01449

Diploma in Civil Engineering

Term-End Examination

December, 2010

BCE-041 : THEORY OF STRUCTURES II

Time : 2 hours *Maximum Marks : 70*

Note : *Attempt 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 calculator is permitted.*

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

(a) According to IS:456-2000, the maximum strain in concrete is

(i) 0.035

(ii) 0.0002

(iii) 0.0035

(iv) 0.00035

(b) According to IS:456-2000, the maximum reinforcement in a column is

(i) 2%

(ii) 4%

(iii) 6%

(iv) 8%

(c) The percentage of reinforcement in case of slabs, when high strength deformed bars are used, is not to be less than

(i) 0.15

(ii) 0.12

(iii) 0.30

(iv) 1.00

(d) The maximum compressive stress in concrete for design purposes is based on a partial safety factor of

(i) 1.15

(ii) 1.50

(iii) 1.85

(iv) 2.20

(e) Due to shrinkage stresses, a simply supported beam having reinforcement only at bottom tends to

(i) deflect downward

(ii) deflect upward

(iii) deflect downward or upward

(iv) none of the above

(f) The side face reinforcement, if required in a T-beam will be

(i) 0.1% of the web area.

(ii) 0.15% of the web area.

(iii) 0.2 to 0.3% of the web area depending upon the breath of the web.

(iv) 0.8% of the web area.

(g) A doubly reinforced beam is considered less economical than a singly reinforced beam because

(i) tensile steel required is more than that for a balanced section.

(ii) shear reinforcement is more.

(iii) concrete is not stressed to its full value.

(iv) compressive steel is under-stressed.

2. Determine area of tension as well as compression reinforcement for a doubly reinforced section of $b \times d = 300 \times 550$mm subjected to a factored moment of 300kN-m. **14**

Use M20 concrete & Fe415 steel and assume effective cover of 50mm both for tension as well as compression reinforcement.

3. Design a one-way slab, with a clear span of 4m which is simply supported on 230mm thick masonry walls. It is subjected to a live load of 4 kN/m² and a surface finish of 1 kN/m². Assume M 20 concrete and Fe 415 steel. **14**

4. Design a dog-legged staircase for an office building, given the following data: **14**

   Height between floor = 3.2m.

   riser = 160mm, tread = 270mm

   width of flight = landing width = 1.30m

   live load = 5.0 kN/m²,

   Finish load = 0.6 kN/m²

   Assume the stair to be supported on 230 mm thick masonry walls at the outer edges of landing parallel to the risers. Use M 20 concrete and Fe 415 Steel.

5. Design a reinforced concrete footing for a 230mm thick masonry wall which supports a load (self wt.) of 200 kN/m. Assume a safe soil bearing capacity of 150 kN/m² at a depth of 1m below ground. Assume M 20 grade concrete and Fe-415 steel. **14**

6. Design the reinforcement in a column of size 450 × 600mm, subject to an axial load of 2000kN under service dead and live loads. The column has an unsupported length of 3.0m and is braced against sides way in both directions. Use M 20 conc. and Fe 415 steel. **14**

7. A column has cross sectional area of 300 × 400 and is reinforced with 625. Determine permissible load if it is effectively held in position at both ends, but not restrained against rotation and has a length of 3.5m. M 20 concrete and Fe 415 steel. **14**

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

(a) Basic assumptions for Design of sections.

(b) Earth pressure.

(c) development length.

(d) minimum eccentricity requirement for columns.

(e) effective length of a column.

(f) Fire resistance of concrete.