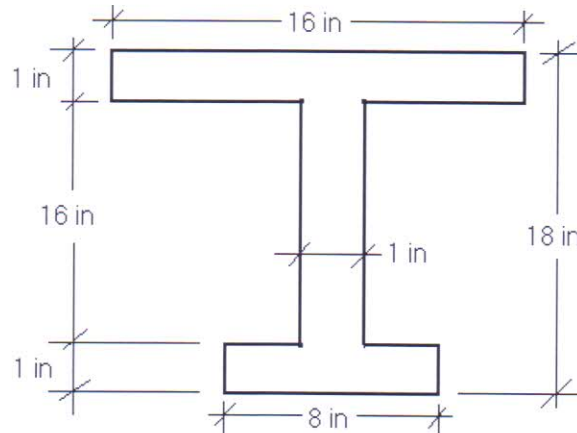
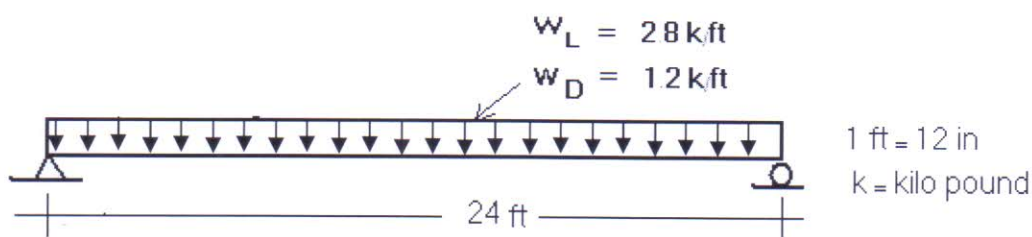


Answer all questions (OPEN BOOK)

1. Calculate the values for S and Z and the shape factor about the horizontal x-axis for the section below (8 points)



2. Select a W33 section for a 36 ft simply supported span to support a service dead uniform load w_D of 2.5k/ft and a live service load w_L of 2.0k/ft if 4 holes for 1-in ϕ bolts are assumed present in the flange at the section of maximum moment. Use AISC Specification and 50ksi steel. $F_u = 65$ ksi (13 points)
3. Select the lightest available W14 section ($F_y = 50$ ksi, $F_u = 65$ ksi) to support the load $P_U = 298$ k and moments $M_{Ux} = 30$ ft-k. The member is 10 ft long and is laterally braced at its ends only. Assume $C_b = 1.0$. (13 points)
4. Select the lightest W30 shape of $F_y = 50$ ksi steel for uniform service dead load and service live load shown. The dead load includes the beam self-weight. The beam has lateral support for its compression flange at the ends and at the concentration load. The maximum service live load deflection may not exceed 1/1200 of the span. Consider moment, shear and deflection. Neglect beam weight. (13 points)



5. Design a cover-plate beam no greater than 16 in. in depth to support a dead service uniform load w_D of 4 k/ft (not including the beam weight) and a live service load w_L of 6 k/ft for a 24 ft simple span. Use A572 steel with $F_y = 50$ ksi with full lateral bracing of the compression flange. Use a W14 beam plus cover plates. (13 points)

