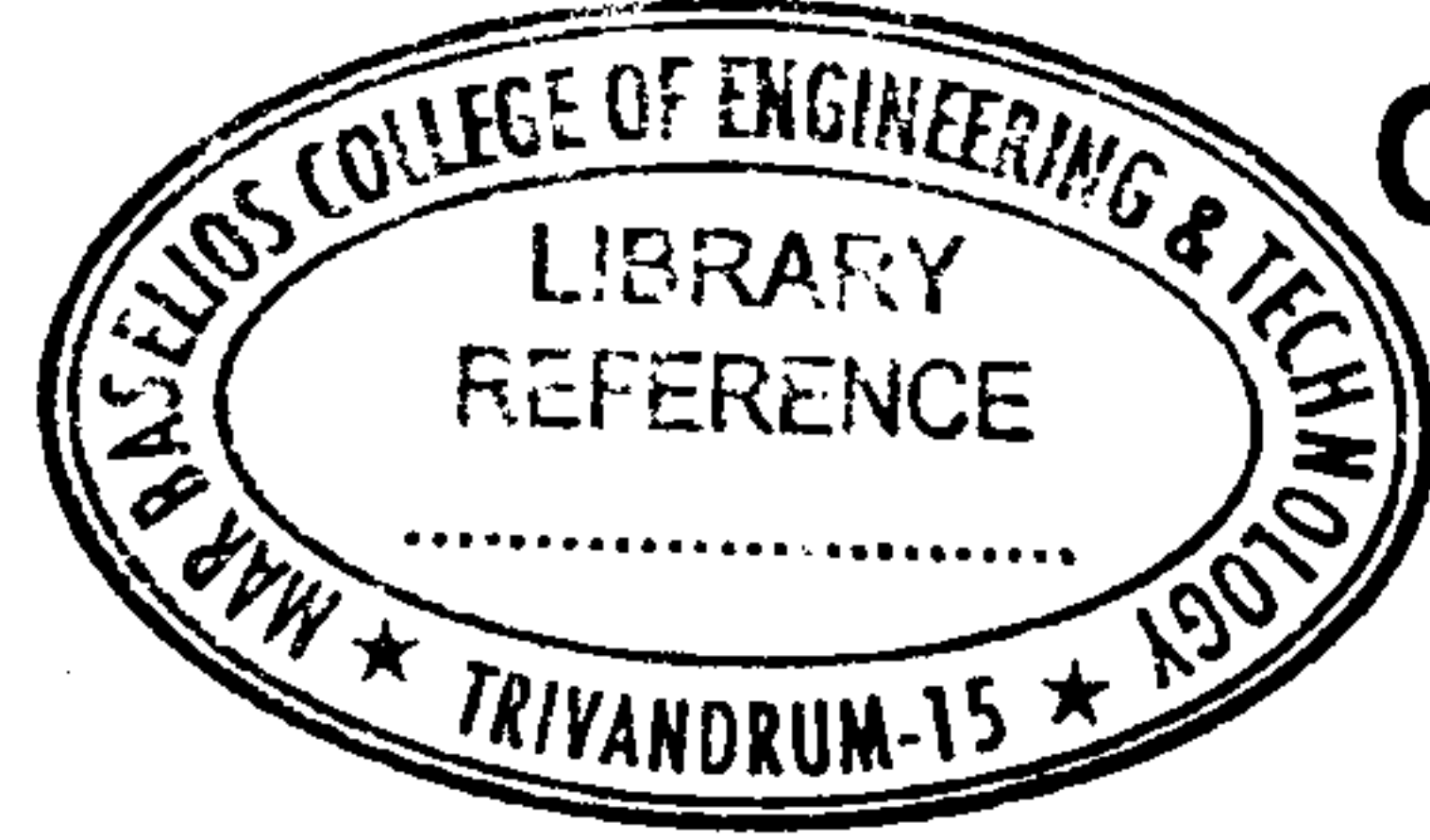




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C – 2349

Reg. No. : .....

Name : .....

**Eighth Semester B.Tech. Degree Examination, May 2017**  
**(Scheme : 2013) (Elective – IV)**  
**13.806.2 : DESIGN OF BRIDGES (C)**

Time : 3 Hours

Max. Marks : 100

**Instructions : Use of IS and IRC codes permitted in exam hall.**

**PART – A**

Answer **all** questions. **Each** question carries **4** marks :

1. Explain the Guyon Massonet method for analyzing the beam grid.
2. What are the advantages of prestressed members ?
3. What are the different floor systems used in railway bridges ?
4. What are the forces to be considered during the design of piers and abutments ?
5. What is the use of pneumatic caisson ?

**PART – B**

Answer **one full** question from **each** Module. **Each** question carries **20** marks :

**Module – I**

6. Following data pertains to a deck slab bridge :

Clear distance between abutments : 7 m

Road : National Highway (two lanes)

Footpath : 1 m on either side

Wearing coat : 75 mm (average)

Loading : IRC Class AA (tracked)

Material : M25 concrete, Fe 415 grade steel.

OR

P.T.O.



7. Obtain Courbon's reaction factor and maximum bending moment in case of a T beam bridge having following details.

Roadway : 2 lanes

Loading : IRC class AA

Number of main girders : 3, Centre to centre spacing = 2.5 m

Span of the bridge : 15 m

Kerb width : 550 mm on either side.

### Module – II

8. a) Explain with sketches the typical pre-tensioned and post tensioned bridge decks commonly used in the construction of bridges.
- b) Explain the construction procedure of precast pre-stressed concrete bridges.

OR

9. Design a post tensioned pre-stressed concrete slab bridge deck to suit the following data. Effective span = 24 m, width of carriage way = 7.5 m. Kerb 500 mm wide on either side of the road. Spacing of the main and cross girders are 2 and 4 m respectively. Loading IRC class AA. Adopt M 40 grade concrete and high-tensile steel strands conforming to IS : 6006 and supplementary reinforcement comprising Fe-415 grade bars. Permissible stress, as specified in IRC : 18-1985, Loss ratio is 0.85.

### Module – III

10. Explain the design principles of all components of deck type plate girder bridge for B.G. railways, with neat sketches.

OR

11. A through type plate girder is provided for a single metre gauge track. The cross girders are spaced 2.80 metre apart, the total span of the main girder from centre to centre of bearing being 28 m. The stringers are spaced at 1.20 m between centre lines, 0.60 kN per metre stock rails and 0.40 kN/metre guard rails are used. The sleepers are spaced at 0.50 m from centre to centre and are of size 2 m × 250 mm × 250 mm. The weight of timber may be assumed as 7.50 kN per cubic metre. Design the maximum section of the plate girder. The main girders are provided at a spacing of 4.8 m between their centre line. Adopt loading from bridge rule.



**Module – IV**

12. a) Write note on open well foundation and its components.  
b) Explain the design adequacy of abutment.

OR

13. Design an elastomeric unreinforced neoprene pad bearing to be placed beneath a girder of a bridge to suit the data given below.

Span of the girder : 12 m

Dimensions : 350 mm × 1400 mm

Number of girders : 3

Slab thickness : 250 mm

Number of lanes : 2

Live load : IRC Class AA

Horizontal force : 100 kN

Shear modulus of elastomer :  $1\text{N/mm}^2$

Coefficient of friction : 0.35.

