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M.E. (Civil - Structure)

STRUCTURAL DESIGN OF STEEL BRIDGES

(2008 Course) (Semester - I) (Elective - II)

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

Instructions to the candidates:

1) Attempt any two questions from Section I and Section 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 where ever necessary.

5) If necessary, assume suitable data and mention clearly.

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

SECTION - I

Q1) a)   What are the different loads acting on a steel bridge? How are the load combinations made?   **[10]**

b)   Explain with neat sketches the various components of a railway steel bridge.   **[10]**

c)   Explain CDA.   **[5]**

Q2) a)   With neat sketches explain stringers, cross-girders in a through type railway bridge.   **[8]**

b)   A through type plate girder railway bridge carries a single line broad gauge track. The span of the bridge is 20 m. The plate girders are provided at 4.65 m c/c. The stringers are provided at 2 m c/c along the center line. The cross - girders are provided at 1.7 m c/c. The EUDL for BM is 460 kN and for SF is 600 kN and, CDA = 1.0. Design the stringers and the cross - girders.   **[17]**

Q3) a) Explain the functions of portal bracings with neat sketch. **[10]**

b) Determine the forces in the various members of the portal bracing system shown in Fig. 1 and plot the shear force, bending moment and axial force diagram for the member AB. **[15]**
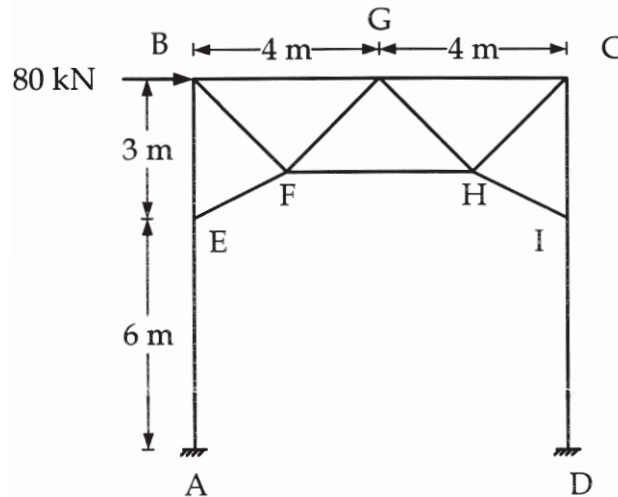

Fig. 1

SECTION - II

Q4) Design the plate girder for the highway bridge having an effective span of 25m. The bridge carries a carriageway of 7.5 m. The deck slab is 350 mm thick. The thickness of wearing coat is 40 mm. The bridge is to be supported on 3 number of plate girders spaced at equidistance. The bridge is to be designed for IRC class A loading. **[25]**

Q5) The effective span of the through type highway bridge shown in Fig. 2 is 32m. The bridge has a carriage way of 7.5 m along with two footpaths of 1.5 m on either side. The thickness of the deck slab is 300 mm. The thickness of wearing coat is 80 mm. The bridge is required to carry IRC class 70R loading. Design the members L_0U_1; L_1U_1; L_2U_1; and U_1U_2. Design the joint at L_1 Sketch the details of the connections. **[25]**
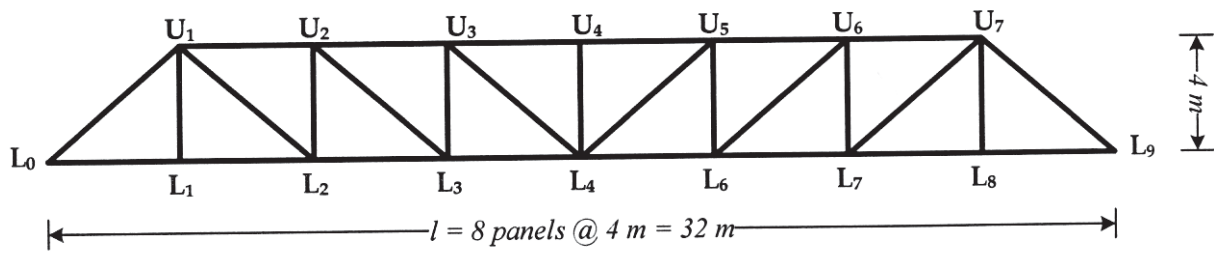
Fig. 2

l = 8 panels @ 4 m = 32 m

Q6) a) Explain the design procedure for an elastomeric bearing. **[10]**

b) What are the functions of bracings in a steel bridge? Explain the different types with neat sketches. **[15]**

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