Total No. of Questions : 8]

P4746

SEAT No. :

[Total No. of Pages : 3

[5060]-547
M.E. Civil (Structures)
STRUCTURAL DESIGN OF RCC AND PRESTRESSED BRIDGES
(2013 Pattern)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***All answers should be written in same book.***
3) ***Figures to the right indicate full marks.***
4) ***Use of IRC- 5,6,18,27,45,78 & 83 codes, IS 1343, IS 456-2000 is allowed.***
5) ***Mere reproduction of theory from IS or IRC codes as answer will not get full credit.***
6) ***Neat diagrams must be drawn wherever necessary.***
7) ***Assume any other data if necessary.***

Q1) a) Write short note on structural forms of bridge decks. **[5]**

b) What are the factors affecting the span of bridge. **[5]**

Q2) a) Write short note IRC 70R loading. **[5]**

b) Explain loading standards for railway bridges. **[5]**

Q3) Design only slab the slab culvert with the data: **[10]**

Clear span of the culvert = 6.1 m Clear carriage way width = 7.5m

Size of kerb = 200mm x 600 mm

Average thickness of wearing coat 80 mm

Use material M25 ,Fe 415

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.

Q4) Design the deck slab only and calculate the maximum bending moment and shear force intermediate post tensioned prestressed concrete bridge girder for the following. Effective span=20 m, width of carriageway=7.5m, No. of beams 3, equally spaced along the carriageway width, Spacing of cross girders=4m c/c, width of footpath on either side of carriageway=lm loading class=IRC class AA, kerb size = 200 X 600mm, Material M25 & TMT for deck slab. **[10]**

Q5) a) Differentiate between rigid frame bridges and simply supported bridges. **[5]**

b) Explain with sketches, how rigid frame bridges are classified. **[5]**

Q6) Design a reinforced elastomeric bearing at a pinned end of a plate girder of a bridge with following data. **[10]**

Maximum vertical load = 600 kN

Dynamic vertical load = 50 kN

Transverse lateral load = 60 kN

Longitudinal load = 50 KN

Longitudinal total translation =10 mm

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

Q7) a) Explain the forces acting on wing wall for bridges. **[5]**

b) Explain with sketches, the type's wing walls. **[5]**

Q8) Design open well type foundation for a pier in sandy soil for following: **[10]**

Diameter of pier at bottom=1 .8 m

Height of bearing above the maximum scour level = 30 m

Permissible horizontal displacement at bearing level = l0mm

Total vertical load including self-weight of pier = 10000 kN

Total lateral force at scour level = 180 kN

Submerged unit weight of soil = 10 kN/m^3

Material of pier and footing = M30 & Fe500

Design the RCC well and check the stresses at the staining