Reg.No. _____

**Karunya UNIVERSITY**

(Karunya Institute of Technology & Sciences)
(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

# End Semester Examination – Nov/Dec – 2016

**Code : 14CE2013** **Semester : V**
**Sub. Name : Design of Steel Structures** **Duration : 3hrs**
**Max. marks : 100**

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

| Q. No. | Sub Div. | Questions | Course Outcome | Marks |
|---|---|---|---|---|
| 1. | a. | A lap joint is made between two plates of 8mm thickness with 6 numbers of 20mm black bolts (G 4.6). Find the joint capacity. Bolts are fully threaded. Ultimate tensile strength of bolts is 400N/mm$^2$ and Ultimate tensile strength of plate is 410N/mm$^2$.Shearing area of bolts is 245mm$^2$ | CO2 | 17 |
| | b. | Define the following terms<br>a)Pitch distance b)End distance c) Gauge distance | CO1 | 3 |
| | | **(OR)** | | |
| 2. | a. | Calculate the maximum tension allowed on a single ISA 75x75x6 ,If it is connected on one side of gusset plate of 8mm thick with bolts of 20mm diameter.Bolt strength is 50kN per bolt.The end distance is 35mm ,Neglect the bolt Failure. | CO2 | 17 |
| | b. | Briefly describe the failure criteria's in tension members | CO1 | 3 |
| 3. | a. | A Central column of an industrial platform bears a working load of 3000kN.The column of height 10m can be assumed to be pinned at supports.design a column,use $f_y$ =250Mpa | CO2 | 15 |
| | b. | (i)Classify the type of buckling class of a Hollow rectangular section.<br>(ii) Indicate the clause and page no of IS800-2007 in which you find the maximum effective slenderness ratio for steel structural elements | CO1 | 5 |
| | | **(OR)** | | |
| 4. | a. | Design a bridge compression members of two channels placed toe to toe.The length of two members is 8m.It carries a load of 1300kN.The width over the backs of channels is be designed by the designer considering the practical point of view .If the channels are connected by lacings,design the lacing system. | CO2 | 16 |
| | b. | (i) Write down the% of axial force to be considered in a lacing system.<br>(ii) Identify the maximum limit for slenderness ratio in a laced column | CO1 | 4 |
| 5. | a. | Design a built up battened column consisting of two channels connected back to back by battens to carry out an axial load of 1000kN.The effective height of the column is 7m | CO2 | 20 |
| | | **(OR)** | | |
| 6. | | A hall of clear dimensions 20m x 8m is to be covered with RCC slab flooring 120mm thick resting over RS joists. Terrazzo finishing 20mm thick is to be provided over the RCC slab. The live load on the slab is 3kN/m$^2$. The joints are resting over 300mm thick walls. Design the floor joists by taking the unit weight of RCC and finishing as 25kN/m$^3$. | CO2 | 20 |
| 7. | a. | Design a slab base for a column ISHB 350 carrying an axial load of 1200kN.Use M20 concrete for foundation. | CO2 | 15 |
| | b. | Ennumerate the uses of column bases and list its types. | CO2 | 5 |
| | | **(OR)** | | |
| 8. | | Analyze a roof truss to be built in Coimbatore for a clear span of 8m being supported on 400mm thick wall.The spacing of the truss is 4m c/c and the average height of roof truss is 6.5m. | CO3 | 20 |

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| | | **Compulsory:** | | |
| 9. | | Design a welded plate girder for a span of 24m to carry a superimposed load of 35kN/m avoid the use of bearing stiffeners and intermediate stiffeners. Use Fe410 grade of steel | CO2 | **20** |

ALL THE BEST

**Course Outcome:**

At the end of the course the students will be able to

CO1: Classify the different structural members and their connections

CO2: Analyse and design structural components

CO3: Apply the design concepts in different types of industrial structures