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ET-508(B)

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

Term-End Examination

00470

June, 2016

ET-508(B) : STRUCTURAL DESIGN – II

Time : 3 hours *Maximum Marks : 70*

Note : *Attempt any **five** questions. All questions carry equal marks. Use of Steel Tables, IS : 800 (1984) and calculator is permitted. Assume any missing data suitably.*

1. A bracket transmits a load of 80 kN at an eccentricity of 250 mm to a column through 10 rivets of 18 mm diameter arranged in two vertical rows as shown in Figure 1. The pitch of the rivet is 80 mm and the load lies in the plane of the rivets. Calculate the maximum stresses in the rivets. *14*

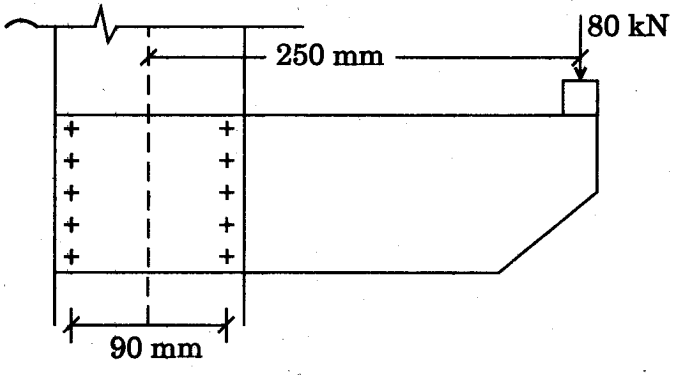

Figure 1

2. A tension member consisting of two 150 × 115 × 10 mm IS angles are connected by their long legs to a gusset plate by means of 20 mm diameter rivets in such a way that each angle section is reduced by one rivet hole only. Calculate the tensile strength of the member when the angles are connected on the opposite sides of a 12 mm gusset plate and the angles are properly tack riveted. Assume $F_y = 250$ N/mm^2. *14*

3. A simply supported beam of span 10 m 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 the beam for deflection also. Assume $F_y = 250$ N/mm^2. *14*

4. (a) Explain the procedure to design purlin for a steel roof truss. *6*

   (b) Differentiate between a bunker and a silo. *4*

   (c) Discuss briefly about end bearings for steel bridges. *4*

5. Design a battened built-up column consisting of two channels placed back to back. The column has to carry an axial load of 1200 kN and has a length of 6·5 m and effectively held in position at both ends but not restrained against rotation. *14*

6. A gantry girder for a crane in a workshop is to be designed for the following data :

(a) Crane capacity = 70 kN

(b) Weight of crane bridge = 40 kN

(c) Span of the gantry girder = 5·5 m

(d) Centre to centre distance between columns = 14·0 m

(e) Wheel spacing = 3 m

(f) Minimum edge distance = 1·2 m

Design the central section for maximum B.M. *14*

7. Design a grillage foundation for a column to carry an axial load of 1500 kN. The bearing capacity of soil is 150 kN/m^2. The column base plate is resting on the grillage of 600 mm × 600 mm. *14*

8. The central section of a simply supported plate girder consists of 1800 mm × 8 mm, two flange plates 500 mm × 10 mm and two angles ISA 200 × 150 × 10 mm in each flange. The effective span of the girder is 9 m. Determine the safe uniformly distributed load the plate girder can carry including its self-weight. The compression flange of the plate girder is laterally supported. Power driven shop rivets of 20 mm dia are used for connections. *14*

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