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Roll No.

18BB1655

M. Tech. EXAMINATION, 2020

(Second Semester)

(C Scheme) (Re-appear)

CE(SE)

CES524C

**DESIGN AND CONSTRUCTION OF BRIDGE
SUPERSTRUCTURES**

Time : 2½ Hours]

[Maximum Marks : 75

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Four* questions in all. All questions carry equal marks. Use of scientific calculator is allowed. Use of Indian Standard is allowed.

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1. (a) Differentiate between normal and maximum scour depths. **3**
- (b) What are various types of loadings specified in the Indian Road Congress standards for the design of highway bridges decks in India ? Also, distinguish between tracked and vehicles specified in IRC codes.
2. (a) Explain the terms :
- (i) Linear waterway
 - (ii) Afflux
 - (iii) Economical span.
- (b) Discuss the differences and advantages between girder and slab type, girder slab and diaphragm type and box girder type bridges with the help of neat sketches.
3. (a) What are Pigeaud's curve ? What are the advantages and limitations of these curves ? **3**

- (b) Design a solid slab bridge required on a highway for the following data :

Width of carriageway 7.5 m, footpath 1 m on either side, clear span 5.5 m, loading IRC class AA, width of curb 600 mm, width of bearing 500 mm. M 30 grade of concrete and Fe 415 grade of steel are to be used.

4. (a) How do you check for limit state of shear strength of deck slabs ? What are the factors effecting shear strength of slabs.

- (b) Design a reinforced concrete slab culvert for a national highway to suit the following data :

Width of carriageway 7.5 m, Footpath 1 m on either side, clear span 6 m, wearing coat 80 mm, loading IRC class AA, width of bearing 400 mm. M 25 grade of concrete and Fe 415 grade of steel are to be used.

5. (a) Briefly discuss the typical structural elements of a reinforced concrete Tee beam and slab bridge deck and their functions.
- (b) Specify the position of IRC class AA tracked vehicle for which maximum bending moment and shear forces occur in main girder of a Tee beam and slab bridge deck. Also, explain how you use Courbon's method to determine the bending moment with its limitations and advantages.
6. (a) What are the advantages of cable stayed bridges in comparison with traditional suspension bridges ?
- (b) What are the main types of longitudinal cable arrangements ? Discuss briefly their advantages and disadvantages.

7. (a) Discuss various components of inspection of RCC bridge in superstructure, bearings and sub-structure.
- (b) Discuss a method of erection with the help of figures for concrete girders.
8. (a) Discuss different types of bearing which are used in road and rail bridges with reasons.
- (b) Explain major causes of bridge failures. How can these failures be avoided ?
9. (a) Which are the ideal situations of choose a balanced cantilever bridge ?
- (b) What are the main functions of bearings in a bridge ?
- (c) Define short term and long term recommendations.

- (d) Draw a neat sketch of cable stayed bridge and show its main parts.
- (e) List the main equipments which can be used in inspection of a constructed bridge.