

**STRUCTURAL ENGINEERING-III (RCC) DESIGN AND DRAWING**  
(Civil Engineering)

Time: 3 hours

Max Marks: 80

**PART-A**

Answer any ONE question from PART-A  
and THREE questions from PART-B  
Use of I.S, Bridge and Railway codes permitted.  
Assume suitable data wherever necessary.

**PART-A (Bridges)**

**(Marks:32)**

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1. Design a simply supported R.C girder bridge (deck slab portion) for the following requirements by Pigeauds theory: [24]  
Clear width of carriage –way: 6.8 m  
Span: c/c of bearings: 16m  
Live load: IRC class AA  
Average thickness of weaving coat: 75mm  
No. of main girders: 3 at 2.5 m c/c  
Spacing of cross girders: 4m c/c  
Width of kerbs on both sides: 0.6m  
Mix: M 20 grade of concrete  
Reinforcement: Fe 415 grade TOR steel  
Draw the L.S and C.S of the bridge showing the details of reinforcement. [8]
2. Design the top bracing for a railway bridge consisting of two trusses of 8 panels of 6m and height 8m. Take the exposed area for calculation of wind force on top bracing as 0.8 m<sup>2</sup> per metre run of top chord. Take the intensity of wind pressure as 1.5 KN/m<sup>2</sup>, and c/c of trusses as 8m. The bracing consists of struts at panel points and double diagonals. [24]  
Draw the details to a suitable scale. [8]

**PART-B**

**(Marks: 3x16=48)**

3. Design a concrete chimney of height 50m and uniform external diameter 3m. The chimney is to be erected in Delhi area. Assume the temperature difference as 100°C. Provide 10 cm thick brick lining with an air gap of 150mm. Use M25 grade concrete and Fe 415 grade TOR steel. Sketch the details.

[16]

**Contd..2**

4. Design the roof dome, and top ring beam of an R.C. Intze tank of capacity 6 lakh litres. The height of tank is 12 m upto the bottom of the tank. The bearing capacity of tank is  $200 \text{ kN/m}^2$ . Take the wind pressure as  $1500 \text{ N/m}^2$ . Use M20 grade of concrete and Fe 415 grade TOR steel. Sketch the reinforcement details. [16]
5. Design the cylindrical wall of the Intze tank whose data is given in Question No. 4. First fix the dimensions of tank. Sketch the details of reinforcement. [16]
6. Design a suitable open-well type stair-case for a multistoreyed building having stair case hall  $3\text{m} \times 4\text{m}$ . The height between floors is 3.5m. Take the design live load as  $3.5 \text{ kN/m}^2$ . Provide three flights. Use M-15 grade of concrete and mild-steel reinforcement. Provide two flights in the length wise direction of hall and one flight in the width-wise direction using 250 mm tread. Provide 2 landings in between the floors. Sketch the reinforcement details. [16]
- 7.a) Illustrate the following with the help of neat sketches : [8]
- i) Going
  - ii) Landing
  - iii) Scotia
  - iv) Pitch or slope
  - v) Baluster.
- b) Design a dog-legged stair to be located in a room  $3\text{-m} \times 5\text{-m}$  if the vertical distance between the floors is 3.2 m. Sketch the reinforcement details. [8]