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CE 131603

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2018

B.Tech. 6th Semester End-Term Examination

DESIGN OF STRUCTURES – II

Full Marks – 100

Time – Three hours

The figures in the margin indicate full marks
for the questions.

Use of IS-800 (2007) : IS-875 (Part III) and Steel table are
permitted.

Answer Q.No.1 and any Six questions from the rest.

1. Fill in the blanks : (10 × 1 = 10)
- (a) If the thickness of thinnest Outside plate is 10 mm then maximum pitch of rivets in tension will be taken as _____.
- (b) The difference between gross diameter and nominal diameter for the rivets up to 25 mm diameter is _____.
- (c) Bolts are most suitable to carry axial tension (Yes/No) _____.
- (d) The effective length of fillet weld should not be less than _____.

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- (e) According to I.S. specifications , the effective length of a column effectively held in position at both ends and restrained in direction at one end is taken as _____.
- (f) According to IS 800, in the Merchant Rankine's formula the value of imperfection index is _____.
- (g) The effective length of battened column is increased by _____.
- (h) Angle of inclination of the lacing bar with the longitudinal axis of the column should preferably be between _____.
- (i) Horizontal stiffener in a plate girder is provided to safeguard against_____.
- (j) Web crippling generally occurs at the point where _____.
2. Design an eccentric riveted connection with Suitable sketches to the following particulars. (15)

Load transferred to each bracket plate = 100 KN.

Number of vertical rows of rivets = 2.

Spacing of rivets in each vertical rows = 80 mm.

Distance between the rows = 120 mm.

Eccentricity of load = 200 mm.

Thickness of bracket plate = 10 mm.

3. (a) What are the advantages of welded connection Over riveted and bolted connection?
- (b) The tension member of a truss consists of two angles $90 \text{ mm} \times 90 \text{ mm} \times 8 \text{ mm}$ and the axial tension in the member is 250 KN. The two members are connected on either side of a gusset plate at a joint. Design the welded joint using 6 mm fillet welds. (5+10=15)
4. Design a built up column 9m long to carry a factored axial compressive load of 1100 KN with connecting system as battens with bolted connections. The column is restrained in position but not in direction at both the ends. Use two channel sections back-to-back. Use steel of grade Fe 410. (15)
5. Longer leg of an ISA $150 \text{ mm} \times 75 \text{ mm}$ is connected to a gusset plate by 20 mm diameter rivets in two rows. The gauge space is 55 mm and Staggered pitch is 40 mm. Determine the thickness of the angle which would be sufficient to transmit a pull of 250 KN. Allowable tensile stress is 150 N/mm^2 . (15)
6. (a) Name any live types of roof trusses with neat diagram.
- (b) Explain briefly the mechanical properties of steel along with its advantages as a structural material. (5+10=15)
7. A column ISHB 350 @ 661.2 N/m carries an axial compressive factored load of 1700KN. Design a suitable bolted gusset base. The base rests on M15 grade concrete pedestal. Assume other data suitable. (15)

8. (a) Write the types of failure of riveted joint with suitable diagram.
- (b) Explain the various design philosophies of steel structure.
- (c) Write the assumptions made in the analysis of bolted joints. (5+5+5 =15)
9. Design a simply supported beam to carry an uniformly distributed load of 24 KN/m of which effective span is 4 m. Assume the beam to be laterally unsupported and consider steel of grade Fe250. (15)
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