Total No. of Questions : 8]

SEAT No. :

P1909

[Total No. of Pages : 3

[5254]-4

B.E. (Civil)

STRUCTURAL DESIGN OF BRIDGES

(2008 Pattern) (Elective - I)

Time : 3 Hours] *[Max. Marks : 100*

Instructions to the candidates:

1) ***Ans Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q. 7 or Q.8.***
2) ***Figures to the right indicate full marks.***
3) ***IRC-6, 83,112 and IS 456-2000, IS1343 are allowed.***
4) ***Assume suitable data wherever necessary.***
5) ***Use of non programmable calculator is allowed.***

SECTION - I

Q1) a) Explain Courbon's theory for determining the load carried by longitudinal girders. **[10]**

b) Explain economic span of a bridge. **[10]**

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

OR

Q2) a) Explain IRC loadings with suitable examples. **[10]**

b) Explain the different types of bearing used in R.C. bridges. **[10]**

c) Explain impact load. How it is calculated for R.C. bridges. **[5]**

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

a) Thickness of railings - 120 mm.

b) Thickness of footpath - 180 mm.

c) Thickness of wearing coat - 85 mm.

d) Span of main girder - 18.0 m.

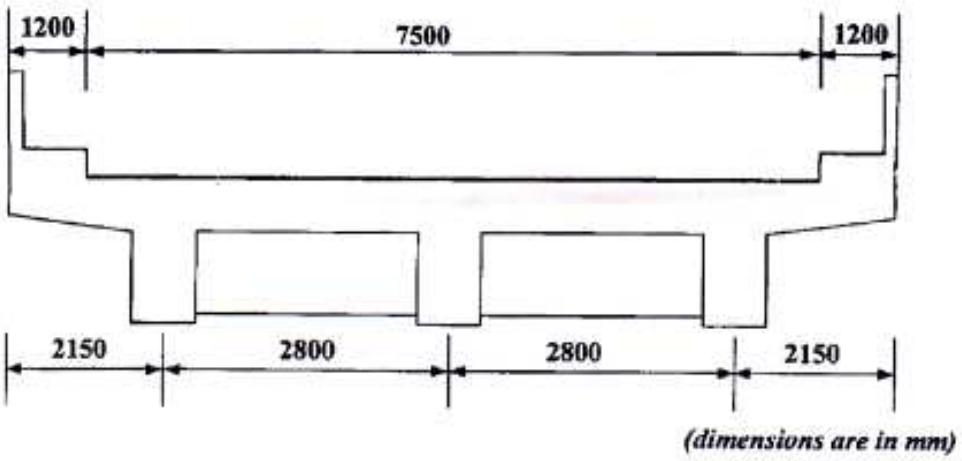
e) Spacing of cross-beams - 3.0 m c/c.

P.T.O.

f) Live load - IRC Class AA Tracked Vehicle.

g) Materials - M30 grade of concrete and Fe 415 grade of steel Adopt $m_1 = 0.08$ and $m_2 = 0.059$.

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/mm^2. 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 in brief the advantages of steel bridges. **[12]**

b) Explain in brief with neat sketches the various types of railway steel bridges. **[13]**

OR

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

i) Reaction from the girder = 2500 kN.

ii) Allowable pressure on bearings 6 N/mm^2

iii) Allowable pressure on bearing plate = 2500 N/mm^2

iv) Allowable pressure on concrete bed = 7 N/mm^2 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 U_2-U_3, U_2-L_3 and U_3-L_3 for the railway steel truss bridge shown in Fig. 7. Also draw a neat sketch of the connection of members at U_3 **[25]**

a) Weight of stock rail - 0.78 kN/m.

b) Weight of check rail - 0.58 kN/m.

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

d) Unit weight of timber - 7.6 kN/m^3

e) Spacing of truss - 6.0 m c/c.

f) The bridge supports a Eudl of 2950 kN.

Assume height of truss is 5.0m

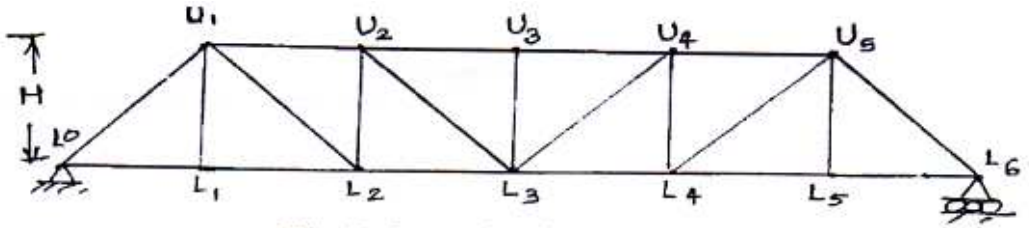


Fig.7 6panels @4m each

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]**