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



**UNIVERSITY**

(Karunya Institute of Technology & Sciences)

(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

**End Semester Examination – April/May – 2017**

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| **Code :** | **14CE3010** | **Duration :** | **3hrs** |
| **Sub. Name :** | **ADVANCED BRIDGE ENGINEERING** | **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. | Distinguish the various IRC loads as per the code. | CO1 | 5 |
| b. | A reinforced concrete simply supported slab is required for the deck of a road bridge having the data given below:  Width of carriageway - 7.5m  Kerbs - 600mm wide  Clear span - 6m  Type of loading - IRC Class AA tracked vehicle  Materials – M25 grade concrete, Fe415 grade tor steel  Design the deck slab. | CO2 | 15 |
| (OR) | | | | |
| 2. | a. | What are the conditions of Courbon’s method? | CO1 | 5 |
| b. | Design the longitudinal girder for a RCC Tee beam bridge for the following data  Clear width of roadway - 7.5m  Wearing coat - 80mm  No. of main girders - 3  Span (C/c of bearing) - 15m  Spacing of cross girder - 5m c/c  Loading - IRC Class AA tracked vehicle  M20 grade of concrete  Fe 415 grade steel is use | CO2 | 15 |
| 3. | a. | Can you specify when box girder bridges are constructed in prestressed concrete bridges. | CO3 | 5 |
|  | b. | Design a post- tensioned prestressed concrete slab bridge for a national highway crossing to suit the following data:  Width of carriage way = 7.5m  Foot path = 1m on either side  Kerbs = 600mm wide  Clear Span = 8 m  Type of loading = IRC Class AA or Class A whichever gives the worst effect  Materials – M40 grade concrete and 7mm diameter high tensile wires with an ultimate tensile strength of 1500 N/mm2 housed in cables with 12 wires and anchored by Freyssinet anchorages of 150mm diameter. Compressive strength at transfer, fci = 35 N/mm2. Loss ratio = 0.8. | CO2 | 15 |
| (OR) | | | | |
| 4. | a. | How would you find the impact factor for steel bridges? | CO1 | 5 |
|  | b. | The effective span of a through type trussed girder two lane highway bridge is 40m. The reinforced concrete slab is 250mm thick inclusive of the wearing coat. The footpaths are provided on both the sides of the carriageway. The cross girders are provided at 5m c/c. The spacing between main girders is 11m. Find the forces in the central vertical and diagonal members. Design the vertical member. Adopt Class A loading.  EUDLL for mainline loading (15m span) = 1606 kN & IF = 0.691  EUDLL for mainline loading (20m span) = 2027 kN & IF = 0.588 | CO2 | 15 |
| 5. | a. | How would you summarize the advantages of plate Girder Bridges? | CO1 | **5** |
|  | b. | The effective span of a through type plate girder railway bridge is 30m. The stringers are spaced 2m between centerlines. 0.60 kN per meter stock rails and 0.40 kN per metre checkrails are provided. Sleepers are spaced at 0.45m from center to center and are of size 2.8 m x 250 mm 250 mm. The weight of timber may be assumed as 7.5 kN/m3. The spacing between main girders is 9.8m. Design the maximum section of the plate girder, if the bridge is to carry standard main lane loading for broad gauge track.  EUDLL for mainline loading (30m span) = 2800 kN & IF = 0.455 | CO2 | **15** |
| (OR) | | | | |
| 6. | a. | Can you list the components of well foundations? | CO3 | **5** |
|  | b. | How would you verify the adequacy of the dimensions for an abutment to ensure safety. | CO3 | **15** |
| 7. | a. | Classify the piles based on materials and composition used in bridges. | CO1 | **5** |
|  | b. | Evaluate the adequacy of the dimensions for the pier as shown in figure. The following details are available.  Top width of the pier = 1.8m  Height of the pier upto springing level = 12m  C/c of bearings on either side = 1.00m  Side batter = 1 in 10  High flood level = 1m below bearing level  Span of the bridge = 16m  Loading on span = IRC Class AA  Road: Two-lane road with 1m wide foot path on either side  SuperStructure: Consists of three longitudinal girders of 1.3m depth with a Deck slab of 200mm depth. Rib width of girders = 300mm.  Material of the pier = Concrete M20  1.8m  3.8m  1.0m  12m | CO2 | **15** |
| (OR) | | | | |
| 8. | a. | Classify the different types of joints in a bridge | CO1 | **5** |
|  | b. | Explain the salient features of different types of bearings used in bridges. | CO2 | **15** |
|  | | **Compulsory**: |  |  |
| 9. | a. | Design the longitudinal girder of a post tensioned prestressed concrete T beam slab bridge deck for a national highway crossing to suit the following data:  Effective span = 30m  Width of road = 7.5m  Kerbs = 600mm on each side  Food path = 1.5m wide on each side  Thickness of the slab = 250mm  Thickness of wearing coat = 80mm  Spacings of cross girders = 5m  Loading = IRC Class AA or Class A whichever gives the worst effect  For the prestressed concrete girders, adopt M50 grade concrete  Take the loss ratio as 0.85 | CO2 | 20 |

ALL THE BEST