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D 50483 (Pages : 2) Name.....

Reg. No.....

SEVENTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION NOVEMBER 2013

CE 09 701—STRUCTURAL DESIGN–III

Time : Three Hours Maximum : 70 Marks

Use of IS 3370 (Part 1 to 4), IRC 21, IS 13473, IS 800, IS 875, IS 456, SP 6, SP 16, steel table permitted.

Assume any missing data suitably.

Part A

Answer **all** *questions.*
Each question carries 2 marks.

1. Explain punching shear.
2. List the different types of shallow footing.
3. Define impact factor in bridge design.
4. Define anchorage block in prestressed concrete.
5. State the use of bearings in bridge.

(5 × 2 =10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 marks.

6. Explain the design principles of pile cap.
7. Explain how a slender column is designed.
8. Write the design steps of RCC slab bridge.
9. Explain various methods of prestressing.
10. Briefly explain stresses in anchorage zone.
11. Explain the structural configurations of railway bridges.

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*
Each question carries 10 marks.

12. Design a reinforced concrete isolated footing for a column of 450 mm × 450 mm transmitting an axial load of 1200 kN and a uniaxial bending moment of 450 kNm at service state. The SBC of soil is 15 kN/m^2 and angle of repose 30°. Use M 20 concrete and Fe 415 grade steel.

Or

Turn over

[redacted]

13. Design a column to carry an ultimate load of 2000 kN and factored design moments of 150 kNm and 100 kNm about major and minor axis respectively. The materials to be used are M 20 and Fe 415. One dimension of column is restricted to 300 mm.

14. Design a cylindrical water tank of capacity 5,00,000 litres resting on the ground. The overall height of tank is restricted to 5 m with a free board of 300 mm. SBC of soil 200 kN/m^2. Use M 25 concrete and Fe 415 grade steel. Detail it properly.

Or

15. Design a T-shaped retaining wall to retain a 4.5 m high earth with horizontal surface at top. Unit weight of soil is 17 kN/m^3, angle of repose 30°, SBC of soil 150 kN/m^2, and co-efficient of friction between soil and base 0.55. Use M 20 concrete and Fe 415 grade steel. Detail it properly.

16. A prestressed concrete beam of section 300 mm × 450 mm is used over an effective span of 7 m to support an imposed load of 5 kN/m. At the centre of the beam find the magnitude of :

    (a) The concentric force necessary for zero fibre-stress at the soffit when the beam is fully loaded.

    (b) The eccentric prestressing force located 100 mm from the bottom of the beam which nullify the bottom fibre stress due to loading.

Or

17. A prestressed concrete beam of 200 mm × 400 mm is used over an effective span of 6 m it support a u.d.l. of 5 kN/m excluding elf weight. The beam is prestressed by a straight cable carrying a force of 200 kN and located at an eccentricity of 40 mm. Determine the thrust line in the beam and plot its position at quarter and central span locations.

18. Design a welded plate girder for a span of 30 m subjected to a u.d.l. of 75 kN/m. Design the section and bearing stiffener.

Or

19. Design a bearing for a plate girder bridge. Maximum end reaction – 900 kN, span of bridge – 15 m.

(4 × 10 = 40 marks)