Total No. of Questions : 12]

SEAT No. :

P3295

[Total No. of Pages : 4

[4959]-4

B.E. (Civil) (Semester - I)

STRUCTURAL DESIGN OF BRIDGES (Elective - I)

(2008 Course)

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

Instructions to the candidates:

1) ***Answer Que.1 or Que.2, Que.3 or Que.4, Que.5 or Que.6 from Section I and Answer Que.7 or Que.8, Que.9 or Que.10 and Que.11 or Que.12 from Section-II.***
2) ***Answer to the two sections should be written in Separate answer books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Assume suitable data, if necessary & mention it.***
6) ***Use of cell phones is prohibited in examination hall.***
7) ***Use of Non-programmable Electronic Pocket calculator is allowed.***
8) ***Use of I.S. 456, I.S. 800, 875, I.S. 1343 & Steel table is allowed.***

SECTION - I

Q1) a) Give the classification of bridges according to material used for construction and forms of super structure. **[8]**

b) Explain the various loads considered in the Design of highway bridges. **[8]**

OR

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

b) Explain role of impact factor in the design of Highway Bridge & how it is calculated. **[8]**

Q3) Design an interior panel of a R.C.C. T-beam deck slab bridge for a two lane highway with following data.

a) Span of bridge = 27 m

b) Foot path on either side = 1.2 m

P.T.O.

c) Width of carriage way = 7.5 m

d) Three longitudinal girders are provided at 3.3 m c/c

e) Cross girder spacing = 3.0 m c/c

f) Thickness of wearing coat = 75 mm

g) Loading IRC class AA tracked vehicles.

h) Use m1 = 0.038 and m2 = 0.031 for D.L and

m1 = 0.08 and m2 = 0.059 for L.L

Use M30 and Fe 415, Sketch the Details of Reinforcement. **[18]**

OR

Q4) The following Data is referred for Proposed Highway Bridge.

a) Span of bridge - 30 m

b) Width of carriage way - 7.5 m

c) Width of foot path on either side - 1.2 m

d) Spacing of Main girder = 3 m c/c.

e) Spacing of cross-girders = 5 m c/c.

f) Material M40 & High tensile steel strands with loss ratio 0.85

Design the intermediate Post tensioned pre-stressed main girder. **[18]**

Q5) a) Design the cantilever of R.C.C.T - beam Deck Bridge for Que.3 above and & Draw the details of Reinforcement. **[10]**

b) Explain economic span of highway bridge. **[6]**

OR

Q6) Design an electrometric pad bearing for following data.

a) Span of main girder = 20 m

b) Live load on bearing = 900 kN

c) Dead load on bearing = 350 kN

d) Longitudinal frictional force on bearing = 45 kN

e) Rotation on bearing = 0.0025 rad

f) Concrete grade - M 30

g) Shear Strain = 5×10^{-4} **[16]**

SECTION - II

Q7) a) Explain in brief the various forces acting on Railway Bridge. **[8]**

b) Classify railway steel bridges according to cross section, span and type of connection. **[8]**

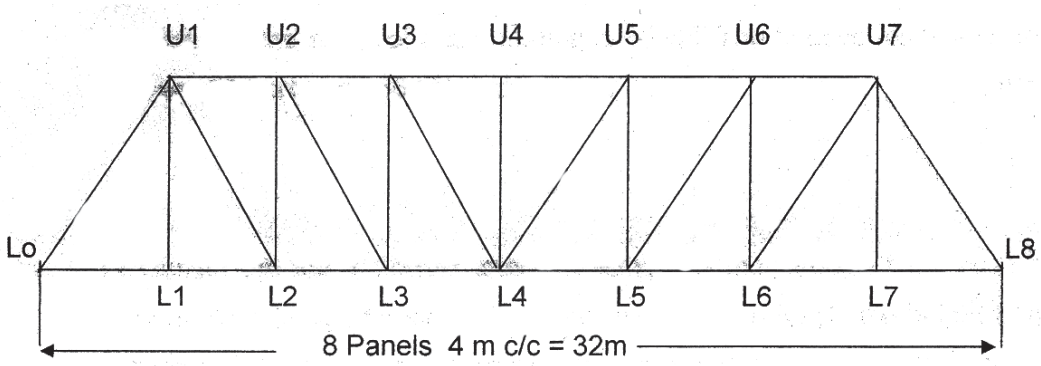
OR

Q8) a) Explain in brief arrangement of deck & through type truss girder bridges with sketches. **[8]**

b) Explain in brief dynamic effect & impact effect for the design of railway truss steel bridges. **[4]**

c) Describe Hudson's formula. **[4]**

Q9) A truss girder through type railway steel bridge consist of two pratt trusses as shown in fig (1) the span of truss in 32 m c/c of bearings, the bridge supports EUDL of 100 kN/m the D.L transmitted to each truss including self wt is 20 kN/m. Considering impact factor as 0.35. Design member U_3U_4 and U_3L_4. Spacing of Truss is 3m and height of truss is 4m. **[18]**



(Fig 1)

OR

Q10) Using channel section, design the members $U_2 - U_3$, $U_2 - L_3$, $U_3 - L_3$ for the railway truss bridge shown in fig (2) also draw the neat sketch of connection details of joint U_3.

a) Weight of stock rail – 0.68 kN/m.

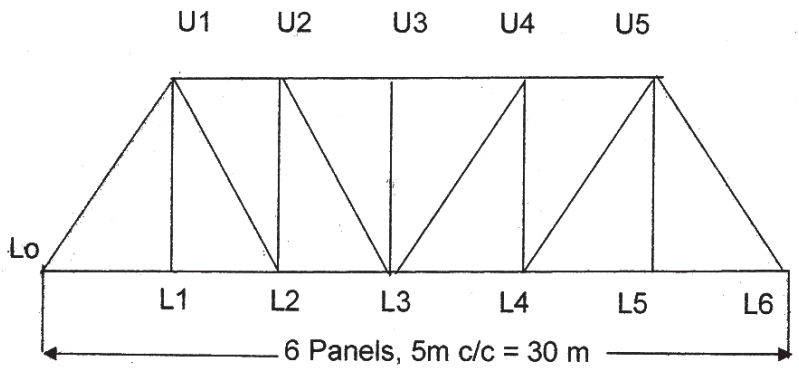
b) Weight of check rail – 0.48 kN/m.

c) Timber Sleeper 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 - 6.00 m c/c.

f) The bridge supports a EUDL of 2950 kN. **[18]**



(Fig 2)

Q11) Design the rocker bearing for 30 m span truss girder Railway Bridge with following Data.

The reaction due to D.L, L.L & Impact load is 1500 kN, Vertical reaction due to overturning effect of wind at each end of girder is 120 kN. The lateral load due to wind effect of each bearing is 60 kN. The tractive force and braking force are 981 kN and 686 kN respectively. **[16]**

OR

Q12) Design the top & bottom lateral bracing for the through type truss girder railway steel bridge for single B.G track as shown in fig (1) the height of girder between C.G to C.G of chord member is 6.0 m the spacing between main girder is 7.0 m the rail is 800 mm above the C.G of bottom chord. The chord members are 600 mm deep and 650 mm wide. The end post is 600 mm deep and 660 mm wide. The Inner web members are 600 mm deep & 600 mm wide. **[16]**

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