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B.Tech.(CE) (2012 to 2017)   (Sem.–7,8)
BRIDGE ENGINEERING
Subject Code : BTCE-820
M.Code : 71879

Time : 3 Hrs.   Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :
1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION-A

1. **Write briefly :**

    a) Why is bridge inspection important?

    b) What are the four types of maintenance system adopted for highway bridges?

    c) What are free and tilled bearings?

    d) Describe the general principle of design of masonry arch bridge.

    e) Draw sketches of cantilever and suspension bridges.

    f) Discuss the precautions to be observed for grouting of ducts in prestressed concrete girders.

    g) Discuss the various types of abutments.

    h) What are the advantages of a circular well?

    i) Define Scour Depth.

    j) Write short note on horizontal and vertical clearance required for highways.

SECTION-B

2. What is the need of investigation for bridges & how the selection of bridge site is done?

3. Determine the design discharge at a bridge side after computing the maximum discharge by :

   a) Empirical method

   b) Rational method, for the following data :

   Catchment area = 160 km^2

   Distance of site from coast = 12 Km

   Distance of critical point to bridge site = 16 Km

   Difference in elevation between the critical point and bridge site = 96 m

   Peak intensity of rainfall = 60 mm/h

   Surface of catchment is loam, largely cultivated.

   Cross sectional area of stream at MFE at bridge site = 120 m^2

   Wetted perimeter of stream at MFE at bridge site = 90 m

   Stream condition- Clean straight banks, Fair condition.

   Slope of stream = 1/500

4. State how the water way of a culvert is worked.

5. List the loads to be considered in the design of plate girder bridges.

6. What are the requirements of an ideal bearing & discuss neoprene bridge bearing?

SECTION-C

7. Design RCC Tee beam to suit following data :

    Clear width of roadway = 7.5 m

    Span (centre to centre of bearing) = 16 m

    L.L = IRC class AA tracked veh.

    Average thickness of wearing coat = 80 mm

    Concrete mix = M-25 grade

    Steel = Fe 415 grade HYSD bars.

    Compute the design moments and shears and design the deck slab main girders and cross girders and sketch the typical details of reinforcement.

8. Design a suitable masonry abutment for girder bridge. The angle of internal friction of the retained material is 45°. An approach reinforced concrete slab is provided to the bridge so that the effect of surcharge may be neglected. The angle of friction between soil and masonry is 30°. Height of the abutment below road level is 6.0 m. The positive earth pressure in front of the abutment is to be neglected. Density of masonry is 2 t/m^3, density of concrete is 2.4 t/m^3 & density of soil is 1.8 t/m^3.

9. a) Why is corrosion prevention important in maintenance of prestressed concrete bridges?

    b) List the equipment needed for bridge inspection.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.