Code No. 6394 / N

FACULTY OF ENGINEERING

B.E. 4/4 (Civil) I-Semester (New) (Main) Examination, November 2013

Subject : Structural Engineering Design and Detailing - II (Steel)

Time : 3 Hours **Max. Marks: 75**

Note: Answer all questions of Part - A and answer any one question from each unit of Part-B. Use of IS 800-1984, 2007, Steel tables and bridge code is permitted. Assume any missing data suitably.

PART – A (25 Marks)

1. Briefly explain about bearing stiffeners of plate girder. (2)
2. How the flanges of a plate girder are proportioned? (2)
3. What is economical depth of the plate girder? (2)
4. How do you account for the longitudinal forces on crane girders? How are they caused? (3)
5. Sketch a rocker and rolling bearing provided at the end of a bridge girder. (2)
6. How the impact loads are handled in the bridge design? (3)
7. What are the functions of bracing system in a truss bridge? (3)
8. How is the self weight of truss estimated for a bridge? (2)
9. Explain the simple post-critical method for calculation of shear in web buckling. (3)
10. Draw a typical cross-section of a deck type bridge, showing details. (3)

PART – B (50 Marks)

Unit - I

11. A welded plate girder is made of a web 2000mm x 20mm and flange 500mm x 40mm thick. The span of the girder is 25m and total load per metre inclusive its own weight is 27 kN/m. Design a suitable welded connection between the web and the flange and also design the bearing stiffeners and intermediate stiffeners. Shear in weld should not exceed 110 N/mm^2.

OR

12. A simply supported plate girder spans 20m and carries a uniformly distributed load (including its own weight) of 3000 kN. The section of plate girder at support is 2500mm x 8mm thick web plate, 500mm x 20mm thick flange plate and 2 ISA 200mm x 150mm x 18mm flange angle at each side. Design end bearing stiffeners and intermediate stiffeners if necessary.

Unit - II

13. Design a simply supported gantry girder to carry one electric overhead travelling crane, given : Span of gantry girder = 6.5m, Span of crane girder = 16m, crane capacity = 250 kN, self weight of crane girder, excluding trolley = 200 kN. Self weight of trolley = 50 kN, minimum hook approach = 1.0m. Distance between wheels = 3.5m. Self weight of the rails = 0.3 kN/m.

OR

14. Design an end roller bearing for a bridge for the following data. Vertical load including impact load + live load+ dead load = 1400 kN, Vertical load due to wind = 250 kN. Lateral load at the pin of the bearing due to wind = 60 kN. Allowable bearing pressure on the concrete = 7 N/mm^2.

Unit - III

15. Design a through type truss bridge (single lane) for a broad guage main line loading. The effective span of the bridge is 24m. Assume suitable data wherever necessary. Sketch neatly the design details.

OR

16. Design a deck type plate girder railway bridge for broad guage single track main line loading for the following data.
    Effective span = 16m
    Center to Center of plate girders = 2m
    Dead load of each girder = 4 kN/m
    Dead load of track with timber sleepers = 7 kN/m
    Lateral load = 9 kN/m
    Sketch the details neatly.

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