

Total No. of Questions : 8]

SEAT No. :

P4572

[Total No. of Pages : 2

[4860] - 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 book.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of IRC-5, 6,18,27,45,78,83 and 112 codes and I.S 1343-2012 and I.S.456-2000 is allowed.*
- 5) *More reproduction of above codes as answer will not get any marks.*
- 6) *Neat diagrams shall be drawn wherever necessary.*
- 7) *Assume suitable data if necessary and clearly mention it while writing answer.*

- Q1)** a) Explain with neat sketch box Girder Bridge and skew bridge. [5]  
b) Explain role of impact factor in design of Highway Bridge. [5]

- Q2)** a) Explain in brief Dynamic effect and Impact effect for the design of railway truss steel Bridges. [5]  
b) Classify railway steel bridges according to load carrying capacity and floor location with their sketches. [5]

- Q3)** Design a slab culvert for a clear span 4.3 m. Suitable for single train of class AA loading the Clear roadway is 10 m. between the kerbs. Use safe stresses as per I.R.C. standards and use M 25 & Fe500. Draw details of reinforcement. [10]

- Q4)** Design the Prestressed Concrete main girder for following data [10]  
a) Effective Span-25 m  
b) Clear width of road way-7.5 m  
c) Foot path - 1 m on either side

**P.T.O.**

- d) Wearing coat- 100mm thick
- e) Spacing of cross girders-5m c/c
- f) Live load - IRC Class AA tracked vehicle
- g) Material-M40 for deck slab and M50 for girder with 12/7 cables ( $f_y = 1500\text{MPa}$ )
- h) End block design is not expected.
- i) Draw details of section designed.

**Q5)** Design R.C.C Rigid Frame Bridge for the following data **[10]**

- a) Clear span- 16m.
- b) Road width-7.5 m between kerbs
- c) Foot path 1.5 on each side.
- d) Height-7.5m.
- e) End condition-hinged.
- f) Loading IRC AA or IRC A which gives maximum effect.
- g) Coeff.of linear expansion of concrete--- $6.5 \times 10^{-6}$
- h)  $E_c = 25 \text{ KN/sq.mm}$  use M 25 & Fe 500

**Q6)** a) Explain the various criteria for adoption of different types of expansion joints as per Ministry of surface transport. **[5]**

- b) Explain with neat sketches various types of expansion joints used in bridges along with there limitations. **[5]**

**Q7)** Check the Stability of RCC Retaining wing wall of height 5 m which carries surcharge of 10 KN/Sq.m acting 2 m away from the wall the backfill material is having density 16 KN/Cu-m and angle of repose as 30 degrees the coeff.of friction as 0.45 Use M25 and Fe500. **[10]**

**Q8)** A pier of major fly over transmits a total load of 15000 KN at foundation level, design No. of precast R.C.C. piles and suitable pile cap using following data. **[10]**

- a) Width of pier-1m.
- b) Length of pier-9m.
- c) Size of piles- $400 \times 400\text{mm}$ .
- d) Spacing of piles-1.5m use M20 & Fe415
- e) Hard strata available at depth -10 m below G.L. of bridge.

