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BICEE-010

B.Tech. IN CIVIL ENGINEERING (BTCLEVI)

Term-End Examination

00016

June, 2016

BICEE-010 : ANALYSIS AND DESIGN OF BRIDGES

Time : 3 hours *Maximum Marks : 70*

Note : *Attempt any **five** questions. All questions carry equal marks. Assume any missing data suitably. Use of scientific calculator and relevant IS code is permitted.*

1. A reinforced concrete simply supported slab is required for the deck of a road bridge having the following data :

Clear span = 5·5 m

Width of carriageway = 7·5 m

Footpath on either side = 1 m wide

Use M 20 and Fe 415.

Type of loading – IRC Class AA

Design the deck slab. Show the reinforcement details. *14*

2. (a) Explain IRC loading standards for a highway bridge and other loads considered for the analysis and design of bridges. *10*

(b) Discuss the factors influencing the choice of the type of bridge and its features. *4*

3. (a) Determine the design discharge at a bridge site after computing the maximum discharge by

(i) Empirical method, and

(ii) Rational method,

for the following data : *4*

Catchment area = 160 km^2

D/s of the site from coast = 12 km

D/s of critical point to the bridge site = 16 km

Diff in elevation H = 96 m

Peak intensity of rainfall = 60 mm/h

(b) Explain the procedure of Pigeaud's method for the determination of maximum moments on a bridge slab due to concentrated loads. What are the limitations of the method and how is it considered for a non-symmetrical load ? *10*

4. (a) Sketch the typical reinforcement details for the deck slab of a reinforced concrete culvert with a clear span of 5 m. *4*

(b) Discuss the relative merits of the following three arrangements of a three girder T-beam bridge : *10*

(i) Without any cross beam on diaphragm

(ii) With three cross beams

(iii) With three diaphragms

5. The effective span of a through type truss girder highway two-lane bridge is 30 m. R.C. slab is 300 mm thick inclusive of wearing coat. Two footpaths of 1·5 m width are provided on either side of the carriageway. Consider IRC Class-A loading. Suggest a suitable truss girder. Design the central top chord and diagonal members of the central panel. *14*

6. (a) Explain with neat sketches the various types of bearings used in bridges. *10*

(b) List the various advantages of prestressed concrete bridges. *4*

7. (a) Discuss three methods of load distribution among the longitudinal girder of a T-beam type concrete bridge deck. *10*

(b) Sketch the typical cross-section of bridges with pre-tensioned members. *4*
