Total No. of Questions : 6]

SEAT No. :

P4670

[Total No. of Pages : 3

[4860]-38

M.E. (Civil Structures)

STRUCTURAL DESIGN OF CONCRETE BRIDGES

(2008 Pattern) (Elective - I(b)) (Semester - I)

Time : 4 Hours] *[Max. Marks : 100*

Instructions to the candidates:

1) ***Solve any two questions from each section.***
2) ***Answers to the two sections should be written in separate answer books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right side indicate full marks.***
5) ***Use of calculator and relevant IS codes is allowed.***
6) ***Assume suitable data if necessary.***

SECTION - I

Q1) Write detail notes on with appropriate sketches.

a) Structural forms of bridge decks. **[9]**

b) IRC standards for live load on different road bridges. **[8]**

c) Planning of bridges. **[8]**

Q2) Design the culvert with the data : **[25]**

Clear span of the culvert = 5.6m.

Clear carriage way width = 7.5m

Size of kerb = 150mm × 600mm

Average thickness of wearing coat 100mm

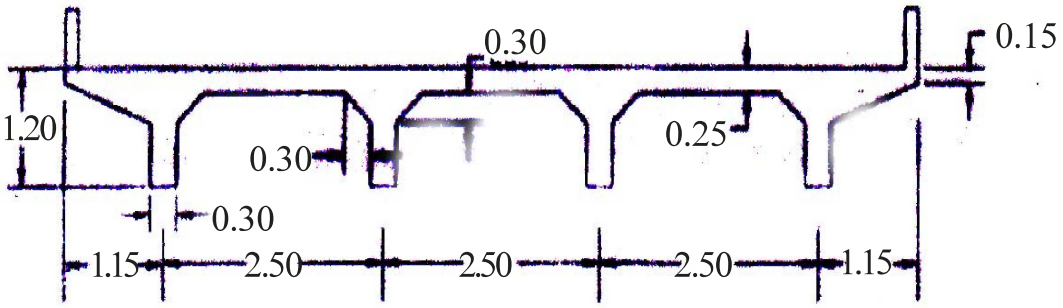
Use material M20, Fe500

Loading class AA

Draw the cross section showing details of reinforcement at mid-span and at junction of the slab are kerb.

P.T.O.

Q3) Design slab, cross girder and main girder of RCC T-beam and slab girder deck for the crossing of a national highway. The cross section is as shown in figure 1. Consider interior panel of the deck slab. Place the loads so as to produce critical SF and BM in the deck slab and girder. Draw neat sketches showing details of reinforcement in plan and elevation. Take the spacing of cross girders as 3 m C/C. Use M25 Fe 500. **[25]**



SECTION - II

Q4) a) Differentiate between rigid frame bridges are different from simply supported bridges with appropriate explanatory sketches. **[8]**

b) Describe different factor affecting the design of rigid frame bridge. **[8]**

c) Necessity and function of expansion joint. **[9]**

Q5) Design a reinforced elastomeric bearing at a pinned end of a plate girder of a bridge with following data : **[25]**

Maximum vertical load = 900kN

Dynamic vertical load = 90 kN

Transverse lateral load = 40 kN

Longitudinal load = 50 kN

Longitudinal total translation = 12mm

Rotation at support = 0.003°

Shear modulus of elastomeric bearing = 1.2 N/mm^2

Allowable comp. Stress for concrete = 8 N/mm^2

Allowable comp. Stress for elastomer = 10 N/mm^2

Q6) Design wall type RCC pier for the following : **[25]**

Top width of pier = 1 m with semicircular ends

Length of pier = 6m excluding the semicircular part

Height of above footing = 10 m

HFL above the top of footing = 8 m

Total DL Reaction = 1800 kN

Total LL Reaction = 1200 kN

Tractive force = 120 kN

C/C distance of bearing on either side of centre line of pier = 1 m

BM in traffic direction due to unequal DL & LL = 600 kN-m

Material of pier and footing = M35 & Fe 500

Safe bearing capacity = 180 kN/m^2

Velocity of water current = 3 m/s consider the cross current also

Design the RCC footing and reinforcement in pier, check the stresses at the bottom of pier.