P4461

[4860]-42

M.E. (Civil) (Structures)
STRUCTURAL DESIGN OF STEEL BRIDGES
(2008 Course) (Semester-I) (Elective-II) (501405)

Time : 4 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) Attempt any two questions from Section I and II.

2) Answers to the two Sections should be written in separate answer books.

3) Figures to the right indicate full marks.

4) Neat diagrams should be drawn wherever necessary.

5) If necessary, assume suitable data.

6) Use of electronic pocket calculator, relevant IS code and steel table are allowed.

SECTION-I

Q1) a) Explain in details, classification of steel bridges as per main load carrying element. **[8]**

b) State and explain different factors for the selection of type of steel bridges. **[9]**

c) State and explain design consideration of longitudinal and lateral forces for highway and railway steel bridges. **[8]**

Q2) a) Explain type of floor system for plate girder railway bridge. **[5]**

b) A deck type plate girder railway bridge of span 24 m is provided for a single broad gauge track. The overall depth of the plate girder is 2050 mm. the depth of sleeper and rail section is 400 mm. Spacing of main girder is 2.1 m. Design horizontal truss bracing and cross frame for plate girder bridge using angle section. **[20]**

Q3) a) Draw the sketch showing different component of through type truss girder railway steel bridge. **[5]**

b) A through type railway truss girder bridge consists of two Pratt trusses as shown in Fig. 3 b. The bridge supports an equivalent uniformly distributed live load 125 kN/m. The dead load transmitted to each truss inclusive of self weight is 20 kN/m. Draw the influence line diagram and find force in members U_2U_3, U_2L_3, L_2L_3 and U_3L_3. Assume the impact factor to be 15%. **[20]**
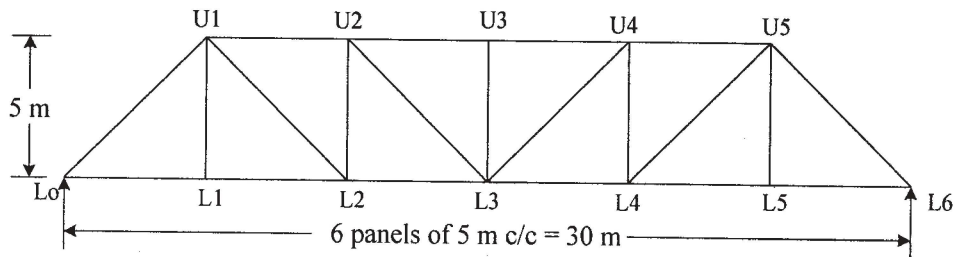
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Fig. 3 b

SECTION-II

Q4) The effective span of a deck type plate girder two lane highway bridge is 30 m. The reinforced concrete slab is 250 mm thick inclusive of the wearing coat. The foot paths are provided on either side of the carriage way. Design the maximum section of plate girder, if the bridge is to carry IRC class A loading as shown in Fig. 4. **[25]**
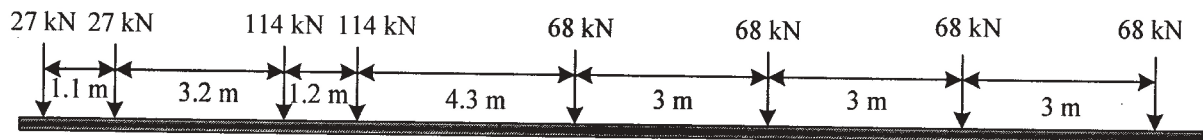

Fig. 4

Q5) The effective span of through type truss girder highway two lane bridge is 24 m. The reinforced concrete slab is 250 mm thick inclusive of the wearing coat. The foot paths are provided on either side of the carriage way. The spacing between centre to centre of truss girder is 12 m. The highway bridge is to carry IRC class A standard loading. Suggest a suitable truss girder for the bridge. Design the central top chord and diagonal members of the central panel. **[25]**

Q6) a) State and explain type of rocker bearing in steel bridges with sketches. **[10]**

b) The effective span of truss girder through type bridge for a single broad gauge track is 30 m. Reaction due to dead load, live load and impact load is 1500 kN. Vertical reaction due to wind is 250 kN. Tractive force is 476 kN and breaking force is 600 kN. Design the rocker bearing and draw design sketch. **[15]**

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