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



**End Semester Examination – Nov / Dec – 2019**

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| **Code :** | **17CE2009** | **Duration :** | **3hrs** |
| **Sub. Name :** | **DESIGN OF REINFORCED CONCRETE ELEMENTS** | **Max. Marks :** | **100** |

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

**IS 456:2000 and SP16 Design Aids are permitted.**

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| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | Define the limit state of collapse. | CO2 | 3 |
| b. | Construct a brief note on Working stress method of design. | CO1 | 5 |
| c. | Estimate the moment of resistance of the rectangular beam of size 230 X 300 mm having 3 numbers of 16mm diameter Fe415 rods as tension reinforcement. The grade of concrete is M25. Use working stress methods of design. | CO3 | 12 |
| **(OR)** | | | | |
| 2. | a. | Explain under reinforced sections. | CO2 | 4 |
| b. | Construct the actual and idealized stress-strain diagrams for concrete. | CO3 | 4 |
| c. | Design the tension reinforcement of a simply supported beam carrying a load of 10kN/m over a span of 6.5m. Use working stress methods of design. | CO5 | 12 |
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| 3. |  | Design a simply supported slab of size 9m X 3m. The slab is supported on 230mm thick masonary wall. The live load is 2000N/m2 . The load due to Floor Finish is 1500N/m2. | CO5 | 20 |
| **(OR)** | | | | |
| 4. |  | Design the interior panel of a continuous slab system. The size of the slab is 4m X 3m. The live load is 2000N/m2 . The load due to Floor Finish is 1500N/m2. | CO5 | 20 |
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| 5. |  | A simply supported rectangular beam is reinforced with 5 number of 16mm Fe 415 rods. Two rods are cranked near the support. The size of the beam is 300 X 600mm. Grade of comcrete is M20 and grade of steel is Fe415. Examine the adequacy of the beam for bond and deflection. | CO6 | 20 |
| **(OR)** | | | | |
| 6. |  | Estimate the moment of reistance of a T beam with the following data. Bf = 1000m, bw = 300mm, Df = 150mm, d= 750mm. It is reinforced with 4 number of 20mm diameter rods. Adopt M20 grade concrete and Fe415 steel. | CO2 | 20 |
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| 7. | a. | Design a square column to carry an axial factored load of 1500kN. The unsupported length of the column is 3000mm. Adopt M20 grade concrete and Fe415 steel. | CO5 | 10 |
| b. | Design the longitudinal reinforcement in a circular column of diameter 450mm subjected to a factored load of 1500kN and a factored moment of 25kNm. | CO5 | 10 |
| **(OR)** | | | | |
| 8. |  | Estimate the reinforcement needed for a column with the following  data. Pu = 1500kN. Mux = 120kNm, Muy = 80 kNm. The column  is short in both the planes. The size of the column is 300 X600 mm. | CO6 | 20 |
|  | | **Compulsory**: |  |  |
| 9. |  | Design a footing for a concrete wall of 200mm thick which supports a load of 200 kN/m. The safe bearing capacity of the soil is 150kN/m2. Adopt M20 grade concrete and Fe415 steel. Draw the detailed diagram. | CO7 | 20 |