M.E. DEGREE EXAMINATIONS: NOV/DEC 2010

Third Semester

STRUCTURAL ENGINEERING

SEE554: Design of Bridges

Time: Three Hours   **Maximum Marks: 100**

Answer ALL Questions:-

PART A (10 x 2 = 20 Marks)

1. What are the loads considered in the design of a highway bridge ?
2. What are the factors to be considered while selecting a site for bridge bridge construction?
3. What is meant by a culvert.
4. State Courbon's theory of distribution of loads.
5. What are the circumstances under which balanced cantilever bridges are provided.
6. What are the advantages of box girder bridges ?
7. Draw the shapes of prestressed concrete bridge ?
8. What are the advantages of prestressed concrete bridges?
9. List different types of bearings used in bridges.
10. What is meant by abutment.

PART B (5x 16 = 80 Marks)

11. a) (i) Explain the general design consideration of bridges   (8)

     (ii) What are the factors considered in planning of bridges?   (8)

(OR)

   b) (i) Explain the classification of bridges   (8)

     (ii) What are the factors considered in selecting the type of bridge?   (8)

12. a) Design a box culvert having inside dimensions of 3m x 3m. This culvert is subjected to

    a dead load of 14,000 N/m^2. The angle of repose of soil is 30°. Use M25 concrete and

    Fe415 steel. Road width is 7.5 m span is 3.3 m.

(OR)

   b) Obtain the values of short span and long span bending moments in case of an interior
      panel of a T-beam bridge having the following details:
      Dimensions of the panel : 3m x 3.5m
      Loading: IRC Class A
      Loading pattern :
      Case (i) Two wheels (each of 75 KN) adjusted symmetrically with respect to centre of
               the panel.
      Case (ii)One wheel (57 KN) at centre of the panel.

13. a) Expalin the design principles of a box girder bridge

(OR)

b) Expalin the design principles of a balanced cantilever bridge

14. a) Explain the design principles of prestressed concrete bridges

(OR)

b) Explain various systems of prestressing the bridge girders

15. a) Design a mild steel rocker bearing for transmitting the superstructure reactive load of 1200 KN.
    Allowable pressure on bearing block : 3.8 MPa
    Permissible bending stress : 165 MPa
    Permissible bearing stress : 100 MPa
    Permissible shear stress : 100 MPa

(OR)

b) Verifiy the adequacy of the dimensions for the pier shown in Fig. 1 The following details are available:
    Top width of the pier: 1.6 m
    height of the pier upto springing level : 10 m
    c/c of bearings on either side : 1.00m
    Side batter: 1in 12
    High Flood Level: 1m below the beraing level
    Span of the bridge: 16m
    Loading on span: IRC Class AA
    Road: Two-lane road with 1 m wide footpath on either side.
    Super structure: consists of three longitudinal girders of 1.4m depth with a deck slab of 200 mm depth. Rib width of girders = 300 mm
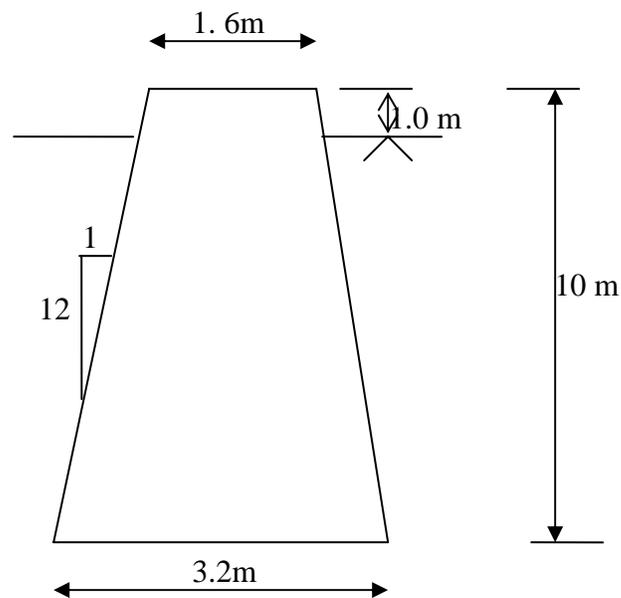

Fig 1.

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