Total No. of Questions : 8]

SEAT No. :

P1677

[Total No. of Pages :3

[4859]-4
B.E. (CIVIL)
a-STRUCTURAL DESIGN OF BRIDGES
(Elective-I) (2008 Course) (Semester - I)

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

Instructions:

1) ***Answer Q.1 or Q.2,Q.3 or Q.4, From Section-I.***
2) ***Answer Q.5 or Q.6,Q.7 or Q.8, 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 456, IS800,IS1343,IRC-21-2000, IRC-83 PART-I and steel tables are allowed.***
6) ***Assume suitable data wherever necessary and mentioned it clearly.***

SECTION - I

Q1) a) Explain various loads specified by IRC **[8]**

b) Classify bridges according to material of construction and forms of superstructure. **[10]**

c) Explain roll of Impact factor in the design of highway bridges. **[7]**

OR

Q2) a) Explain Pigeaud's Method of analysis of slab bridges. **[8]**

b) Explain Courbon's theory of determining the load carried by longitudinal girder. **[10]**

c) Explain the Economic span of the bridges and how it is calculated. **[7]**

Q3) Design the Cantilever slab and Interior panel of the deck slab of R.C.C T-beam deck slab Bridge with the given details and draw the necessary details. **[25]**

a) Carriage way-2 lane
b) Footpath on either side-1.2 m
c) Thickness of railing-100mm
d) Thickness of footpath--150mm
e) Thickness of wearing coat-80mm
f) Span of main girder-25m
g) Spacing of cross beams--3.0mc/c
h) Live load IRC class AA tracked vehicle
i) Use M-40 and Fe-500
j) Assume $m_1 = 0.055$ and $m_2 = 0.038$

P.T.O.

OR

Q4) For the R.C.C T-Beam deck Slab Bridge given in Que-No-3 design the intermediate post tensioned girder along with end block Use M-45 grade of concrete and high Tensile strands 7 ply 15.2 mm in diameter having ultimate tensile strength of 1600 N/mm^2. Use Fe-415 for supplementary reinforcement consider loss ratio as 0.85 sketch the cable profile. **[25]**

SECTION - II

Q5) a) Explain in brief the advantages of steel bridges over concrete bridges. **[10]**

b) Explain in brief with neat sketches the various types of railway steel bridges. **[10]**

c) Explain the function of bracings. **[5]**

OR

Q6) a) Design elastomeric bearing for the given data and also sketch the details. **[18]**

i) Maximum normal load = 1500 kN.

ii) Minimum normal load =250 kN.

iii) Lateral load = 25 kN.

iv) Longitudinal load = 80 kN.

v) Total longitudinal translation =10 mm.

vi) Rotation at support = 0.0015.

vii) Shear modulus of elastomer =1.2 N/mm^2.

viii) Allowable compressive stress for concrete = 8 N/mm^2

ix) Allowable compressive stress for elastomer = 7 N/mm^2.

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. below. Also draw a neat sketch of the connection of members at U3. **[25]**

a) Weight of stock rail - 0.70 kN/m.

b) Weight of check rail - 0.50 kN/m.

c) Timber sleepers of size - (0.25 x 0.25 x2.5)m @ 0.45 m c/c.

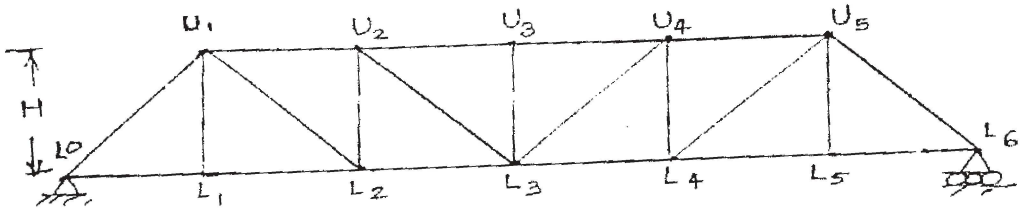
d) Unit weight of timber -7.0kN/m^3.

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

f) The bridge supports a EUDL of 2950 kN.

g) Assume height of truss is 6.0m.

h) Assume 6 panels @ 5m 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 650 mm above the c.g. of bottom chord. The chord members are 450 mm deep and 550 mm wide. The end posts are 450 mm deep and 450 mm wide. The web members are 450 mm deep and 250 mm wide. **[25]**