Total No. of Questions : 10] SEAT No. :

P2042 [Total No. of Pages : 3

[4859] - 1004

B.E. (Civil)

STRUCTURAL DESIGN OF BRIDGES

(2012 Pattern) (Elective- I)

Time : 2½Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2; Q.3 or Q.4; Q.5 or Q.6; Q.7 or Q.8; and Q.9 or Q.10.***
2) ***Figures in bold, to the right indicate full marks.***
3) ***IRC: 6, IRC:112, IS 456, IS 800, IS 1343 and Steel table are allowed in the examination.***
4) ***Neat diagrams should be drawn wherever necessary.***
5) ***If necessary, assume suitable data and indicate clearly.***
6) ***Use of electronic pocket calculator is allowed.***

Q1) What are IRC loading standards? Explain any one loading case. **[10]**

OR

Q2) Explain loading standards for railway bridges. **[10]**

Q3) What are Pigeaud's curves? Explain in brief. **[10]**

OR

Q4) Show the placing of wheel loads for obtaining maximum bending moment and shear force on an interior panel of a T-beam deck slab bridge for IRC Class 70R and Class A loading. **[10]**

Q5) Design the members U_2-U_3, U_2-L_2 for the broad gauge railway steel truss bridge shown in fig.1. The details are as follows. **[18]**

a) Weight of stock rail =0.65kN/m,

b) Weight of check rail =0.5kN/m

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

d) Unit weight of timber =6.2kN/m^3

e) Spacing of truss = 6.0 m c/c

P.T.O.

f) Equivalent uniformly distributed load for BM and SF are 3498kN and 3815kN respectively.

g) CDA = 0.324

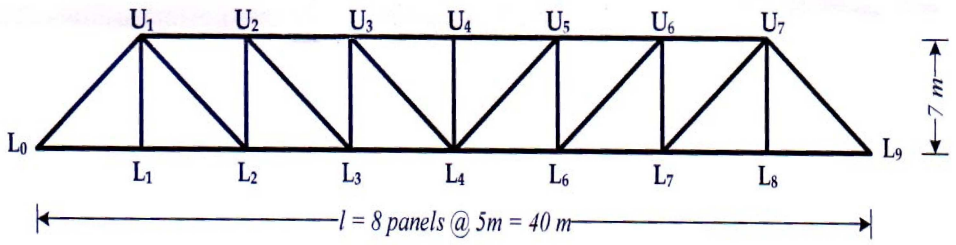

Fig. 1

OR

Q6) For the problem given in Q.5 design the members L_2-L_3 and L_3-U_2. **[18]**

Q7) Design an elastomeric bearing for the given data and also sketch the details. **[16]**

a) Maximum normal load = 1250 kN.

b) Minimum normal load = 400kN

c) Lateral load = 35kN

d) Longitudinal load =85 kN

e) Total longitudinal translation =10mm

f) Rotation at support =0.001

g) Shear modulus of elastomer = 1.0 N/mm^2

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

i) Allowable compressive stress for elastomer = 9N/mm^2

OR

Q8) a) What are bearings? Explain the classification of various types of bearings with neat sketches. **[8]**

b) Explain the design procedure for rocker bearing. **[8]**

Q9) a) Explain with neat sketches the different types of piers used for reinforced concrete and steel bridges. **[8]**

b) Explain the loads considered in the design of piers and abutments. **[8]**

OR

Q10) Design a RC abutment for a RC T-beam deck slab bridge with the following data. **[16]**

a) Span = 15m

b) Width of carriageway =7.5m

c) Footpath = 1.5 m on either sides

d) Live load on the deck slab =IRC Class A

e) Dead weight of span = 4000 kN

f) Longitudinal force = 200 kN

g) Load on footpath =5kN/m^2

h) RL of formation = 500.000 m; RL of cg of girder = 499.100 m; RL of center of bearing pin = 498.000 m; RL of bed level =490.000 m.

i) Unit weight of backfill soil = 18kN/m^3

j) Allowable bearing pressure =250 kN/m^2

k) μ=0.35, Φ=35°, Ground acceleration = 0.1g.

l) Materials = M 30 grade concrete and steel of grade Fe500

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