**19CE4101 – DESIGN OF STEEL STRUCTURES**

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

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| **Course Objectives** | 1. To explain different types of connections available for steel joists. 2. To study the behavior and design of tension members 3. To carryout design of compression members. 4. To understand the design of laterally supported beams. 5. To carryout design of laterally unsupported beams and gantry girders. 6. To know the importance of column bases and carryout design. | |
| **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. 4. *IS 800 : 2007, General construction in steel – code of practice*, 3rd Revision. | |

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

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