

## SEVENTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION

DECEMBER 2009

CE 04 701-STRUCTURAL DESIGN—III

(2004 Admissions)

Time : Three Hours

Maximum : 100 Marks

*Assume any missing data suitably.**Use of IS 456, IS 3370, IRC 5, IRC 6, IRC 21, IS 1343, IS 800, IS 875, SP 6, SP16 are permitted.**Answer all questions.***Part A**

1. (a) Explain the steps involved in the design of combined footing.
- (b) Explain the design of counter fort in the counter fort retaining wall design.
- (c) Discuss different types of IRC live load.
- (d) Explain the different type of construction joints in water tanks.
- (e) Discuss different losses of prestressing.
- (f) Explain the grades of concrete and steel used in prestressing ? Justify.
- (g) Explain the components of a self supporting chimney.
- (h) Explain the different types of bearings used in plate girders.

(8 × 5 = 40 marks)

**Part B**

2. (a) Design a rectangular column of effective height of 5 m subjected to an axial load of 800 kN and bending moment of 180 kNm about major axis and 120 kNm about minor axis. Use M30 grade concrete and Fe-500 grade steel. (15 marks)

*Or*

- (b) Design a cantilever retaining wall for the following data :-

Height of wall above the ground = 5m ; Density of earth = 17 kN/m<sup>3</sup>

Angle of internal friction = 30°

Safe Bearing Capacity of soil = 160 kN/m<sup>2</sup>

Coefficient of friction at base between soil and concrete = 0.55

Backfill is horizontal. Use M20 concrete and Fe-415 grade steel.

(15 marks)

3. (a) Design a RC solid slab bridge for the following data :-

Clear span = 5.5 m

;

Width of support = 400 mm

;

Live load = Class A loading

Carriageway width = 7.5 m

;

Thickness of wearing coat = 80 mm

Use M20 concrete and Fe-415 grade steel.

(15 marks)

*Or*

- (b) Design a circular water tank for a capacity of 4,00,000 litres. The joint between base and wall is fixed. Use IS method of design. Use M20 concrete and Fe-415 grade steel. (15 marks)

**Turn over**

4. (a) Explain the different methods of pre-tensioning and post tensioning.

Or

- (b) Design a suitable mid span section of a built up plate girder, supporting an uniformly distributed live load of 90 kN/m inclusive of its self weight. The beam is simply supported with a span of 25 m. Use 22 mm diameter power driven rivets. (15 marks)
5. (a) Design a suitable mid span section of a built up plate girder, supporting an uniformly distributed live load of 90 kN/m inclusive of its self weight. The beam is simply supported with a span of 25 m. Use 22 mm diameter power driven rivets. (15 marks)

Or

- (b) A simply supported plate girder has a span of 30 m and carried a total uniformly distributed load of 6000 kN inclusive of its own weight. The plate girder consists of 2400mm deep  $\times$  16 mm thick web plate, 2 ISA 200 mm  $\times$  150 mm  $\times$  18 mm angles and 750 mm  $\times$  16 mm cover plates in each flange. Design the riveted connection of flange angles to web and flange angle to flange plates. (15 marks)

[15  $\times$  4 = 60 marks]