# COURSE DELIVERY PLAN

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| DEPARTMENT OFCIVIL ENGINEERING | T P CDate Rev.No | : 0: 0: 3: 18-12-2023:00  |
| Course Regulation Course Code Course Name | : CE: R-20: R2032011 : DESIGN AND DRAWING OF STEEL STRUCTURES |
| **Class** | **Course Coordinator** | **Section** | **Name of the Faculty** |
| III B. TECH- II SEM | Y.PRIYANKA | CE-A | Mrs. V.BHARGAVI |
| CE-B |  |
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**COURSE OUTCOMES:**

**After successful completion of the course, the student will be able to,**

**CO1: Work** with relevant IS codes anddesign different connections. **(K5)**

**CO2: Carryout** analysis and design of flexural members with detailing. **(K5)**

**CO3: Design** of compression and tension members with different types of connection detailing. **(K5)**

**CO4: Design** of column foundations with detailing. **(K5)**

**CO5: Design** Plate girder and Gantry girder with connection detailing. **(K5)**

**Bridge Course**

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| **S. No.** | **Topic Discussed** |
| **1** | Revision of Code Books |
| **2** | Methods of design  |
| **3** | Structural Drawings |

**UNIT – I** Types of structural steel – Mechanical properties of steel – Concepts of plasticity – yield strength -Loads and Stresses – Local buckling behaviour of steel. Concepts of limit State Design –Different Limit States - Load combinations for different Limit states - Design Strengths- deflection limits – serviceability – stabilitycheck;

**Connections:** Design of Connections– Different types of connections – Bolted connections –Design strength - efficiency of joint

**Welded connections**: Advantages and disadvantages - Strength of welds-Butt and fillet welds: Permissible stresses – IS Code requirements. Design of fillet weld subjected to in-plane moment acting in the plane and at right angles to the plane of the joints.

# Objective:

The students are to be familiarized with different types of connections and relevant IS codes.

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| **Session No** | **Topics to be Covered** | **Reference** | **Teaching Aids/Class****Methods** |
| 1 | Types of structural steel, Mechanical properties of steel and Concepts of plasticity. | TB1 : Chapter-2Page no:49-51 | BB, Chalk, Duster |
| 2 | Yield strength, Loads and Stresses. | IS456-2000 | PPT and videos |
| 3 | Local buckling behaviour of steel, Concepts of limit State Design and Different Limit States. | TB1:Appendix APage no:896-910 | BB,Chalk,Duster |
| 4 | Load combinations for different Limit states, Design Strengths, deflection limits, serviceability and stability check. | TB1:Appendix APage no: 896-910 | BB,Chalk,Duster |
| 5 | Design of Connections, Different types of connections. | TB1:Appendix APage no: 896-910 | BB,Chalk,Duster |
| 6 | Bolted connections, Design Strength of bolted connections, efficiency of joint. | IS456-2000 | BB, Chalk, Duster |
| 7 | Welded connections: Advantages and disadvantages | TB1:Appendix APage no: 896-910 | BB, Chalk, Duster |
| 8 | Strength of welds, Butt and fillet welds | TB1:Appendix APage no: 896-910 | BB, Chalk, Duster |
| 9 | Permissible stresses and IS Code requirements. | TB1:Appendix APage no: 896-910 | BB, Chalk, Duster |
| 10 | Design of fillet weld subjected to in-plane moment acting in the plane and at right angles to the plane of the joints. | TB1:Appendix APage no: 896-910 | BB, Chalk, Duster |
| 11 | Assignment |  |  |
| 12 | Slip test |  |  |

**UNIT II:** Plastic Analysis*;* Plastic moment – Plastic section modulus - Plastic analysis of continuous beams **Beams**: Allowable stresses, design requirements as per IS Code-Design of simple and compound beams-Curtailment of flange plates, Beam to beam connection, check for deflection, shear, buckling, check for bearing, laterally unsupported beams.

**Objective:**

The students are to be equip with concepts of design of flexural members.

