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ET-508(B)

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

Term-End Examination

01390

June, 2014

ET-508(B) : STRUCTURAL DESIGN – II

Time : 3 hours *Maximum Marks : 70*

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

1. A tension member consists of two 100 × 75 × 10 IS angles. These angles are connected by their long legs to a gusset plate by means of 16 mm diameter rivets in such a way that each angle section is reduced by one rivet only. Determine the tensile strength of the member :

(i) If the angles are connected on opposite sides of 12 mm gusset plate and angles are properly tack riveted. *9*

(ii) If the angles are connected on the same side of a gusset plate of 12 mm thickness. Angles are properly tack riveted. $8\frac{1}{2}$

2. Using Airy theory, show that maximum depth of Bunker (h_{max}) can be expressed as

$$h_{max} = b\left[\mu + \sqrt{\frac{\mu(1+\mu^2)}{(\mu+\mu')}}\right]$$

where, b = breadth of bunker

μ = coefficient of friction on the walls of bunker

μ' = coefficient of internal friction of stored material. $17\frac{1}{2}$

3. A bracket transmits a load of 90 kN at an eccentricity of 250 mm to a column through 10 rivets of 20 mm diameter arranged in two vertical rows as shown in Figure 1. The pitch of the rivets is 70 mm and the load lies in the plane of the rivets. Calculate the maximum stress in the rivets. $17\frac{1}{2}$

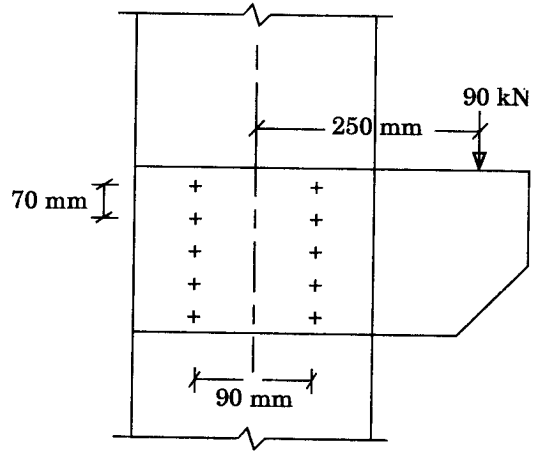

Figure 1

4. A simply supported beam of 9·0 m span (effective) is carrying a uniformly distributed load of 25 kN/m. Design the beam using standard I-section if the compression flange of the beam is laterally supported throughout its length. Check for deflection and shear also. Adopt $f_y = 250$ N/mm^2. $17\frac{1}{2}$

5. Design a bearing stiffener for a plate girder bridge. This stiffener has to resist a reaction of 1200 kN. Assume allowable bearing stress as 187·5 N/mm^2. $17\frac{1}{2}$

6. Design a built-up column to carry an axial load of 1200 kN. The column has a length of 6·0 m with bottom end held in position and restrained in direction while top end is held in position only. This column consists of two channels placed back to back and these channels are connected by battens. $17\frac{1}{2}$