Diploma in Civil Engineering (DCLE(G))
DCLEVI

Term-End Examination

December, 2012

01180

BCE-041 : THEORY OF STRUCTURES - II

Time : 2 hours *Maximum Marks : 70*

Note : *Question number **1** which is **compulsory.** Attempt any other **four** questions. All questions carry **equal** marks. Assume suitable data wherever necessary and mention it clearly. Use of scientific calculator is permitted.*

1. Choose the most appropriate answer from the given alternatives in questions (a) to (g) **7x2=14**

(a) According to IS : 456-2000, the modulus of elasticity of concrete E_C (in N/mm^2) can be taken as

(i) $E_c = 5700 \sqrt{fck}$

(ii) $E_c = 570 \sqrt{fck}$

(iii) E_c - 5700 fck

(iv) $E_c = 700 \sqrt{fck}$

Where fck is the characteristic strength in N/mm^2.

(b) Critical section for shear in case of flat slab is at a distance of :

(i) effective depth of slab from periphery of column / drop panel

(ii) d/2 from periphery of column / capital / drop / panel

(iii) at the drop panel of slab

(iv) at the periphery of column

(c) The average permissible stress in bond for plain bars in tension is :

(i) increased by 10% for bars in compression

(ii) increased by 25% for bars in compression

(iii) decreased by 10% for bars in compression

(iv) decreased by 25% for bars in compression

(d) In T-shaped R.C. retaining walls, the main reinforcement in the stem is provided on

(i) the front face in one direction

(ii) the front face in both directions

(iii) the inner face in one direction

(iv) the inner face in both directions

(e) According to IS 456-2000, the maximum compressive stress in concrete for design purposes is taken as :

(i) 0.370 fck (ii) 0.416 fck

(iii) 0.446 fck (iv) 0.670 fck

(f) Minimum clear cover (-in mm) to the main steel bars in slab, beam, column and footing respectively are :

(i) 10, 15, 20, 25

(ii) 15, 25, 40, 75

(iii) 20, 25, 30, 40

(iv) 20, 35, 40, 75

(g) In case of 2-way slab, the limiting deflection of slab is :

(i) primarily a function of the long span

(ii) primarily a function of the short span

(iii) independent of long or short span

(iv) dependent on both long and short spans

2. A rectangular reinforced concrete beam, located inside a building is simply supported on two masonary walls 230 mm thick and 6m apart (centre to centre). Consider live load of 10 kN/m and dead load of 5 kN/m for the beam. Design the beam section for maximum moment at mid span. Assume M 20 concrete and Fe 415 steel. **14**

3. Design a one-way slab, with a clear span of 5.0 m, simply supported on 230 mm thick masonary walls, and subjected to a live load of 3 KN/m^2 and a surface finish load of 1 kN/m^2, using Fe 415 steel. Assume that the slab is subjected to mild exposure. Use M20 concrete and Fe 415 steel. **14**

4. Design the reinforcement in a column 400 mm × 400 mm, located in the lowermost storey. It is subjected to factored loads as follows : Pu = 1300 kN, Mux = 190 kNm and Muy-110 kNm. The unsupported length of column is 3.5m. Use M25 concrete and Fe 415 steel. **14**

5. Design a 'waist slab' type staircase comprising a straight flight of steps, supported between two stringer beams along the two sides. It has an effective span of 1.5 m, riser of 150 mm and tread of 270 mm. Assume live load of 3.0 kN/m^2. Use M20 concrete and Fe 415 steel. Assume mild exposure conditions. **14**

6. Design a plain concrete footing for a column, 300 mm × 300 mm, carrying an axial load of 330 kN (under service loads, due to dead and live loads). Assume an allowable soil pressure of 360 kN/m^2 at a depth of 1.0 m below ground. Assume M 20 concrete and Fe 415 steel. **14**

7. Design a roof slab simply supported on all four edges of effective spans 4m × 6m. The top of slab is covered with 100 mm line terrace. Imposed load may be taken as 1.5 kN/m^2. Consider M20 concrete and Fe 415 steel. **14**

8. Write short notes on ***any four*** of the following : **4x3½=14**

(a) Flexural behaviour of reinforced concrete

(b) doubly reinforced sections

(c) Curtailment of flexural tension Reinforcement

(d) Effect of Flexural cracking on Flexural bond stress

(e) Development length

(f) Factors influencing bond strength

(g) Forces acting on contilever retaining wall.