

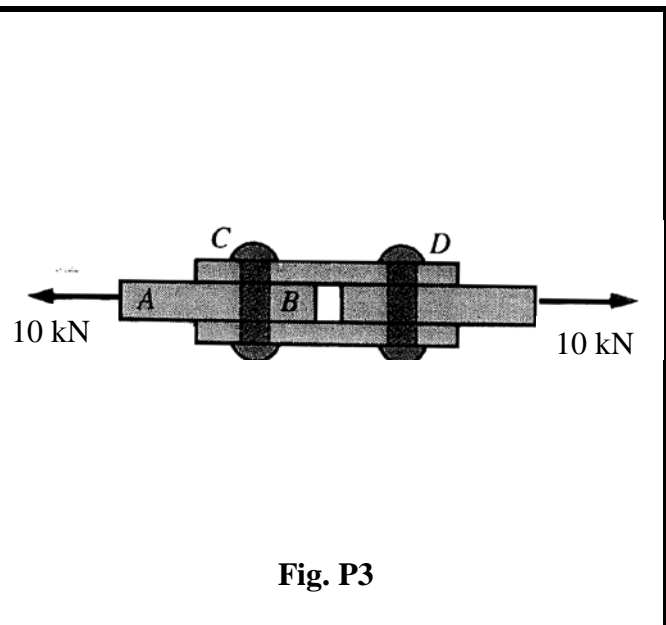
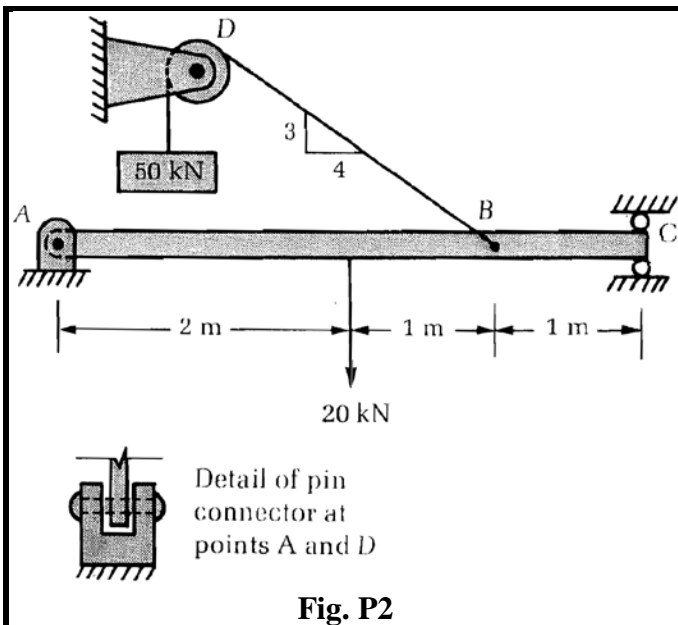
CE 203 STRUCTURAL MECHANICS I

Second Semester 1433 / 2012 (112)

HOMEWORK NO. 2

- **Textbook Sections Covered:** 1.4 - 1.7
- **Subject Material Covered:** Average Normal, shear, and Bearing Stresses + Allowable Stress + Design
- **DUE DATE: Monday 21-3-1433 (13-2-2012)**

- 1) Solve problem 1-77 (p. 55) in the textbook, but let the 10-kN force be 6, and the 25-mm width be 20. [Secs. 1.4 - 1.7] (20 pts.)
- 2) In Fig. P2 shown, determine the normal stress in cable BD (Area = 100 mm²) and the shear stress in the smooth pins at A and D. The diameter of the pins is 20 mm. [Secs. 1.4 - 1.7] (20 pts.)
- 3) For the riveted joint shown in Fig. P3, determine
 - (a) the shear stress in the 10-mm diameter rivet,
 - (b) the bearing stress in the 100-mm × 15-mm main plate AB, and
 - (c) the bearing stress in the 100-mm × 5-mm cover plate CD. [Secs. 1.4 - 1.7] (20 pts.)
- 4) The steel pipe column shown in Fig. P4 has an outside diameter of 150 mm and a wall thickness of 15 mm. The load imposed on the column by the timber beam is 150 kN. Determine
 - (a) the average bearing stress at the surface between the steel pipe column and the steel bearing plate,
 - (b) the diameter of a circular bearing plate if the maximum (failure) bearing stress between the steel bearing plate and the wood beam is 6.5 MPa. Use a safety factor of 2. [Secs. 1.4 - 1.7] (20 pts.)
- 5) The base of the square concrete footing shown in Fig. P5 is 500 mm × 500 mm. Determine the maximum allowable load **P** that can be applied if
 - * the maximum allowable normal stress in the steel is 100 MPa,
 - * the maximum allowable bearing stress in the concrete is 15 MPa,
 - * the maximum allowable bearing stress in the soil is 2 MPa. [Secs. 1.4 - 1.7] (20 pts.)



