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ET-508(B)

B.Tech. Civil (Construction Management) /
B.Tech. Civil (Water Resources Engineering)

Term-End Examination

00942 **December, 2016**

ET-508(B) : STRUCTURAL DESIGN – II

Time : 3 hours *Maximum Marks : 70*

Note : *Attempt any **four** questions. Use of steel table, IS : 800 and scientific calculator is allowed. Any missing data may be assumed suitably.*

1. A single-riveted double cover butt joint is used to connect two plates 16 mm thick with chain riveting as shown in Figure 1.

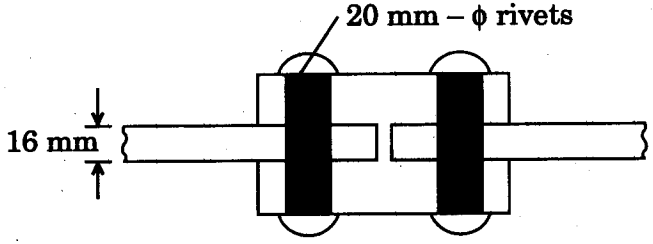

Figure 1

The rivets used are power driven 20 mm in diameter at a pitch of 60 mm. Find out the safe load per pitch length and efficiency of the joint. $17\frac{1}{2}$

2. A tie member in a bracing system consists of two angles 150 × 115 × 10 mm (f_y = 250 MPa) with long legs connected to a gusset plate by 18 mm diameter rivets in such a way that each angle section is reduced in section by one rivet hole only. Determine the tensile strength of the member, if the angles are connected on the same side of the gusset plate, 12 mm thick and are tack-riveted as shown in Figure 2. $17\frac{1}{2}$

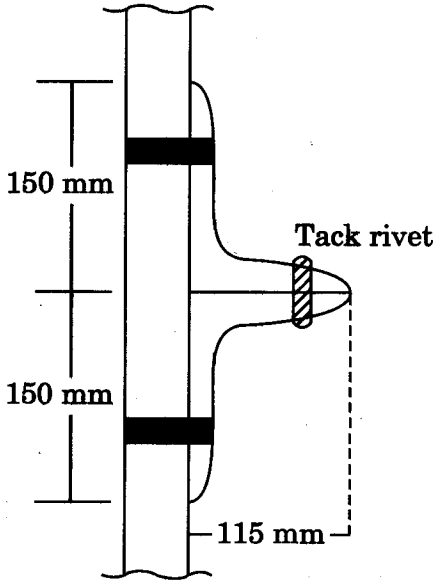

Figure 2

3. A simply supported steel beam with a 4·0 m effective span carries a uniformly distributed load of 40 kN (Total load) over its span inclusive of self-weight. The beam is supported laterally throughout. Design the beam using standard I-sections. Take $f_y = 250$ N/mm^2. $17\frac{1}{2}$

4. A column section ISHB 350 @ 661·2 N/m carries an axial load of 1100 kN. Design a suitable gusset base using riveted construction. Allowable bearing pressure on concrete is 4000 kN/m^2. $17\frac{1}{2}$

5. Design a purlin to span 5·0 m between trusses. The purlins are spaced at 1·5 m apart. The roofing and insulation weigh 200 N/m^2 and the snow load is 1000 N/m^2. Assume maximum stress in the purlin as 142 N/m^2. $17\frac{1}{2}$

6. (a) What do you mean by silo ? Explain the design procedure of silo. $7\frac{1}{2}$

   (b) Using Janssen's theory, show that the horizontal pressure in a bunker can be expressed as

$$P_h = \frac{\gamma R}{\mu'}\left(1 - e^{-\mu' \frac{kH}{R}}\right)$$

   where all the terms have their usual meanings. *7+3=10*