

Roll No.

CE-702

B. E. (Seventh Semester) EXAMINATION, June, 2009

(Civil Engg. Branch)

ADVANCED STRUCTURAL DESIGN – II

(R. C. C.)

(CE – 702)

Time : Three Hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : Total five questions are to be solved. There is internal choice between questions. Assume any missing data if required.

1. (a) Discuss the types of bracing commonly used for multistorey buildings. 8
- (b) Discuss substitute frames and loading conditions for maximum moment values of different critical points of a building frame. 12

Or

- (a) Explain the function of shear walls. 8
- (b) Derive the expression for moment of resistance of a rectangular shear wall. 12

2. Design the stem of a cantilever retaining wall for the following requirements : 20

- (i) Height of wall above ground level = 5.0 m
- (ii) Superimposed load due to road traffic = 18 kN/m²
- (iii) Unit weight of fill = 18 kN/m³
- (iv) Angle of internal friction for fill material = 28°
- (v) Allowable bearing pressure on ground = 150 kN/m²
- (vi) Coefficient of friction between concrete and ground = 0.4
- (vii) Height of parapet wall on top of stem = 1.0 m
- (viii) Use M-20 concrete and Fe-415 grade steel.

Or

Design the counterfort of a counterfort type retaining wall to the following particulars :

- (i) Height of wall above G. L. = 7.5 m
- (ii) Safe bearing capacity of soil = 16 kN/m²
- (iii) Angle of repose = 26°
- (iv) Unit weight of Fill = 16 kN/m³
- (v) Spacing of counterforts = 3.6 m
- (vi) Use M-20 grade concrete and Fe-415 grade steel.

3. Design an underground reservoir 12 m × 6 m × 3.0 m deep including a free board of 0.2 m. The dry density of soil is 16.5 kN/m³ and the angle of repose of dry soil is 32°. The outside soil which is 0.3 m below the top of the tank wall may be taken as fully saturated upto its full height. Use M-25 concrete and Fe-415 steel. 20

Or

Design the top dome, top ring beam, cylindrical wall and bottom ring beam of an intze type water tank of 1.0 million litres capacity. Take diameter of cylindrical part = 12.0 m. Use M-20 concrete and Fe-415 steel. 20

4. (a) Distinguish clearly between a bunker and silo. 5
- (b) A silo with internal diameter 5.5 m, height of cylindrical portion 20 mm and central opening 0.5 m dia. is to be built to store wheat. Design the wall of silo, using M-20 grade concrete and Fe-415 steel. Given : 15
- (i) Unit weight of wheat = 8.5 kN/m^3
- (ii) Angle of internal friction = 280

Or

Using Airy's theory, derive an expression for horizontal pressure at any depth h below the top of Bin. 20

5. (a) What are losses in prestress due to ? Explain. 10
- (b) Calculate the design moment along long and short span of deck slab for a T-beam bridge on a National Highway considering Class AA tracked vehicle only. The following data is given : 10
- Effective span of beam = 16 m
- Carriage way width = 8.0 m
- C/C spacing of cross beams = 4.0 m
- C/C spacing of longitudinal beams = 2.5 m
- Thickness of weaving coat = 80 mm
- Thickness of slab = 220 mm
- Width of rib of T-beam = 360 mm

[4]

Or

Design the slab of a culvert having 6.0 m span (clear), width of bearing = 400 mm, clear width of road way = 7.5 m, width of footpaths on each side = 1.0 m, average thickness of wearing coat = 80 mm. Design for IRC Class AA tracked vehicle. Sketch details. Use M-25 concrete and Fe-415 steel.

Take permissible stresses in concrete and steel as per IRC : 21 – 1987.

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