Code No. : 41011

VASAVI COLLEGE OF ENGINEERING (Autonomous), HYDERABAD
B.E. (Civil Engg.) IV Year I-Semester Main Examinations, December-2017
Design of Steel Structures-II

Time: 3 hours

Max. Marks: **70**

*Note: 1. Answer **ALL** questions of Part-A at one place and in the same order as they appear in the question paper.*

*2. Answer one question from each unit of **Part-B***

3. Use of IS: 800-2007, Steel Tables and Bridge rules is permitted.

Part-A (10 × 2 = 20 Marks)

1. Explain briefly 'bearing stiffeners' in plate girders.
2. What is economical depth of the plate girder?
3. Under what conditions web buckling of a plate girder take place.
4. Draw a sketch showing the forces acting on a gantry girder
5. Sketch two sections generally used for gantry girders
6. Sketch a 'rocker and rolling bearing' provided at the end of a bridge girder
7. Draw a typical cross-section of a deck type bridge carrying broad gauge main line loading.
8. How do you calculate the self weight of a truss girder steel railway bridge?
9. What are the functions of bracing system in a truss girder steel railway bridge?
10. Explain the 'racking force ' in a steel railway bridge.

Part-B (15 + 15 + 20 = 50 Marks)

Unit I

11. a) What is a flange splice? Is it desirable to provide or not? [3]
    b) A welded plate girder is to be designed for an effective span of 22 m. It carries a u.d.l of 90 kN/m including self weight over the entire span. Design the mid span section of the plate girder without intermediate stiffeners. Design end bearing stiffener and connections Use LSD. [12]

(OR)

12. a) What is the purpose of providing intermediate vertical stiffeners in a plate girder? [3]
    b) A simply supported welded plate girder of 18 m effective span carries two point loads of 250 kN each at one-third point and a u.d.l of 50 kN/m including self weight over the entire span. Design the mid span section of the plate girder with intermediate stiffeners. Check the section for shear stress and bending stress. Use LSD. [12]

Unit-II

13. a) Explain the terms surge loads and drag loads. [3]
    b) Design a simply supported gantry girder to carry an electric overhead traveling crane for the following data: [12]
    Crane capacity = 300 kN
    Self Weight of crane and crab = 350 kN
    Minimum approach of crane hook = 1.8m
    Distance between c/c of wheels = 3.0m
    Bay width (c/c of gantries) = 12.0m
    Span of gantry girder = 8.0 m
    Self weight of rail section = 300N/m
    Diameter of crane wheels = 150mm

(OR)

14. a) What are the uses of bearings. List the types of mechanical bearings.   [3]

     b) Design a roller cum rocker bearing for a plate girder bridge for the following data: [12]

Total vertical load inclusive of impact = 1100kN

Vertical load due to wind = 200 kN

Lateral load due to wind = 60 kN

Longitudinal force = 300 kN

The least allowable perpendicular distance between rollers in rolled position is 6 mm.

Use M20 concrete for pedestals. Draw design details.

Unit-III

15. a) In which type of bridge counter bracing is provided. Why is it necessary?   [3]

     b) Design the central bottom chord member of a through type truss bridge (single line) for   [17]
a broad gauge main line loading. The effective span of the bridge is 24m. Assume
suitable data wherever necessary. Sketch neatly the design details.

(OR)

16. a) How is the economical span of a railway bridge fixed?   [3]

     b) Design a deck type plate girder railway bridge for broad gauge single track main line   [17]
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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