Total No. of Questions : 8]

SEAT No. :

P4115

[Total No. of Pages :3

[4760] - 1036
M.E. (Civil) (Structures)
DESIGN OF R.C.C. AND Pr.C.C. BRIDGES
(2013 Credit Pattern) (Semester -III)

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

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***All answers should be written in same answer book.***
3) ***Figures to the right indicates full marks.***
4) ***Use of IRC-5, 6,18, 27, 45,78 & 83 Codes, I.S. 1343, IS-456-2000 is allowed.***
5) ***Mere reproduction of IS Code & IRC Codes as answer will not considered as answer.***
6) ***Assume suitable data, if required.***

Q1) a) Classify the bridges according to materials of construction and forms of Superstructure. **[5]**

b) Explain various types of loads and forces considered in the design of bridges. **[5]**

Q2) a) Explain the role of Impact factor in the design of highway bridges. **[5]**

b) Explain with neat sketches various types of highway bridges. **[5]**

Q3) Design a R.C.Box culvert having clear waterway 3.5m ×3.5m, the superimposed D.L. on culvert is 13.5KN/m^2 and L.L. on culvert is 65KN/m^2, density of soil at site is 18KN/m^3 and angle of repose is 30º. Use M20 and Fe 500, Sketch details of Reinforcement in box culvert. **[10]**

Q4) Design the deck slab and calculate the maximum Bending moment and Shear force for the intermediate post tensioned pre stressed concrete bridge girder for the following data **[10]**

a) Effective span = 18m,

P.T.O.

b) width of carriage way = 7.5m

c) No. of beams = 3 equally spaced along the carriage way width

d) Spacing of girders = 3m c/c

e) Width of footpath = 1.2m

f) Loading -IRC class AA tracked vehicle

g) Kerb size – 200 mm ×600mm

h) Material -M25 & Fe 500 for deck slab & Multi strand cables for girder

Q5) a) Explain design criteria of rigid frame bridges with suitable sketches. **[5]**

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

Q6) Design the elastomeric pad bearing to support the Tee beam girder of bridge using following data. **[10]**

a) Maximum D.L. reaction per bearing - 300KN

b) Maximum L.L. reaction per bearing - 700 KN

c) Longitudinal force due to friction per bearing - 45 KN

d) Estimated rotation at bearing of girder due to DL & LL = 0.002 radians

e) Estimated strain due to creep, shrinkage & temperature = 6×10^{-4}

f) Concrete for Tee beam & bed block = M 25

Q7) a) Explain various factors to be considered while designing Wing Wall. **[5]**

b) Differentiate between Pre cast wing wall & R.C.C Wing wall. **[5]**

Q8) The Pier of a major fly over bridge transmits a load of 9000KN at the foundation level. Design the number of precast R.C.C piles and suitable pile cap using following data, **[10]**

a) Width of pier = 1.5m

b) Length of pier = 9m

c) Size of pile = 300m ×300mm

d) Spacing of piles = 1.5m

e) Material -M20 & Fe 415

f) Hard strata is available at 6m depth below G.L.

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