[4760] - 43

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

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

Instructions to the candidates :

1) *Attempt any two questions form 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.*
7) *Use of cell phone is prohibited in examination hall.*

SECTION - I

Q1) a) State and explain different factors for the selection of type of steel bridges.
[15]

b) Explain in details, classification of steel bridges as per structural layout of main load carrying element with sketches. **[10]**

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

b) A deck type plate girder railway bridge of span 20 m is provided for a single broad gauge track. The self weight of stock rails and check rails are 0.8 and 0.4 kN/m respectively. The self weight of sleepers is 3.2 kN/m. Design a economical cross section of plate girder and horizontal truss bracing. Draws the design sketches for the bridge structures. The EUDL for B M is 2027 kN, for S F is 2224 kN and impact factor is 0.588. **[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 if 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 20kN/m. Design central top chord and bottom chord members using channel section only. **[20]**
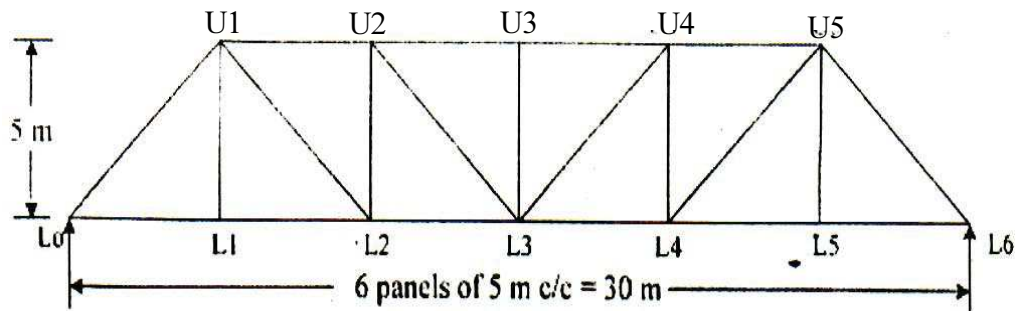
Assume the impact factor to be 15%.

Fig. 3 b

SECTION - II

Q4) a) Explain in details design consideration for the design horizontal truss bracing and cross frame for plate girder highway bridge. **[10]**

b) The effective span of a deck type plate girder two lane highway bridge is 24m. 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 b. **[15]**
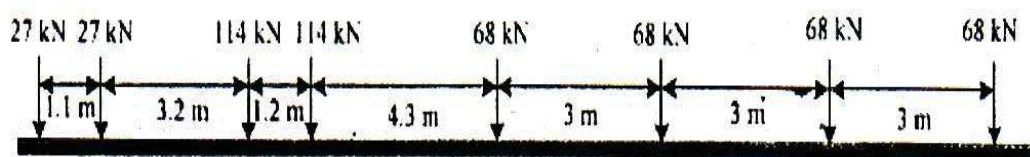

Fig. 4 b. IRC Class A Loading

Q5) The effective span of through type truss girder highway two lane bridge is 24m. 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 end bearing in steel bridges with sketches. **[10]**

b) The effective span of truss girder through type bridge for a single broad gauge track is 24 m. Reaction due to dead load, live load and impact load is 1200 kN. Vertical reaction due to wind is 180 kN. Tractive force is 900 kN and breaking force is 600 kN. Design the rocker bearing and draw design sketch. **[15]**

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