No. of Printed Pages : 4

BCE-041

00194

Diploma in Civil Engineering

Term-End Examination

June, 2011

BCE-041 : THEORY OF STRUCTURES II

Time : 2 hours *Maximum Marks : 70*

Note : *Attempt Question number **1** which is **compulsory** and any other **four** questions. Solve **five** questions in all. 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 questions (a) to (g) **7x2=14**

(a) In a singly reinforced beam, if the permissible compressive stress in concrete reaches earlier than the permissible tensile stress in steel, the beam section is called

(i) under - reinforced section

(ii) over reinforced section

(iii) economic section

(iv) critical section

(b) Maximum pitch of transverse reinforcement in a column is

(i) the least lateral dimension of the member

(ii) sixteen times the smallest diameter of longitudinal reinforcement bar to be tied

(iii) 300 mm

(iv) least of the above three values

(c) In reinforced concrete footing on soil, the minimum thickness at edge should not be less than

(i) 100 mm (ii) 150 mm

(iii) 200 mm (iv) 250 mm

(d) In working stress design, permissible bond stress in the case of deformed bars is more than that in plain bars by

(i) 10% (ii) 20%

(iii) 30% (iv) 40%

(e) Maximum percentage reinforcement in case of columns is limited to

(i) 2 (ii) 4

(iii) 6 (iv) 8

(f) For the design of retaining walls, the minimum factor of safety against over turning is taken as

(i) 1.5 (ii) 2.0

(iii) 2.5 (iv) 3.0

(g) According to IS : 456 - 2000, the maximum strain in concrete at the outermost compression fibre in the limit state design of flexural member is :

(i) 0.0020 (ii) 0.0035

(iii) 0.0050 (iv) 0.0065

2. Explain procedure of design of reinforced concrete retaining walls. **14**

3. Design a one - way slab which has a clear span of 5 m. It is simply supported on 230 mm thick masonry walls and is subjected to a live load of 3 kN/m^2 and a surface finish load of 1 kN/m^2. Assume M 20 concrete and Fe 415 steel. **14**

4. Design the shear reinforcement in a rectangular beam having a section 350 mm wide and 750 mm deep . It is subjected to an ultimate twisting moment of 140 kNm, combined with an ultimate bending moment of 200 kNm and an ultimate shear force of 110 kN. Assume M 25 concrete and Fe 415 steel. **14**

5. Design a RC footing for a masonry wall 375 mm thick carrying a superimposed load of 250 kN/m. The bearing capacity of soil is 135 kN/m^2. Assume M 20 concrete and Fe 415 steel. Take Nominal cover as 50 mm. **14**

6. Design a 'waist slab' type staircase comprising a straight flight of steps, supported by two stringer beams along the two sides. Assume an effective span of 1.5 m, a riser of 150 mm and a tread of 270 mm. Assume a live load of 3.0 kN/m^2. Use M 20 concrete and Fe 250 steel. **14**

7. Design only the wall of a circular water tank with a dome as top cover. The tank is to rest over ground and shall have a capacity of 250,000 litres. Total Depth of the tank is to be 3.5 m including 0.2 m free board. Use M 30 concrete and Fe 415 steel. **14**

8. Write short notes on ***any four*** of the following : **4x3½=14**
   (a) Limit state of collapse
   (b) Shear reinforcement
   (c) Assumptions for design of flexural members.
   (d) Effective length of column.
   (e) Creep of concrete
   (f) Balanced section