III B.Tech II Semester

15ACE31-DESIGN OF STEEL STRUCTURES

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Course Objectives:

- *To understand design specifications, loading and design procedures of different steel structures as per BIS specifications.*
- *Ability to perform analysis and design of steel members and connections. 2. Ability to design steel structural systems*
- *Familiarity with professional and contemporary issues Assignments: Students write two professional papers.*

UNIT – I

Materials – Making of iron and steel – types of structural steel – mechanical properties of steel – Concepts of plasticity – yield strength. Loads–and combinations loading wind loads on roof trusses, behavior of steel, local buckling. Concept of limit State Design – Different Limit States as per IS 800 -2007 – Design Strengths- deflection limits – serviceability - Bolted connections – Welded connections – Design Strength – Efficiency of joint – Prying action Types of Welded joints - Design of Tension members – Design Strength of members.

UNIT – II

Design of compression members – