Roll No. Total No. of Pages : 03

Total No. of Questions: 09

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.

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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 bam, 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?

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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/m³ & density of soil is 1.8 t/m³.
- 9. a) Why is corroson 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.

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