip, (b) the magnitude of the couple required to bend the strip.

**Pb.4.7** using an allowable stress of 120MPa, determine the largest couple M that can be applied to a beam of the cross section of the beam is an 80mm square.

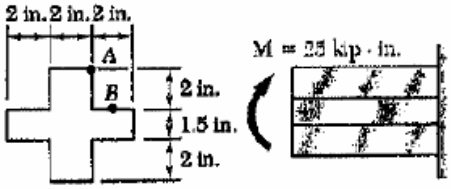


Fig. 4.1(a)

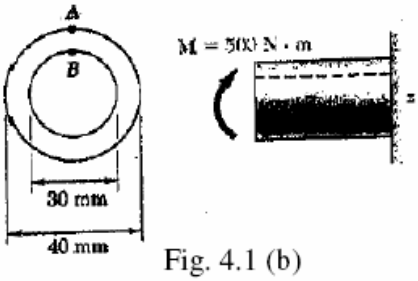


Fig. 4.1 (b)

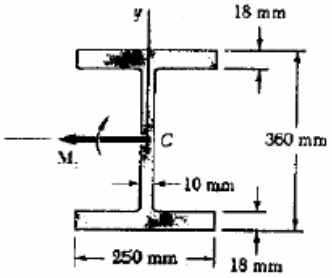


Fig. 4.2

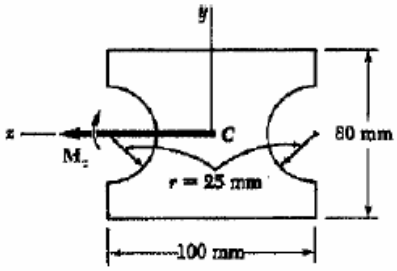


Fig. 4.3

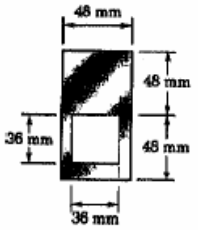


Fig.4.4 (a)

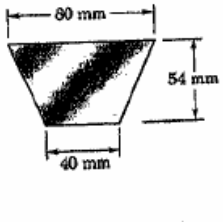


Fig.4.4 (b)


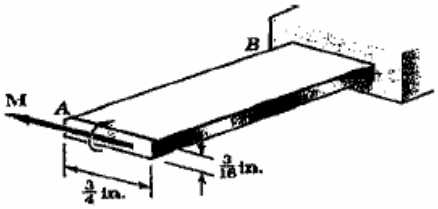


Fig. 4.5

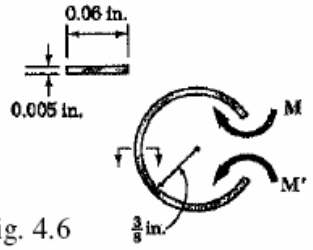


Fig. 4.6

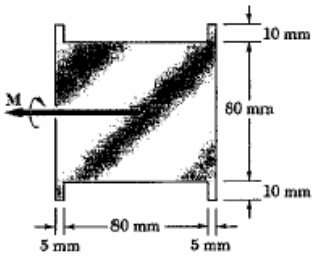


Fig. 4.7

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