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| **Session No** | **Topics to be Covered** | **Reference** | **Teaching Aids/Class****Methods** |
| 13 | Plastic Analysis | TB1 : Chapter-3Page no:68-75 | BB, Chalk, Duster |
| 14 | Plastic moment and Plastic section modulus | TB1 : Chapter-3Page no:75 | PPT |
| 15 | Plastic analysis of continuous beams | TB1 : Chapter-3Page no:68-75 | BB, Chalk, Duster |
| 16 | Beams: Allowable stresses, design requirements as per IS Code | TB1 : Chapter-3Page no:68-75 | BB, Chalk, Duster |
| 17 | Design of simple and compound beams | TB1 : Chapter-4Page no:83-86 | BB, Chalk, Duster |
| 18 | Curtailment of flange plates, Beam to beam connection | TB1 : Chapter-4Page no:85-86 | BB, Chalk, Duster |
| 19 | Check for deflection, shear, buckling, check for bearing | TB1 : Chapter-4Page no:87-88 | BB, Chalk, Duster |
| 20 | Laterally unsupported beams | TB1 : Chapter-4Page no:87-88 | BB, Chalk, Duster |
| 21 | Assignment | IS456-2000 | BB, Chalk, Duster |
| 22 | Slip Test | TB1 : Chapter-6Page no:125-136 | BB, Chalk, Duster |

**UNIT III:** **Compression and Tension Members: E**ffective length - Slenderness ratio – permissible stresses. Design of compression members, and struts. Built up compression members – Design of lacings and battens. Design Principles of Eccentrically loaded columns, Splicing of columns.

**Roof Truss Element:** Different types of trusses – Design loads – Load combinations as per IS Codes

–Design of simple roof trusses involving design of purlins, rafters and joints – tubular trusses.

# Objective:

The students are to be familiarized with design of Tension and compression members in trusses.

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| **Session No** | **Topics to be Covered** | **Reference** | **Teaching Aids/Class****Methods** |
| 23 | Effective length, Slenderness ratio and permissible stresses. | TB1 : Chapter-12Page no:309 | BB, Chalk, Duster |
| 24 | Design of compression members, and struts. | TB1 : Chapter-12Page no:309 | BB, Chalk, Duster |
| 25 | Built up compression members and Design of lacings and battens. | TB1 : Chapter-11Page no:262 | BB, Chalk, Duster |
| 26 | Design Principles of Eccentrically loaded columns, Splicing of columns. | TB1 : Chapter-11Page no:250-262 | BB, Chalk, Duster |
| 27 | Roof Truss Element:Different types of trusses, Design loads, Load combinations as per IS Codes | TB1 : Chapter-11Page no:250-262 | BB, Chalk, Duster |
| 28 | Design of simple roof trusses involving design of purlins, rafters and joints. | TB1 : Chapter-11Page no:262 | BB, Chalk, Duster |
| 29 | tubular trusses | TB1 : Chapter-11Page no:262 | BB, Chalk, Duster |
| 30 | Assignments  | TB1 : Chapter-12Page no:309 | BB, Chalk, Duster |
| 31 | Slip Test |  |  |

**UNIT – IV Design of Column Foundations:** Design of slab base and gusseted base. Column bases subjected moment.

# Objective:

The students are to be familiarized with types of columns, column bases and their design.

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| **Session No** | **Topics to be Covered** | **Reference** | **Teaching Aids/Class****Methods** |
| 32 | Explanation about column foundations | TB1 : Chapter-16Page no:397 | BB, Chalk, Duster |
| 62 | Design of slab base :procedure | IS456-2000 | BB, Chalk, Duster |
| 63 | Problems on slab base design | TB1 : Chapter-16Page no:415 | BB, Chalk, Duster |
| 64 | problems | TB1 : Chapter-16Page no:399-403 | BB, Chalk, Duster |
| 65 | Design of gusseted base. | TB1 : Chapter-16Page no:399-403 | BB, Chalk, Duster |
| 66 | Problems | TB1 : Chapter-16Page no:399-403 | BB, Chalk, Duster |
| 67 | Problems | TB1 : Chapter-17Page no:413-426 | PPT |
| 68 | Column bases subjected moment. | TB1 : Chapter-17Page no:429-477 | BB, Chalk, Duster |
| 69 | problems | TB1 : Chapter-18Page no:482-483 | BB, Chalk, Duster |
| 70 | Problems | TB2 : Chapter-18Page no:483-486 | BB, Chalk, Duster |
| 71 | problems | TB1 : Chapter-18Page no:496-497 | BB, Chalk, Duster |
| 72 | Problems | TB1 : Chapter-18Page no:497-504 | BB, Chalk, Duster |
| 73 | Assignment |  |  |
| 74 | Slip Test |  |  |
| Content beyond syllabus covered (if any) :Model making of column reinforcement detailing. |

# UNIT V: Footings: Types of footings – Design of isolated footings – pedestal, square, rectangular and circular footings subjected to axial loads, uni-axial bending moment.