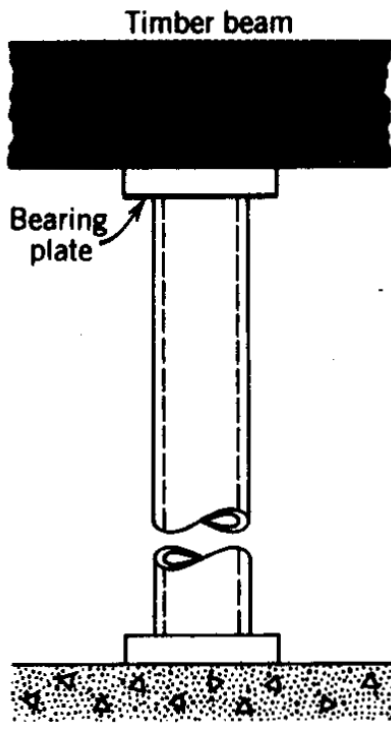


Fig. P4

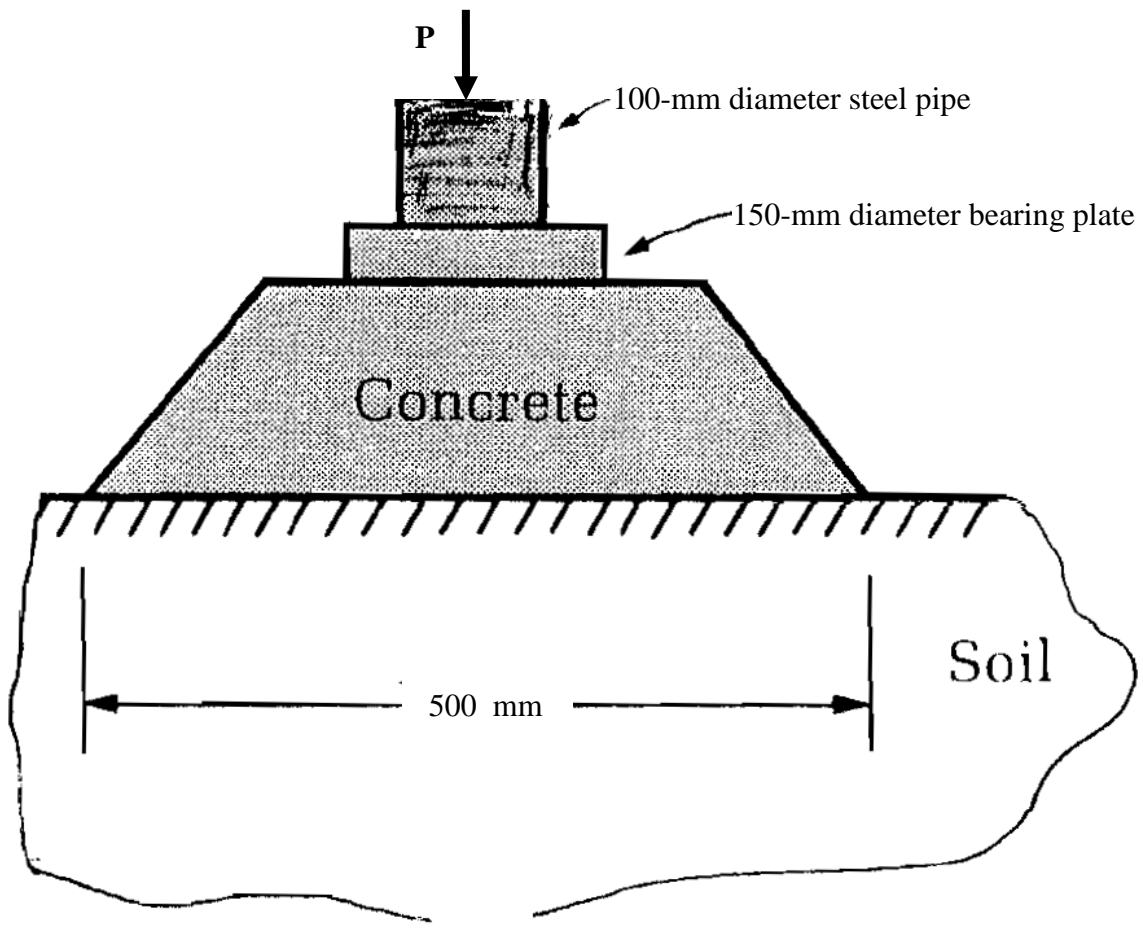


Fig. P5