THAPAR INSTITUTE OF ENGINEERING AND TECHNOLOGY, PATIALA
UES 017: SOLIDS AND STRUCTURES

B.E. – Second Year **Session: 2020-2021**

Tutorial Sheet No. 1 **(Axial, bearing and shearing stresses)**

1. Determine the bearing stresses caused by the applied force at A, B and C for the wooden structure as shown in Fig. 1

2. For the plane structure ABC with intermediate hinge at B (Fig. 2) compute the reactions at the supports A and C and intermediate hinge B and prepare the free body diagrams of members AB and BC. Determine normal stress in member BC. The area of cross-section of member BC is 400 mm^2.

3. Determine the tensile stress in cable BD and shearing stress in the pin at A (Fig. 3). The diameter of cable and pin are 20mm and 10mm, respectively. Draw the free body diagram of ABC.

4. A composite bar (Fig.4) formed by joining two concentric steel rods of 20mm diameter and 100mm length to each end of a copper rod of 50mm diameter and 200mm length. When an axial force is applied to the bar, its total extension is found to be 0.2mm. Determine the axial stresses in the copper and steel rods. Take E_{steel} = 210GPa and E_{copper} = 120GPa

5. A tapered bar shown in Fig. 5 carries a tensile load of 10kN at its free end. Calculate the total extension of the rod. Adopt E = 205GPa.

6. For the timber truss shown in Fig. 6, the allowable stresses in direct bearing and shear are 6 N/mm^2 and 1.2 N/mm^2, respectively. Compute the proper dimension *a* and *b* for the notched joints at the ends of the horizontal member. The size of the timber members is 150mm x 150mm. Assume joint B behaves like a pinned connection.

Fig. 1

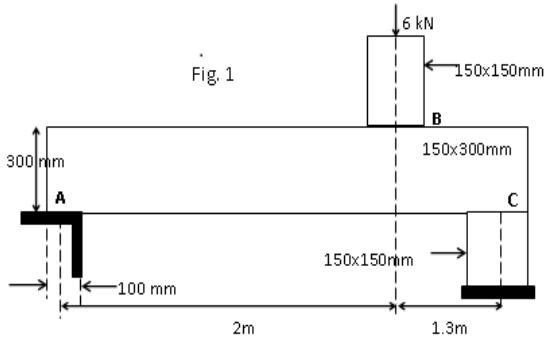
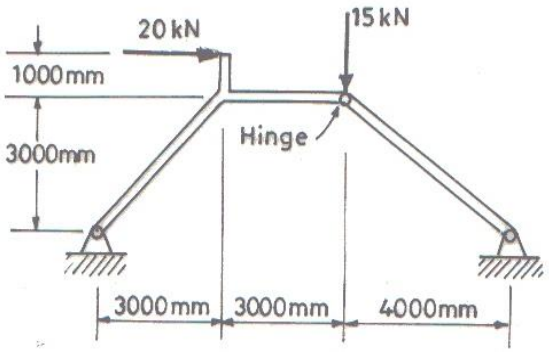


Fig. 2



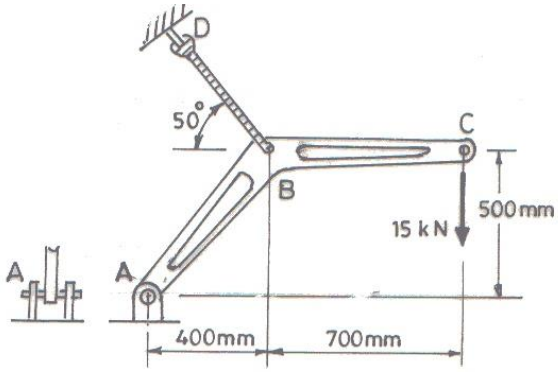


Fig. 3

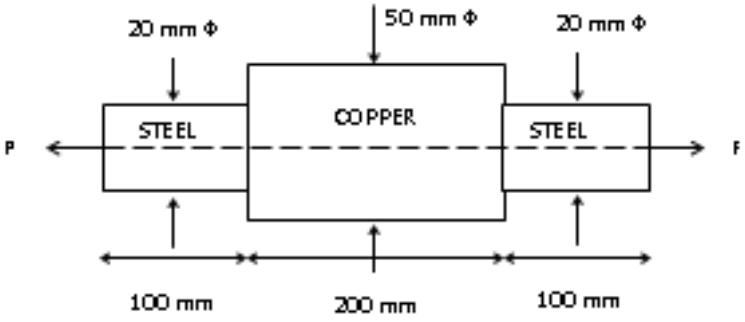


Fig. 4

Fig. 5

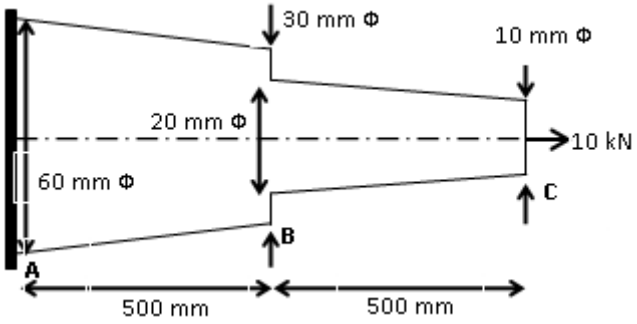


Fig. 6