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



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

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| **Code : 18CE3023** | **Duration : 3hrs** |
| **Sub. Name : DESIGN OF ADVANCED CONCRETE STRUCTURES** | **Max. marks : 100** |

**ANSWER ANY FIVE QUESTIONS (5 x 16 = 80 Marks)**

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| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | Design the reinforcements of a doubly reinforced beam of rectangular cross section 300mm x 550mm. The beam is simply supported over a span of 6m. Live load on beam is 35kN/m. Use M20 grade concrete and Fe415 steel. | CO5 | 10 |
| b. | Elaborate on reasons for cracking and effects of cracking in beams. | CO6 | 6 |
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| 2. |  | A simply supported spanning over 7 m is of rectangular section with a width of 300 mm and overall depth of 550 mm. The beam is reinforced with 4 bars of 25mm ϕ on the tension side at an effective depth of 500 mm. Two nominal hanger bars of 12 mm ϕ are provided on the compression side. The beam is subjected to a service load moment of 160 kN.m at the centre of span section. Assume M20 concrete and Fe415 steel. Check the beam for the serviceability limit state of cracking. | CO6 | 16 |
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| 3. |  | Design a continuous reinforced beam ABC of rectangular section to support a dead load of 10 kN/m and a service live load of 20kN/m over two simply supported spans of 8m each. Adopt M30 grade of concrete and Fe415 HYSD bars. Moments should be redistributed at 15%. Draw the reinforcement diagram of the beam. | CO2, CO3 | 16 |
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| 4. | a. | List the characteristic features of yield lines. | CO1 | 6 |
| b. | Using yield line theory design a simply supported square slab of 3.6m to carry a service load of 6 kN/m2. Adopt M30 grade of concrete and Fe415 steel. | CO1 | 10 |
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| 5. |  | Design the side walls and hopper bottom of a 3 m square bunker to store 40 tonnes of coal. Density of coal is 9 kN/m3. Use M30 grade concrete and Fe 415 HYSD steel. Sketch the reinforcements in the bunker. | CO4 | 16 |
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| 6. | a. | Discuss the bond mechanism in reinforced concrete structures. | CO1 | 5 |
| b. | Calculate the moment carrying capacity of a reinforced concrete rectangular beam of size 300 x 600mm. The beam is reinforced with 3 bars of 20 mm diameter. The beam is having severe exposure condition. The concrete mix is M20 and steel is Fe415. | CO2 | 6 |
| c. | Discuss about moment redistribution. List out the advantages of moment redistribution. Give the IS code provisions for moment redistribution. | CO3 | 5 |
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| 7. |  | Design a corbel to carry an ultimate load of 600 kN at a distance of 250 mm from the face of a column of size 400 mm x 400 mm. Use M30 concrete and Fe 415 steel. Draw the reinforcement details. | CO3, CO4 | 16 |
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| **COMPULSORY QUESTION (1 x 20 = 20 Marks)** | | | | |
| 8. | a. | Elaborate on the growing usage of precast concrete. List the advantages of precasting. | CO5 | 12 |
| b. | Give the details about types of precast systems as per Indian Standard codal guidelines | CO1 | 8 |