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22/11/13 FN

Reg. No. :

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Question Paper Code : 82316

M.E. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2013.

Elective

Structural Engineering

ST 9252/ST 952/UST 9152 — DESIGN OF BRIDGES

(Regulation 2009)

Time : Three hours

Maximum : 100 marks

Use of relevant BIS, IRC and Pigeaud's Curves are permitted.

Assume any required data suitably.

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. How will you select the type of bridges?
2. What is the impact effect for IRC Class AA loading?
3. What do you mean by effective width of dispersion?
4. How will you find bending moment in slabs spanning in two directions?
5. What are the advantages of continuous bridges?
6. What is called articulation?
7. How will you design end block of a prestressed concrete bridge?
8. How will you check the diagonal tension?
9. What are the advantages of plated girder bridges?
10. What are the forces calculated in the design of an abutment?

PART B — (5 × 16 = 80 marks)

11. (a) Explain the different types of loading to be considered in the different types of bridge structures.

Or

- (b) What are the data to be collected in the planning stage of bridge construction?

12. (a) Obtain Courbon's reaction factor and maximum bending moment in case of a T beam bridge having following details :

Road way	: Two lanes
Loading	: IRC Class A
No. of main girders	: 3
C/C of spacing	: 2.5 m
Span of bridge	: 8 m
Kerb width	: 600 mm on either side

Or

- (b) Design a deck slab bridge for the following data :

Clear distance between abutments	: 8 m
Road	: NH (Two lane)
Foot path	: 1 m on either side
Wearing coat	: 80 mm average
Loading	: IRC Class AA (Tracked)
Materials	: M 30 Concrete and Fe 415 Steel

13. (a) Write the step by step procedure of design of box girder bridges.

Or

- (b) Explain the design procedure of balanced cantilever bridges in detail.

14. (a) A simply supported beam of span 8 m and section 450 × 700 mm is prestressed by a parabolic cable having an eccentricity of 110 mm at centre of span and zero at supports with a prestressing force of 1500 kN. If beam supports an udl of 30 kN/m, find the extreme stresses at mid span section.

Or

- (b) How will you calculate short term and long term deflections of prestressed concrete bridge members? Explain in detail.

15. (a) Explain the different types bearing used in bridge structures with neat sketches.

Or

- (b) Verify the adequacy of the dimensions for the pier with the following details :

Top width of pier	: 1.2 m
Side batter	: 1 in 10
High flood level	: 1.5 m below bearing level
Span of bridge	: 12 m
Loading	: IRC Class AA
Road	: Two lane road with 1 m wide footpath on either side
Super structure	: Consists of 3 longitudinal girders of 1.2 depth with a deck slab of 200 mm depth
Rib of girder	: 300 mm
Material of pier	: M 30