**20CE3103– STEEL STRUCTURAL DESIGN**

**(Civil Engineering)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Category**  | Professional Core | **Credits** | 3 |
| **Course Type** | Theory | **Lecture - Tutorial - Practical** | 2 - 1 - 0 |
| **Prerequisite** | Strength of Materials, Structural Analysis | **Sessional Evaluation**  | 40 |
| **Semester End Exam Evaluation** | 60 |
| **Total Marks** | 100 |

|  |  |  |
| --- | --- | --- |
| **Course Outcomes** | CO1 | Compare types of connection and select the suitable connection. |
| CO2 | Design steel tension members with lugs and splices.  |
| CO3 | Design steel laced and battened compression members. |
| CO4 | Design laterally supported beams and their connections. |
| CO5 | Design simple laterally unsupported beams and gantry girders. |
| CO6 | Design various types of bases and grillage foundation. |
| **Course****Content** | **UNIT – I****INTRODUCTION:** Properties of sections – Types of loads – Permissible stresses in tension, compression and shear as per IS code.**BOLTED CONNECTIONS:** Types of bolted joints – Modes of failure of bolted joints – Strength and efficiency of bolted joints – Strength of lap and butt joints – Design of Bolted joints – Design of bracket connections (beam to column and beam to beam connections).**WELDED CONNECTIONS:** Types of welded joints – Strength of fillet and butt welds – Design of welded joints – Design of bracket connections (beam to column and beam to beam connections).**UNIT – II****DESIGN OF TENSION MEMBERS:** Design of tension members – Lug angles – Tension splice. **UNIT – III****DESIGN OF COMPRESSION MEMBERS:** Design of compression members – Single and built-up columns – Design of lacing and battens – Design of eccentrically loaded columns.**UNIT – IV****LATERALLY SUPPORTED BEAMS:** Design of simple beams – Design of built-up beams- Curtailment of flange plates – Connection of flange plate with flange of beam.**UNIT – V****LATERALLY UNSUPPORTED BEAMS:** Permissible bending compressive stress – Effective length of compression flange – Design of simple beams – Design of Gantry Girders.**UNIT – VI****DESIGN OF COLUMN BASES:** Slab base – Gusseted base – Bases subjected to moment – Grillage foundation. |
| **Text books****and****References** | **TEXTBOOKS:**1. S.K. Duggal, *Design of Steel Structures*, McGraw-Hill education publishers, 2nd edition, 2017.
2. S.S. Bhavikatti, *Design of Steel Structures*, I K International Publishing house, 4th edition, 2014.
3. N. Subramanian, *Design of Steel Structures*, Oxford University press, 2nd edition, 2018.

**REFERENCE BOOKS:**1. M.R. Shiyekar, *Limit State Design in Structural Steel*, PHI Learning publishers, 3rd edition, 2016.
2. Dr. V.L.Shah & Dr. S.R.Karve, *Limit State Design of Steel Structures*, Jain Book Agency, 3rd edition, 2012.
3. P.Dayaratnam, *Design of Steel Structures*, S Chand Publishers,3rd edition, 2012.
 |

**CO-PO Mapping:** 3-High Mapping, 2-Moderate Mapping, 1-Low Mapping, - -Not Mapping

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| **CO1** | 2 | 1 | 1 | 1 | - | - | - | - | - | - | - | 2 | - | - | - |
| **CO2** | 3 | - | 2 | - | 1 | - | - | 1 | - | - | - | 2 | 1 | 1 | - |
| **CO3** | 3 | 1 | 2 | - | 1 | - | - | 1 | - | - | - | 3 | 1 | 1 | - |
| **CO4** | 3 | 1 | 2 | - | 1 | - | - | 1 | - | - | - | 2 | 1 | 1 | - |
| **CO5** | 3 | 1 | 2 | - | 1 | - | - | 1 | - | - | - | 1 | 1 | 1 | - |
| **CO6** | 3 | - | 2 | - | 1 | - | - | 1 | - | - | - | 2 | 1 | - | - |