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Total No. of Pages : 03

Total No. of Questions : 09

B.Tech.(CE) (2011 Onwards) (Sem.-7,8)

**DESIGN OF STEEL STRUCTURES-II**

Subject Code : BTCE-801

Paper ID : [A2956]

Time : 3 Hrs.

Max. Marks : 60

**INSTRUCTION TO CANDIDATES :**

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.
4. Use of IS 800 : 2007 and steel table is permitted.
5. Assume any missing data.

**SECTION-A****1. Answer briefly :**

- a) List the various forces, which are used for design of gantry girder.
- b) Differentiate between sway bracing and horizontal truss bracing.
- c) State the advantages of using a knee brace.
- d) What is CDA?
- e) "No allowance for impact is to be made for foot bridge". Comment on this.
- f) Discuss the purpose of column bracket.
- g) For IRC class A loading and class 70 R, what is the value of impact percentage in case of Highway bridge having span <9m (for wheeled vehicle).
- h) "When the cost of pier is equal to the cost of trusses and bracing of one span, the total cost of bridge will be minimum". Comment on this.
- i) Why riveting is not very popular in steel structures?
- j) Write short note on angle seat connection.

**SECTION-B**

2. A plate girder section is made up of a web of 250 cm by 1.5 cm, and flange angles 150 mm × 150 mm × 12 mm and one cover plate in each flange of 45 cm × 1.5 cm. The girder is supported at either end on bearing plates 500 mm × 500 mm. If the maximum end reaction is 1750 kN, design the end stiffener using a cluster of 4 angles 150 mm × 150 mm × 15 mm. Assume  $F_y = 250$  MPa.
3. Determine the design loads on the purlins of an industrial building near Visakhapatnam, for the following data :  
  
Class of building : General with life of 50 years, Terrain : Category 2, Maximum Dimensions : 50 m, Width of building : 18 m, Height : 8 m, Topography :  $\theta$  less than  $3^\circ$ , Permeability : Medium, Span of truss : 18 m, Pitch: 0.2, Spacing of purlins : 1.43m, Spacing of trusses : 4.5m.
4. Design a suitable bearing for a plate girder railway bridge of span 3.5m centre to centre of bearings. The bridge is designed for metre gauge single track main line.
5. Describe the design procedure for column bracket.
6. Describe the design procedure for Foot Bridge.

**SECTION-C**

7. Design a gantry girder to carry an electric overhead travelling crane for the following data :  
  
Crane Capacity = 280 kN  
  
Self weight of crane alone = 185 kN  
  
Self weight of trolley, electric motor, hook etc = 70 kN  
  
Minimum approach of crane hook = 1.2 m  
  
Distance between centers of crane wheels = 3.2m  
  
Distance between cranes of gantry girders = 16 m  
  
Span of gantry girder = 8m  
  
Weight of rail section = 0.300 kN/m

8. A pratt truss girder through bridge is provided for single broad gauge track. The effective span of the bridge is 42 m. The cross girders are provided at 4.5 m apart. The stringers are spaced 2.2 m between centre lines. If 0.60 kN/m stock rails and 0.40 kN/m check rails are provided. Sleepers are spaced at 0.45 m from center to center and are of size 3m × 250 mm × 250 mm . Weight of timber may be assumed as 7.8 KN/m<sup>3</sup>. The main girder are provided at spacing of 7.5 m between the center line. Design the central top chord and bottom chord member and vertical and diagonal of central panel. The bridge is to carry standard main line loading.
9. a) Draw neat sketch and explain the design principle Stiffened seat welded connections for the transfer of shear only. (5)
- b) Determine the maximum load “W” which can be applied on the bracket plate with 8 mm fillet weld as shown in Figure 1. (5)

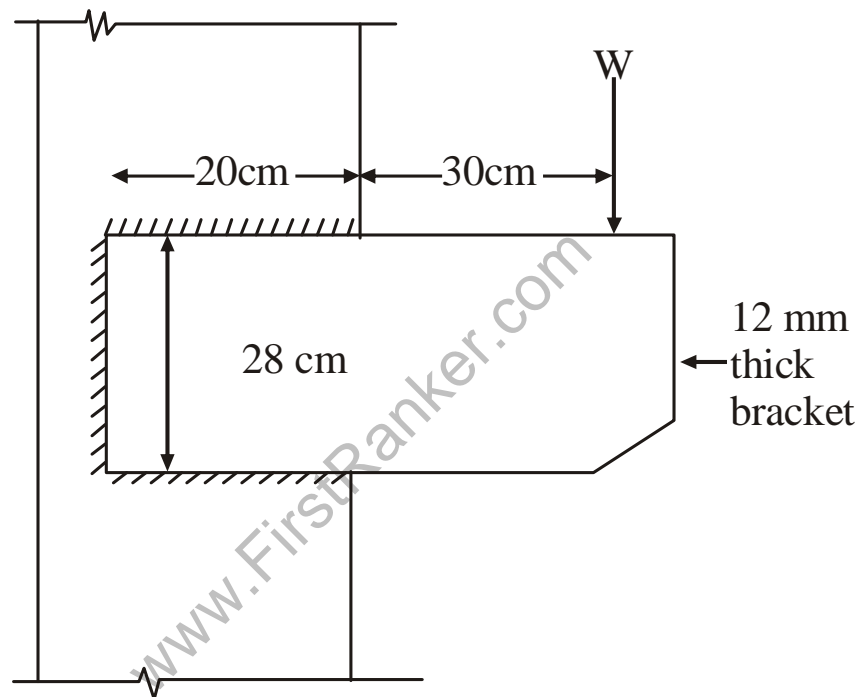


FIGURE- 1