1. A cast iron link, as shown in Fig., is required to transmit a steady tensile load of 45 kN. Find the tensile stress induced in the link material at sections A-A and B-B.



1. A mild steel rod supports a tensile load of 50 kN. If the stress in the rod is limited to 100 MPa, find the size of the rod when the cross-section is 1. Circular, 2. Square and 3. Rectangular with width = 3 × thickness.
2. A shaft, as shown in Fig. , is subjected to a bending load of 3 kN, pure torque of 1000 N-m and an axial pulling force of 15 kN.

Calculate the stresses at A and B.



1. An overhang crank with pin and shaft is shown in Fig. A tangential load of 15 kN acts on the crank pin. Determine the maximum principal stress and the maximum shear stress at the centre of the crankshaft bearing.



1. The load on a bolt consists of an axial pull of 10 kN together with a transverse shear force of 5 kN. Find the diameter of bolt required according to

1. Maximum principal stress theory; 2. Maximum shear stress theory; 3. Maximum principal strain theory; 4. Maximum strain energy theory; and 5. Maximum distortion energy theory.

1. A mild steel shaft of 50 mm diameter is subjected to a bending moment of 2000 N-m and a torque T. If the yield point of the steel in tension is 200 MPa, find the maximum value of this torque without causing yielding of the shaft according to 1. The maximum principal stress; 2. The maximum shear stress; and 3. The maximum distortion strain energy theory of yielding.
2. A mild steel bracket as shown in Fig, is subjected to a pull of 6000 N acting at 45° to its horizontal axis. The bracket has a rectangular section whose depth is twice the thickness. Find the cross-sectional dimensions of the bracket, if the permissible stress in the material of the bracket is limited to 60 MPa.



1. A C frame subjected to a force of 15 kN is shown in Fig. It is made of grey cast iron PG 300. Taking a factor of safety of 2.5, determine the dimensions of the section of frame.



1. The stresses developed at a critical point in a machine component made of steel 45C8 (𝑆𝑦𝑡 = 380 MPa) are as follows : 𝜎𝑥= 100 MPa, 𝜎𝑦= 40 MPa and 𝜎𝑥𝑦= 80 MPa. Calculate the factor of safety by: (a) Maximum principal stress theory (b) Maximum shear stress theory (c) Distortion energy theory .