 **Objective:**

The students are able to understand different types of footings and their design.

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| **Session****No** | **Topics to be Covered** | **Reference** | **Teaching Aids/Class****Methods** |
| 75 | Footings: Explanation | TB1 : Chapter-22Page no:564 | BB, Chalk, Duster |
| 76 | Types of footings | TB1 : Chapter-22Page no:572 | BB, Chalk, Duster |
| 77 | Design of isolated footings subjected to axial loads, uni-axial bending moment - pedestal | TB1 : Chapter-22Page no:574-597 | BB, Chalk, Duster |
| 78 | Problems | TB1 : Chapter-22Page no:574-597 | BB, Chalk, Duster |
| 79 |  Problems | TB1 : Chapter-22Page no:574-597 | BB, Chalk, Duster |
| 80 |  Design of Square footings | TB1 : Chapter-22Page no:574 | PPT |
| 81 |  Problems | TB1 : Chapter-22Page no:574-577 | BB, Chalk, Duster |
| 82 | Design of Rectangular footings | TB1 : Chapter-22Page no:604 | PPT |
| 83 | Problems | TB1 : Chapter-22Page no:604 | BB, Chalk, Duster |
| 84 | Design of Circular footings | TB1 : Chapter-22Page no:581 | PPT |
| 85 |  Problems | TB1 : Chapter-22Page no:581 | BB, Chalk, Duster |
| 86 |  Problems | TB2 : Chapter-11Page no:581-597 | BB, Chalk, Duster |
| 87 |  Assignment |  |  |
| 88 | Slip Test |  |  |
| Content beyond syllabus covered (if any) : Model making of footing reinforcement detailing. |

Session Duration: 50 Minutes

**Total No. of Sessions required: 88**

**COURSE OUTCOMES**

Student should be able to,

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| **CO1** | **Work** on different types of design methods and design beams using working stress method.  | **Work** | K5 |
| **CO2** | **Carryout** analysis and design of flexural members for Flexure, Shear and Torsion with detailing.  | **Carryout** | K5 |
| **CO3** | **Design** of different types of slabs with detailing.  | **Design** | K5 |
| **CO4** | **Design** of different types of columns (compression members) with detailing.  | **Design** | K5 |
| **CO5** | **Design** of different types of footings. | **Design** | K5 |

**PROGRAM OUTCOMES**

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| S. No |  Graduate Attributes | Action Verbs | Level |
| 1 | Engineering Knowledge | Apply | K3 |
| 2 | Problem Analysis | Analyze | K4 |
| 3 | Design Development Of Solutions | Evaluate | K5 |
| 4 | Investigation Of Complex Problems | Evaluate | K5 |
| 5 | Modern Tool Usage | Create | K6,K5,K3 |
| 6 | Engineer and Society |  |  |
| 7 | Environment and Sustainability |  |  |
| 8 | Ethics |  |  |
| 9 | Individuals and Team Work |  |  |
| 10 | Communication |  |  |
| 11 | Life Long Learning |  |  |
| 12 | Project Management and Finance |  |  |

**PROGRAM SPECIFIC OUTCOMES**

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| **PSO1** | Graduates will have an ability to design components of diverse civil structures like buildings, roads, bridges, hydraulic structures etc.(K6,K5,K3) |
| **PSO2** | Graduates will have an ability to understand the materials and processes involved in various domains of civil engineering using codes of practices. (K4,K3) |

**Mapping of CO-PO-PSO**

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

1: Weekly Mapped 2: medium Mapped 3: Strongly Mapped

# REFERENCES:

**TEXT BOOKS:**

1. Limit State Design, A. K.Jain, Nem Chand Brothers

2. Reinforced Concrete Structures, N. Krishna Raju & R. N. Pranesh, and New Age Publications.

3. Structural Design and Drawing by N.Krishna Raju, Universities Press

**REFERENCE BOOKS:**

1. R C C Design, B.C Punmia, A. K. Jain and A. K Jain. Lakshmi Publications

2. Reinforced Concrete Structures, S. Unnikrishna Pillai & Devdas Menon, Tata C.Graw Hill, NewDelhi.

3. Design of Reinforced concrete Structures, N.Subrahmanian, and Oxford University Press.

4. Limit state design of reinforced concrete structures by P C Varghese, PHI Learning pvt. Ltd.

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| Prepared By | Signatures | Approved By | Signature |
| V.Bhargavi |  | HOD |  |
|  |  |
|  |  | PRINCIPAL |  |