

Total No. of printed pages = 2

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Azara, Hatkhowapara  
Guwahati - 781017

2023

**B.Tech. 8<sup>th</sup> Semester End-Term Examination**

**Civil Engineering**

**BRIDGE ENGINEERING**

**New Regulation (w.e.f. 2017-18) & New Syllabus (w.e.f. 2018-19)**

Full Marks – 70

Time – Three hours

The figures in the margin indicate full marks  
for the questions.

IS 456, IS 800, IRC 21 and relative curves may be allowed if required.

Assume suitable data if any missing.

Answer question No. 1 and any *four* from the rest.

1. Fill in the blanks : (10 × 1 = 10)
- (i) One of the aesthetic requirement of bridge is \_\_\_\_\_
  - (ii) Site investigation and \_\_\_\_\_ are mandatory.
  - (iii) Scour depth is known as \_\_\_\_\_
  - (iv) \_\_\_\_\_ is one of the factor affecting scour.
  - (v) Geotechnical investigation is needed for \_\_\_\_\_ foundation.
  - (vi) Approach structures are \_\_\_\_\_
  - (vii) IRC loading deals with \_\_\_\_\_
  - (viii) Analysis and design means \_\_\_\_\_
  - (ix) Need of bearing in bridge are \_\_\_\_\_
  - (x) Difference between Pier and Abutment is \_\_\_\_\_

[Turn over



2. (a) Explain with neat sketch about pile foundation in bridge structures. (5)
- (b) The stone masonry abutment of 4 meter depth below earth has top width 1.5 meter and bottom width 2.5 meter subjected to a vertical force of 15 kN at middle of top width. There is a vertical force of 15 kN and horizontal force of 20 kN also act at middle of the depth of abutment. Find the stresses developed at the base and check the stability. (10)
- SBC of soil = 200 kN/sq.m  
 Coefficient of friction = 0.75  
 Density of masonry = 30 kN/m<sup>3</sup>.
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3. (a) List the various types of bearing used in bridge structures. (5)
- (b) Design a mild steel rocker bearings for transmitting a vertical load of 1000 kN and horizontal reaction of 150 kN at the support of girder bridge. The permissible compressive stress on concrete block is 5 MPa, Flexural stress in steel plate is 200 MPa, Bearing stress on steel plate is 250 MPa and Shear stress in steel is 120MPa. (10)
4. (a) Design a RCC T-beam girder bridge for the effective span of 20 m with 2 lane. Width of footpath is 1 m each side and Wearing coat of thickness 75 mm. M25 grade of concrete and Fe 415 steel. IRC class AA load. Assume number of main girders and cross girders with suitable spacing. (12)
- (b) What is called Balanced Cantilever Bridges? (3)
5. (a) Define Impact factor. (3)
- (b) A bridge across an alluvial stream with discharge of 400 cumec/cumec Silt factor as 2. Calculate the maximum scour depth when the bridge consist of
- (i) Two span of 35 m each  
 (ii) Three span of 25 m each. (12)
6. (a) Explain about the selection of suitable types of bridges. (5)
- (b) Write a note on Water way and Afflux. (5)
- (c) Tabulate the difference between well and caisson foundation. (5)
7. (a) Explain in detail about Highway loading standards. (5)
- (b) Write down the analysis and design procedure for RCC slab bridge decks. (10)