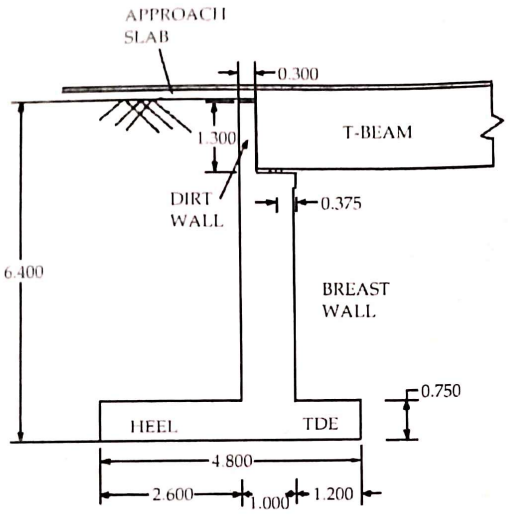

ALL DIMENSIONS IN m

7. Why is bridge inspection important ? Discuss in detail about various methods of bridge inspection. 20

8. Discuss in detail the major cause of bridge failures. Discuss what are the precautionary measures to protect the bridge from these failures. 20

Roll No. .....

23232

M. Tech. 1st Sem. Civil Engg. (Transportation Engg.) (Elective-I) Examination – January, 2023

BRIDGE ENGINEERING

Paper : CE-617

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

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

Note : Attempt any *five* questions. All questions carry equal marks.

1. A reinforced concrete simply supported slab is required for the deck of a road bridge having the following data : 20

   (i) clear span = 15 m.

   (ii) width of carriage way = 7.5 m.

   (iii) foot path on either side = 1.2 m wide.

   (iv) Materials = M25 grade concrete and Fe 415 steel.

(v) Type of loading IRC class AA. Design the deck slab. Show the reinforcement details.

2. (a) Design a box culvert having inside dimensions' 5m x 3m for the following data. 20

Dead load = 16 kN/m2

Live load = 52 kN/m2

Density of soil = 18 kN/m3

Use M25 concrete and Fe 415 steel.

(b) Explain the various components of a bridge.

3. Design the longitudinal girder of a T-beam and slab bridge for the following data. Effective span 12m, Carriage way width 7.5m, Kerb 500 mm on either side. Provide three longitudinal beams and five cross beams. Loading IRC class AA tracked vehicle. Adopt M20 for Concrete Fe415 bars. Also provide the reinforcement details. Use Courbon' s method for the calculation of reaction coefficients. 20

4. Design the intermediate beam of a prestressed concrete bridge of clear span 18m. Assume the roadway width as 7.5 m., loading IRC class 70R tracked vehicle. 20

5. Design an elstomeric bearing at the sliding end of a bridge for the following data. Maximum normal load 1200 kN, Minimum normal load 300 kN, Transverse lateral load 50 kN, Longitudinal load 70 kN, Total longitudinal translation 20 mm, Rotation at support 0.0020 radians. Shear modulus of elstomeric bearing = 2.0 N/mm2. Allowable compressive stress for concrete = 10 N/mm2. Allowable compressive stress for elastomer = 8 N/mm2. 20

6. Design a reinforced concrete abutment using following data 20

Dimensions : shown in Fig.

Superstructure : T-beam two-lane bridge of effective span 20 m

Overall length : 20 m

Loading : As for National Highway

Back fill : Gravel with angle of repose = 300

Unit weight of back fill w = 20 kN/m2