Total No. of Questions : 8]

SEAT No. :

P4021

[Total No. of Pages : 3

[5255]-518

M.E. (Civil) (Structures)

DESIGN OF RCC & PRESTRESSED CEMENT CONCRETE BRIDGES

(2013 Course) (Semester-III) (601014)

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 and 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) Explain Economic Span of Bridge and how it is calculated. **[5]**

b) Classify the bridges according to material of construction. **[5]**

Q2) a) Explain importance of Impact load analysis on road bridges. **[5]**

b) Explain IRC Class AA and Class B standards of loadings. **[5]**

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

Clear span of the culvert = 5.0 m

Clear carriage way width = 7.5 m

Size of kerb = 200 mm × 400 mm

Average thickness of wearing coat 80 mm

Use material M 20, 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 the deck slab only and calculate the maximum bending moment and shear force intermediate post tensioned pretressed concrete bridge girder for the following. Effective span = 21 m, width of carriageway = 7.5 m. No. of beams 3, equally spaced along the carriage way width, Spacing of cross girders = 3 m c/c, width of footpath on either side of carriageway = 1 m loading class = IRC class AA, kerb size = 200×600 mm, Material M25 & TMT for deck slab. **[10]**

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

b) Explain factors affecting design of rigid frame bridges. **[5]**

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

Maximum Vertical load = 1500 kN

Minimum Vertical load = 500 kN

Dynamic Vertical load = 60 kN

Transverse lateral load = 50kN

Longitudinal load = 60 kN

Longitudinal total translation = 10 mm

Rotation at support = 0.002°

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 selection criteria for wing wall. **[5]**

b) Explain with sketches various types of wing walls. **[5]**

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

Diameter of pier at bottom = 2.0 m

Height of bearing above the maximum scour level = 16 m

Permissible horizontal displacement at bearing level = 10 mm

Total vertical load including self-weight of pier = 6500 kN

Total lateral force at scour level = 150 kN

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

Material of pier and footing = M 30 & Fe 500

Velocity of water current = 3 m/s consider cross current ratio

Design the RCC well and check the stresses at the staining.

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