Reg. No. :

Question Paper Code: 92062

M.E. DEGREE EXAMINATION, OCTOBER - 2014.

Elective

Structural Engineering

01PSE513 - DESIGN OF BRIDGES

(Regulation 2013)

Duration: Three hours   Maximum: 100 Marks

(IRC, IS 800, IS 456, IS 1343, Steel table and Pigeaud's curves are permitted)

Answer ALL Questions.

PART A - (10 x 2 = 20 Marks)

1. What are the different forces acting on bridges?

2. Explain through type bridges.

3. What is meant by load dispersion on road bridges?

4. Under what circumstances the skew slab is used?

5. What are the advantages of cable stayed bridges?

6. What are the important constraints in design of continuous bridges?

7. Define pressure line or thrust line.

8. What are the types of losses in prestress concrete bridges?

9. Explain the wind effect on bridge structure.

10. Under what conditions the stiffeners are provided on plate girder bridges?

11. (a) Describe the various types of road bridges and explain various components in detail. (14)

Or

(b) Discuss in detail about the general design considerations of bridges. (14)

12. (a) A reinforced concrete simply supported slab is required for the deck of a road bridge having the following data:

> Clear span = 5.5 m
> Width of carriage way = 7.5 m
> Foot path on either side = 1m wide
> Wearing coat thickness = 80mm
> Materials = M20 grade concrete and Fe 415 steel
> Type of loading IRC class AA

Design the deck slab. Show the reinforcement details. (14)

Or

(b) Discuss the analysis and design principles of "T" beam bridges. (14)

13. (a) Write down the step by step procedure of design of balanced cantilever bridges. (14)

Or

(b) Discuss about the design principles of cable stayed bridges. (14)

14. (a) Design the intermediate beam of a prestressed concrete bridge of clear span 25m. Assume the roadway width as 7.5 m, loading IRC class 70R tracked vehicle. (14)

Or

(b) Design of post-tensioned prestressed concrete T - beam slab bridge deck for a National Highway crossing to suit the following data:

Effective span = 30 m
Width of road = 7.5 m
Kerbs = 600 mm on each side
Footpath = 1.5 m wide on each side
Thickness of wearing coat = 80 mm
Live load = IRC class AA tracked vehicle
For the deck slab, adopt M - 20 grade concrete.
Adopt M - 50 grade concrete with cube strength at transfer as 40 N/mm^2
Loss ratio = 0.85
Spacing of cross girders = 5 m. (14)

15. (a) Design an elastomeric bearing at the sliding end of a bridge for the following data. Maximum Normal load 1000 kN, Minimum - normal load 200 kN, Transverse lateral load 40 kN, Longitudinal load 60 kN, Total longitudinal translation 15 mm, Rotation at support 0.0025 radians. Shear modulus of elastomeric bearing = 1.2 N/mm^2. Allowable compressive stress for concrete = 7 N/mm^2. Allowable compressive stress for elastomeric = 10 N/mm^2. (14)

Or

(b) Write down the step by step procedure for design of welded plate girder bridges.

(14)

PART - C (1 x 10 = 10 Marks)

16. (a) Discuss in detail about the planning and inspection of bridges. (10)

Or

(b) Write down different types of bridge foundations with neat sketches. (10)

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