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



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

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| **Code :** | **18CE3029** | **Duration :** | **3hrs** |
| **Sub. Name :** | **DESIGN OF BRIDGES** | **Max. Marks :** | **100** |

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| **Q. No.** | **Sub Div.** | **Questions** | **Course Outcome** | **Marks** |
|  |  | **PART A (5 X 16= 80 MARKS)**  **(Answer any five from the following)** |  |  |
| 1. |  | Compute the live load bending moment on RCC slab bridge for the following data:  Carriage width = 7.5m  Foot path = 1m on either side  Clear span = 10m  Wearing course = 75mm  Width of bearing = 0.3m  Materials = M30 and Fe 500  Loading = IRC Class A Wheeled | CO3 | 16 |
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| 2. |  | Calculate the Live load bending moment in the Longitudinal girder of the RCC Tee beam girder bridge  Thickness of slab - 300mm  Thickness of Wearing course - 100mm  Carriage width = 7.5m  Kerb = 0.6x0.5m on either side  Span = 16m (at 4m spacing in each bay)  Loading = IRC 70R tracked  Assume the relevant missing data. | CO3 | 16 |
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| 3. |  | A post tensioned prestressed concrete girder of effective span 12m is to be designed to carry an live load of 15kN/m in a bridge. Provide M40 concrete and 12mm dia high tensile wires of ultimate strength 1500MPa. Design the mid span section of the beam assuming the compressive strength of concrete at transfer 35N/mm2. Assume the loss of prestress 20%. Assume Type I member and select suitable I section by trial. Evaluate the initial and final stresses in the section. | CO4 | 16 |
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| 4. |  | Design welded plate girder bridge for the following data:  Effective span of the girder - 30m (Broad gauge single track)  Dead load (including sleeper and rail) - 12kN/m  Live load - as per IRC Railway loading  Select the suitable trial section and check the moment and shear capacity of the section. | CO4 | 16 |
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| 5. | a. | Explain the design principles of different types of arch bridges with neat sketches. | CO2 | 10 |
| b. | Write short notes on Cable stayed bridges. | CO2 | 6 |
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| 6. |  | Evaluate the stability of the abutment as shown in the following for the following details.  Density of soil – 16 kN/m3  Angle of repose – 25º  Coefficient of friction b/w soil and concrete – 0.5  Angle of friction b/w soil and concrete – 20º  Span of the bridge – 12m  Live load – IRC AA  No of Longitudinal girders – 3, Size of the girder 0.3x1.4m  Thickness of the slab – 250mm  image (4).png | CO5 | 16 |
| 7. |  | The foundation for sub structure of a bridge consists of 6 piles to carry a total load of 2000 kN. The piles are spaced at 1m c/c. Length of the pile is 12m. Estimate the pile load carrying capacity and design the pile foundation using M30 concrete and Fe 500 steel. Unit weight of soil 18kN/m3 | CO5 | 16 |
|  | | **PART B (1 X 20= 20 MARKS)** |  |  |
| 8. |  | Explain the different causes of failures in steel bridges, also write the advantages of using steel material in bridge construction. | CO6 | 20 |