(15)

Total No. of Questions : 8]

SEAT No. :

P3856

MAY 2016

[Total No. of Pages : 2

[4960] - 1036

M.E. (Civil) (Structure Engg.)

STRUCTURAL DESIGN OF R.C.C AND PRESTRESSED BRIDES

(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 IR C- 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) State and explain Data required for design of bridges. **[5]**

b) Write detailed note on classification of bridges. **[5]**

Q2) a) Differentiate between IRC Class AA and A loading. **[5]**

b) Explain impact load on road bridges. **[5]**

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

Clear span of the culvert = 4.5 m

Clear carriage way width = 7.5m

Size of kerb = 150 mm × 600 mm

Average thickness of wearing coat 100 mm

Use material M30, Fe 500

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 only the deck slab and calculate the maximum bending moment and shear force for intermediate post tensioned prestressed concrete bridge girder for the following data
Effective span = 12m, width of carriageway = 7.5m, No. of beams 3, equally spaced along the carriageway width, Spacing of cross girders = 3m c/c, width of footpath on either side of carriageway = 1.2m loading class = IRC class AA, kerb size = 150 × 600mm, Material M25 & TMT for Deck slab and M40 & Multi-strand cables for girder. **[10]**

Q5) a) Describe with sketches the component parts of rigid frame bridges. **[5]**
b) Explain with sketches, what are the merits and demerits of rigid frame bridges over simply supported bridges. **[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 = 300 KN
Dynamic vertical load = 50 KN
Transverse lateral load = 40 KN
Longitudinal load = 40 kN.
Longitudinal total translation 12 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 necessity of wing wall for bridges. **[5]**
b) Explain with sketches, the wing walls with geo-textile. **[5]**

Q8) Check the stability of the abutment for the following : **[10]**
Top width of abutment = 1 m
Height of abutment = 4m.
Front face of abutment is vertical
and the back face is battered at 1:6.
Material of abutment = stone masonry.
Unit Weight of soil = $18kN/m^3$
Angle of repose = 28°
Superstructure: A T beam- bridge with span 15 m.
Type of loading: IRC class AA

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