Total No. of Questions : 8]

SEAT No. :

P3596

[Total No. of Pages : 4

[5154]-4
B.E.Civil
STRUCTURAL DESIGN OF BRIDGES
(2008 Course)

Time : 3 Hours] *[Maximum Marks : 100*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, from section -I.***

2) ***Answer Q5 or Q6, Q7 or Q8, from section -II.***

3) ***Answer to the two sections should be written in separate answer-books.***

4) ***Figures to the right indicates full marks.***

5) ***IS 1343, IS 456, IS 3370 are allowed.***

6) ***Assume suitable data wherever necessary and mentioned it clearly.***

SECTION -I

Q1) a) Write detail classification of Bridges. **[10]**

b) How will you calculate economic span of bridge and what is its importance. **[10]**

c) Explain scour depth of a bridge? **[5]**

OR

Q2) a) Explain various types of IRC loadings. **[10]**

b) Explain Piguard's method. **[10]**

c) Explain importance of impact load in design of bridges. **[5]**

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Q3) An R.C.T.-Beam deck slab bridge shown in Fig. 3 has the following details. **[25]**

a) Thickness of railings -100 mm.

b) Thickness of footpath - 180 mm.

c) Thickness of wearing coat -80 mm.

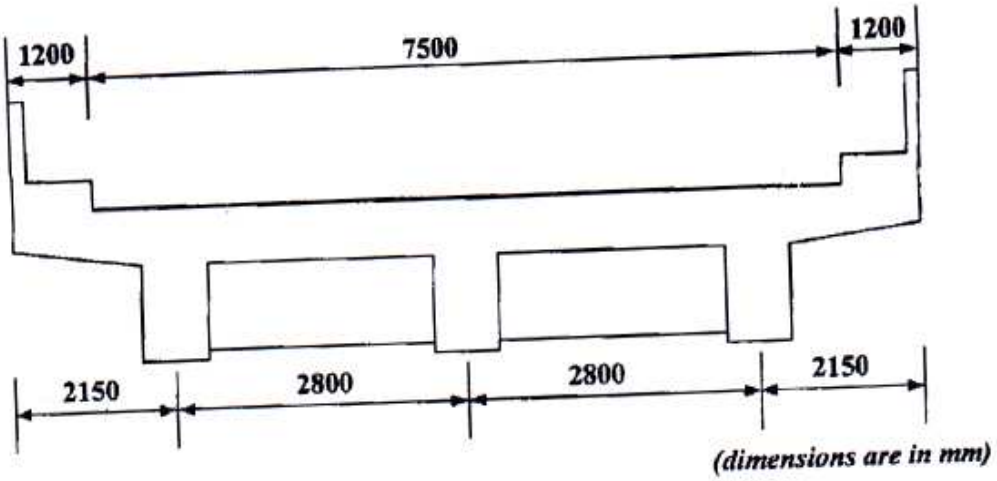
d) Span of main girder -15.0m.

e) Spacing of cross-beams -3.0 m c/c.

f) Live load -IRC class AA Tracked Vehicle.

g) Materials -M30 grade of concrete and Fe 500 grade of steel Adopt m1 = 0.08 and m2 =0.059.

Design the deck slab and also sketch the details of reinforcement.



OR

Q4) For the R.C. T-beam deck slab Bridge given in Q.3, design the intermediate post-tensioned prestressed girder. Use M45 grade of concrete and high tension strands of 9 ply 15.2 mm diameter having an ultimate tensile strength of 1400 N/mm2. Use Fe 415 steel for supplementary reinforcement. Consider loss ratio as 0.85. Sketch the cable profile for the girder. **[25]**

SECTION -II

Q5) a) Explain various types of steel bridges with suitable sketches. **[12]**

b) Explain various types of Bridge bearings. **[13]**

OR

Q6) a) Design a rocker and roller bearing for the given data. **[18]**

i) Reaction from the girder = 3500 kN.

ii) Allowable pressure on bearings = 6 N/mm2

iii) Allowable pressure on bearing plate = 2500 N/mm2

iv) Allowable pressure on concrete bed = 7 N/mm2

sketch the details.

b) What are the factors considered during the selection of bearing for steel bridges? **[7]**

Q7) Using channel sections, design the members U2-U3, U2-L3 and U3-L3 for the railway steel truss bridge shown in Fig. 7. Also draw a neat sketch of the connection of members at U3, **[25]**

i) Weight of stock rail -0.75 kN/m.

ii) Weight of check rail -0.55 kN/m.

iii) Timber sleepers of size - (0.25 × 0.25 × 2.5)m @ 0.45 m c/c.

iv) Unit weight of timber - 7.5kN/m3

v) Spacing of truss -5.0 m c/c.

vi) The bridge supports a Eudl of 2950 kN.

Assume height of truss is 5.0m.

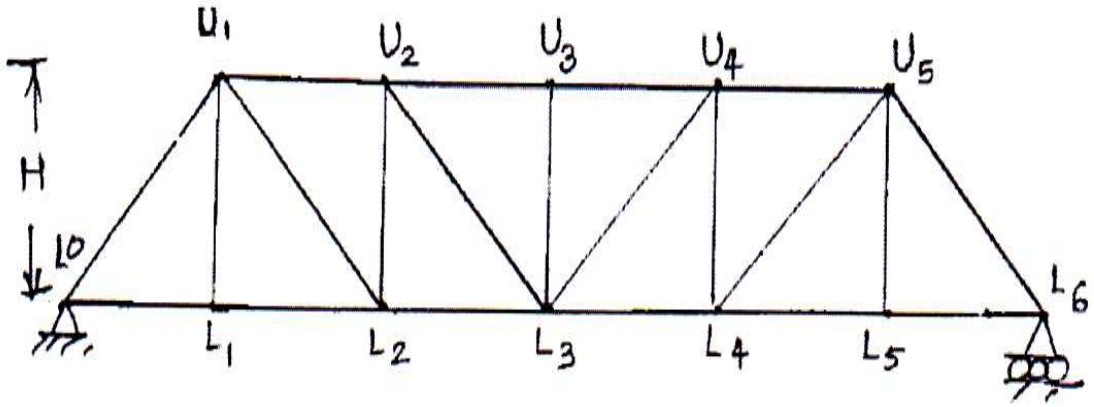


Fig.7 6panels @4m each

OR

Q8) For the railway bridge shown in Fig. 7, design the top and bottom lateral bracing with the given data. The rails are 850 mm above the c.g. of bottom chord. The chord members are 500 mm deep and 600 mm wide. The end posts are 475 mm deep and 475 mm wide. The web members are 475 mm deep and 240 mm wide. **[25]**

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