

**5E3152****5E3152**

**B.Tech. (Sem.V) (Main) Examination- Dec. 2012**  
**Civil Engineering**  
**5CE2 Concrete Structures-I**

Time : 3 Hours]

[Total Marks : 80  
[Min. Passing Marks : 24**Instructions to Candidates :**

Attempt any five questions, selecting one question from each unit. All questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

**UNIT-I**

1. (a) Discuss the major features of working stress method and limit state method. (5)
- (b) What do you understand by a Balanced section, over reinforced and under reinforced section. (5)
- (c) A rectangular singly R. C. beam with cross-section  $300\text{mm} \times 600\text{mm}$  is simply supported over the clear span of  $4.25\text{m}$  with support of  $300\text{mm}$  each. Calculate ultimate moment of resistance of the beam. Use M 20 and Fe 415 steel grade. (6)

**OR**

1. (a) What do you understand by a singly reinforced beam and doubly reinforced beam. State the condition where a doubly reinforced beam is preferred. (6)
- (b) Determine the ultimate moment of resistance capacity of a doubly reinforced beam with width of beam as  $300\text{mm}$  and effective depth  $600\text{mm}$  and cover as  $40\text{mm}$  both in tension and compression. Reinforcement in compression as 2 nos @  $25\text{mm}$   $\phi$  and in tension as 5 nos @  $25\text{mm}$   $\phi$ . Use M 20 concrete and Fe 415 steel grade. (10)

**UNIT-II**

2. Design a singly reinforced concrete beam supported on two walls of thickness  $500\text{mm}$  spaced at a clear distance of  $6\text{m}$ . The beam carries a superimposed load of  $10\text{ kN/m}$ . Use M 20 concrete and Fe 415. Apply all checks. (16)

**OR**

Design a doubly reinforced beam which rests over a clear span of  $5\text{m}$ . The superimposed dead load is  $18\text{ kN/m}$  and live load is  $12\text{ kN/m}$ . Bearing at each end is  $50\text{mm}$ . The beam has cross-section of  $300 \times 550\text{mm}$ . Use M 15 and Fe 415 grade. Apply all the checks. (16)

**UNIT-III**

3. Design a simply supported R.C. slab for a room having inside dimensions as  $3\text{m} \times 8\text{m}$ . The slab carries a lime concrete of  $75\text{ mm}$  thickness at its top. The live load on the slab is  $2\text{ kN/m}^2$ . Take unit weight of lime concrete as  $20\text{ kN/m}^3$ . Use M 20 grade of concrete and steel of Fe 415 grade. (16)

**OR**

3. Design a R.C. slab for a room measuring  $5\text{m} \times 6\text{m}$  from inside. The slab carries a live load of  $2\text{ kN/m}^2$  and  $25\text{ mm}$  thick lime concrete having unit weight as  $20\text{ kN/m}^3$ . The slab is simply supported at the four edges, with corners free to lift. Take the width of supporting wall as  $350\text{ mm}$ . (16)

**UNIT-IV**

4. Design a circular column to carry an axial load of  $1000\text{ kN}$ . Use M 20 and Fe 415 grade of steel. Also provide helical reinforcement for the above column. (16)

**OR**

4. (a) A concrete column of  $450\text{mm} \times 450\text{mm}$  is reinforced with 4 bars of  $20\text{mm}$  dia. Determine the ultimate load capacity of column, using M 20 concrete and steel Fe 415 grade. (10)
- (b) Give typical sketch of the following : (6)
- (i) Isolated square footing. (ii) Strap footing. (iii) Raft foundation.

**UNIT-V**

5. (a) A footing supports a square column of size  $400\text{mm} \times 400\text{mm}$  with a service load of  $900\text{ kN}$ . Find out the size of footing, depth of the footing and reinforcement required in it, if the safe bearing capacity of soil is  $200\text{ kN/m}^2$ . Use M 20 and Fe 415. Also draw Neat Sketch. (16)

**OR**

5. (a) Describe one way shear and two way shear in a square footing. (4)
- (b) Determine the thickness and size of R.C footing of a column of size  $300\text{mm} \times 500\text{mm}$ . The column carries a load of  $1500\text{ kN}$  and safe bearing capacity of soil at the site  $175\text{ kN/m}^2$ . (12)