

Answer ALL questions

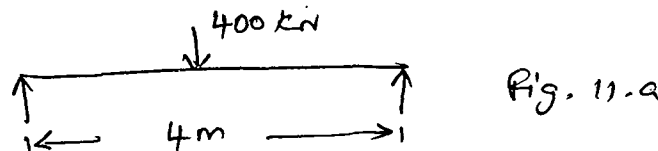
Use of IS 800:2007, IS 883:1994 and Steel Tables may be allowed

Part - A (10 X 2 = 20 Marks)

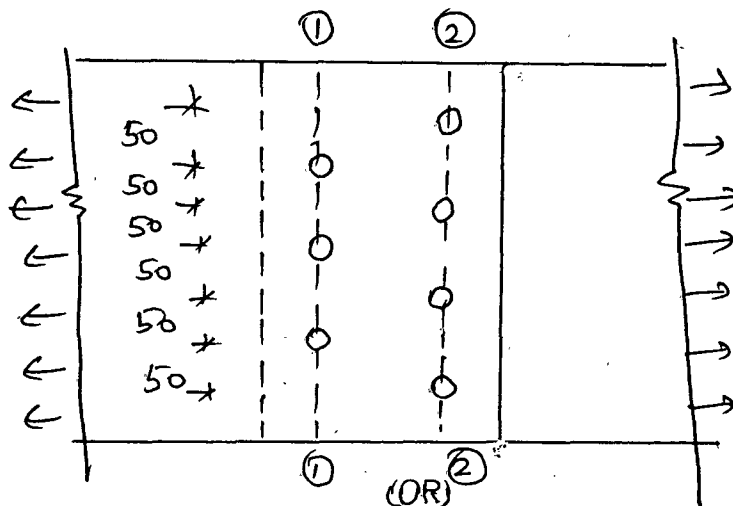
1. Classify the section ISLB 300 @ 37.7 kg/m where $f_y = 250$ MPa
2. Find the shape factor for a rectangular section $b \times h$
3. Name the different failure modes of bolted joints
4. How is the strength of fillet weld determined?
5. Define: Slenderness ratio of a tension member
6. What is built-up Column (Latticed column)?
7. Define: Web buckling
8. Draw the shear stress and bending stress distribution in elastic and plastic ranges for an I - section.
9. What is called Seasoning in Timber?
10. Name the common defects in Timber

Part - B (5 X 16 = 80 Marks)

11. A laterally supported, simply supported beam of span 4 m is subjected to factored column load of 400 kN (Fig. 11.a) Load is transferred through base plate of 200 mm length. Check limit states. Section available is ISMB 400.

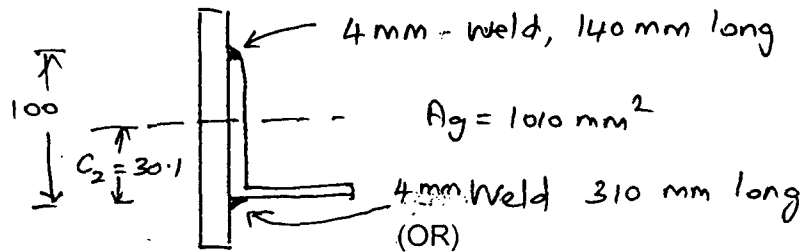


12. (a) Calculate the efficiency of a zig-zag double bolted lap joint as shown in Fig. 12.a. Assume Fe 410 grade plate and grade 4.6 bolts of diameter 20 mm and 8 mm thick plates. (For grade 4.6 bolt, Shear strength = $v_{nsb} = 185$ N/mm²; Bearing strength = $v_{npb} = 400$ N/mm²; Tension strength = $t_{nb} = 211$ N/mm²; For 20 mm dia bolts, tensile stress area = 245 mm²)



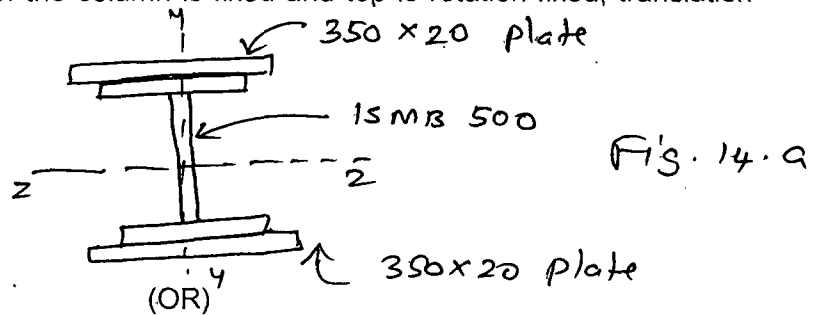
- (b) Design a connection to join two plates of size 250 x 12 mm of grade Fe 410, to mobilize full plate tensile strength using shop fillet welds, if
- a lap joint is used
 - a double cover butt joint is used.

13. (a) Determine the tensile strength of a roof truss diagonal 100 x 75 x 6 mm ($f_y = 250$ MPa) connected to the gusset plate by 4 mm weld as shown in Fig. 13.a



- (b) Design a tension member of single angle section to carry a factored tensile load of 350 kN. Assume that the length of member is 3 m and $f_y = 250$ MPa.

14. (a) Calculate the compressive resistance of a column consisting of ISMB 500 with one cover plate 350 x 20 mm on each flange (Fig. 14.a) and having a length of 5m. Assume that the bottom of the column is fixed and top is rotation fixed, translation free, and $f_y = 250$ MPa.

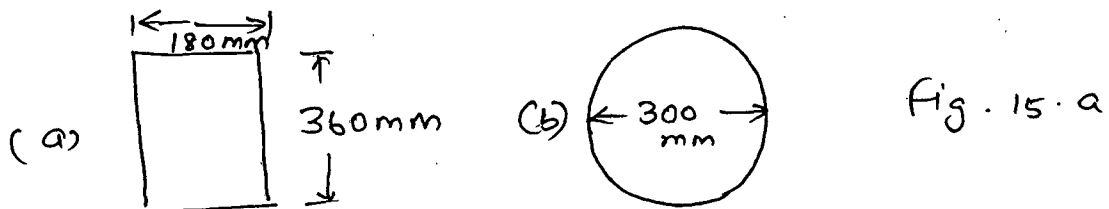


- (b) Design a double angle discontinuous strut to carry a factored load of 175 kN. The length of the strut is 3.0 m between intersections. The two angles are placed back-to-back and are tack bolted. Consider the following cases:

- Angles are placed on opposite sides of the gusset plate
- Angles are placed on same sides of the gusset plate

Assume grade Fe 410 steel with $f_y = 250$ MPa.

15. (a) Find the form factor and load carrying capacity of the cross-sections of beams of teak shown in Fig. 15.a.



(OR)

- (b) Design a 5m long rectangular box columns built up by 50 mm thick deodar planks to carry an axial load of 400 kN.