

FACULTY OF ENGINEERING

B.E (III/IV Year) (Civil) II Semester (Main) Examination, June 2010

STRUCTURAL ENGINEERING DESIGN AND DETAILING – I (RCC)

Time : 3 Hours]

[Max. Marks : 75

Answer all questions from Part A
Answer any five question from Part B

Part A – (Marks : 25)

3 × 1 = 3

1. Multiple choice (Write the correct answer)

- a) The critical section for punching shear in footings from the face of the column is at a distance of
- 0.25 d
 - 0.75 d
 - 0.5 d
 - 1 d
- b) W.r.t. retaining walls, in Rankine's theory of earth pressure it is assumed that
- Soil is dry and cohesionless
 - soil is wet
 - Soil is cohesive
 - Soil is hard
- c) Clear distance from the face of the kerb to the outer edge of class A. A tracked vehicle is
- 150mm
 - 1200mm
 - 850mm
 - 1000mm

2. Fill up the blanks

3 × 1 = 3

- a) Maximum cement content in Kg/m^3 to be used in the concrete mix in R.C. water tanks is restricted to _____
- b) If ϕ is the angle of internal friction = 30° the value of passive earth pressure coefficient K_p = _____
- c) The clear distance between crossing vehicles of class A loading for a carriage way width of 7.5 m is _____

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3. Explain the design forces (with formulae and notation) and how the walls of a rectangular R.C water tank are designed when L/B is less than 2 (Explain in 5 or 6 steps) 3
4. W.r.t. retaining walls explain how toe and heel slab are designed. 3
5. Explain pigeaud's method of design of bridge slabs supported on longitudinal and cross girders. 3
6. Explain two way shear in footings. 2
7. How do you calculate the lateral pressure in the stem of a retaining wall with sloping back fill? 2
8. How is the behaviour of a vertical wall (stem) is different in cantilever and counterfort retaining walls? 2
9. What is courbain theory and where do you use it? 2
10. Sketch the details of 70R IRC loading and mark the important values. 2

Part B – (Marks : 50)

Unit I

11. Design a combined footing for two columns each of 500 x 500mm size 5m apart (c/c) and each carrying a load of 1500kN. The available width is restricted to 2.2m. SBC of the soil may be taken as 180kN/m². Use M20 and Fe 415 grade for concrete and steel respectively. Sketch neatly the reinforcement details. 15

Or

12. A cantilever retaining wall is to retain an earthen embankment 3.5m above G.L and loaded uniformly with a load of 100kN/m². Its foundation is 1m below ground level. SBC of the soil is 225kN/m². Unit weight of earth is 18kN/m³ and the angle of repose in 30°.
 - a) Check the stability of the wall
 - b) Design the stem
 - c) Sketch neatly the reinforcement details. 15

Unit II

13. a) Design the walls of a circular water tank of height 3m (including 0.2m free board) to store water for 2.5 lakh litres capacity. The base point is flexible. Adopt M20 and Fe 415 grade concrete and steel respectively.
- b) Sketch neatly the C/S of the wall and the base with reinforcement details. 15

Or

14. a) Design the spherical dome and top ring beam of an Intze tank of roof base diameter of 12m. Top of dome above roof base is 1.5m. Assume M20 grade concrete and Fe 415 grade steel.
- b) Sketch neatly with reinforcement details section of the dome and the ring beam at its base. 15

Unit III

15. a) Design an R.C.Slab bridge for class AA tracked vehicle loading. Clear span is 5m. Carriage way width= 7.5m. Assume thickness of wear coating= 10cm.
- b) Sketch neatly the cross section and elevation of the bridge showing clearly the reinforcement details. 20

Or

16. a) For a T beam girder bridge with the following data design one of the longitudinal girders. Span= 20m. Loading: IRC class AA tracked. Thickness of deck slab= 20cm. Wear coating= 10cm thick clear carriage way width=7.5m. Longitudinal girders provided at 2.5m c/c of ribs. Assume width of ribs as 300mm. Spacing of cross girders 4m c/c. Width of Kerbs = 1m.
- b) Sketch neatly the cross section and longitudinal section of the bridge showing clearly the reinforcement details. 20
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