

B.E. CIVIL ENGINEERING FOURTHYEAR SECOND SEMESTER EXAMINATION 2023

BRIDGE ENGINEERING (ELECTIVE II)

Time 3 hours

Full marks 100

Use separate answer scripts for each part

Part- I (40 Marks)

Answer ALL questions. Full marks 40. **Permitted codes:** IRC 5, IRC 6 and IRC SP13

1. How do we technically decide the most appropriate location of a bridge site? 3
 A bridge is to be founded near Agartala ($i_o = 66 \text{ mm}$) that has a catchment area of 1200 hectares with the upstream of the location being lightly covered plateau. The cross section of the river at the bridge site is shown in fig. Q1. The RL of the lowest beds at 500m upstream and 500m downstream are 107.42m and 105.30m, respectively. The river bed is clean with fairly straight banks with no rifts or deep pools. Find flood discharges using (i) Dicken's, (ii) Ryve's, (iii) Inglis's, (iv) Rational and (v) Manning's formulae. 1+1+1+5+6
 Obtain the design discharge, linear waterway assuming a regime flow on alluvial bed, and RL for the maximum scour level for a possible abutment. 2+2+3 = 24 (CO -2)

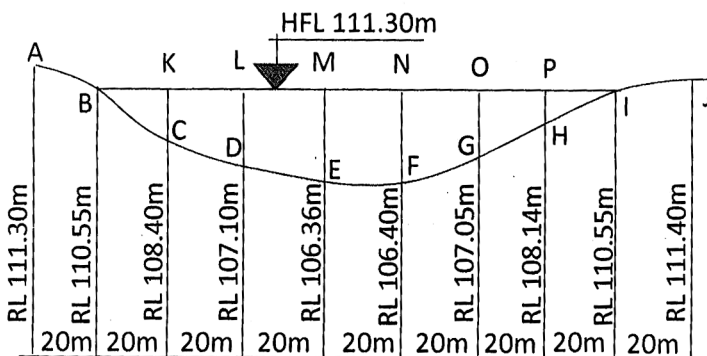


Fig. Q1

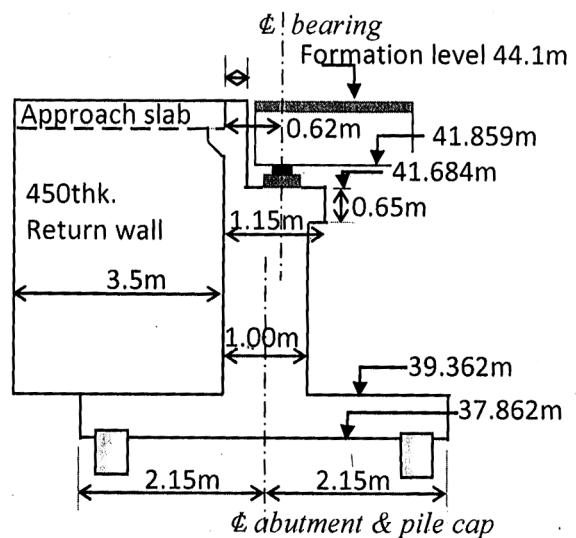


Fig. Q2

2. Consider the abutment shown in Fig. Q2, that supports a superstructure of 21 m clear span (21.6m out to out). Compute
- the **maximum longitudinal and transverse moments** at the bases of abutment and pile cap due to single-lane **70R tracked-vehicle** loading.
 - the longitudinal moments at the bases of abutment and pile cap due to temperature movement if the bridge is located around **Bankura**.
 - The longitudinal moments at the bases of abutment and pile cap due to **braking** if we adopt **elastomeric bearing**.

Marks: 6+5+4 = 16 = 24

(CO -4)

[Turn over

B.E. CIVIL ENGINEERING FOURTH YEAR SECOND SEM. EXAM. -2023**Subject: BRIDGE ENGINEERING. Time: 3 hours****Full Marks 100****PART-II (MARKS-60)**

Use a separate Answer-Script for each part

IRC-6, IRC -112, IS 456, SP 16 and required charts and tables are allowed in the exam hall**Assume any other required data if not stated**

No. of questions	<u>Answer question 1 and 2</u>	Marks 25+35=60
1.	a) Describe the classification of different types of bridges. b) Describe the factors considered in deciding types of bridges. c) Discuss different type of loading coming on bridges	CO1 8+12+5=25
2.	A R.C.C. Tee beam girder bridge shown in figure 1. has the following data: Clear width of carriage way=7.5 m Span (center to center of bearings) =16 m. Kerbs on either side = 600 by 300 mm Live load : IRC Class AA tracked vehicle Thickness of the wearing coat =75 mm Materials: M-35 Grade concrete and Fe-415 HYSD reinforcements. Three main girders are provided at 2.5 m center to center. The thickness of deck slab 250 mm. Width of main girder 300 mm. Assume depth of main girder and depth and width of cross girder. Cross girders are provided 4 m interval.	CO3

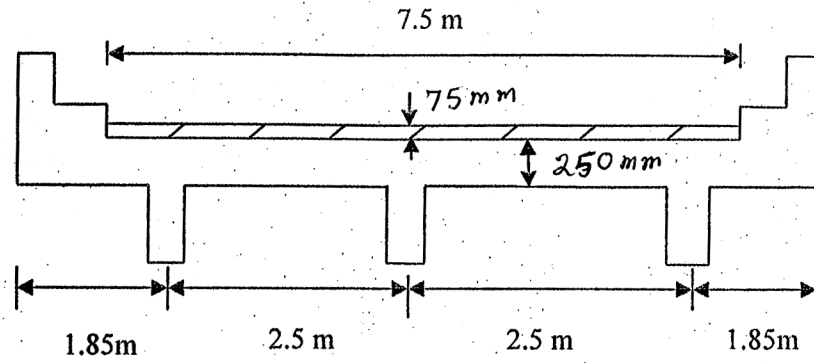


Figure 1.

Design the longitudinal girder and cross girder of the bridge using IRC 6, IRC 112 and IS 456 with the above data. Draw the necessary reinforcement detail with neat sketches.

28+7=35