Reg.No. \_\_\_\_\_\_\_\_\_\_\_\_

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**End Semester Examination – Nov/Dec – 2018**

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| **Code :** | **14CE2009** | **Duration :** | **3hrs** |
| **Sub. Name :** | **REINFORCED CONCRETE STRUCTURES** | **Max. marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

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| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | Draw the stress strain curve for steel and mark the salient points. | CO1 | 4 |
| b. | Discuss in detail the concepts and advantages of limit state method over other two methods. | CO1 | 16 |
| (OR) | | | | |
| 2. |  | Design a simply supported slab of 6 x 2.5 m supported on 230mm walls. Assume live load as 3 kN/m2 and floor finish of 0.7 kN/m2. Use M20 concrete and Fe415 steel. | CO2 | 20 |
|  |  |  |  |  |
| 3. | a. | Calculate the value of τc for a beam with Ast as 400 mm2, b =230mm and d=400mm. Use M25 grade of concrete. | CO1 | 2 |
| b. | Differentiate between singly and doubly reinforced sections? | CO3 | 2 |
| c. | A simply supported beam of size 230x 500mm overall depth has to resist a factored moment of 450 kNm and grade of concrete is M20.Design the reinforcement in the beam. | CO2 | 16 |
| (OR) | | | | |
| 4. |  | Find the moment of resistance of T-beam for the following data  bf = 750mm, d= 500mm, bw= 250mm, Ast= 1160mm2. Use M20 concrete and Fe415 steel, when   1. Df= 90 mm 2. Df= 130mm   iii ) Df=110mm | CO3 | 20 |
|  |  |  |  |  |
| 5 | a. | Mention the minimum and maximum reinforcement percentage in columns. | CO2 | 2 |
|  | b. | “Exterior columns are designed for uniaxial moment”Justify the statement. | CO3 | 2 |
|  | c. | Design a short circular column of diameter 500mm with effective length of 3.0m capable of safely resisting a factored load of Pu=1500kN. Use M20 concrete and Fe415 steel. i) provide circular ties ii) provide helical reinforcement. | CO2 | 16 |
| (OR) | | | | |
| 6. | a. | As per the code mention the condition for design of columns subjected to biaxial bending. | CO1 | 2 |
| b. | Differentiate between short and long column. | CO3 | 2 |
| c. | Design a column of size 400 x 500 mm with effective length of 3.5m to resist a factored load of Pu=1200kN and Mu=120kN.m. Use M20 concrete and Fe415 steel. | CO2 | 14 |
|  |  |  |  |  |
| 7. |  | An RC column 500 x 500mm in section carries an axial load of 1000kN. Design the footing for the column using M20 concrete and Fe415 steel. The safe bearing capacity of soil may be taken as  220 kN/m2. | CO2 | 20 |
| (OR) | | | | |
| 8. |  | Design a dog-legged stair for a building in which the vertical distance between floors is 3.2m. The stair hall measures 3 m x 6 m. The live load may be taken as 3.5 kN/m2. Use M20 concrete and Fe415 steel. | CO2 | 20 |
|  |  |  |  |  |
|  | | **Compulsory:** |  |  |
| 9. |  | Design a cantilever retain wall to retain a horizontal earth embankment of height 4m. Assume safe bearing capacity of the Soil as 200 kN/m2. Angle of repose 300, Coefficient of internal friction 0.5. | CO2 | 20 |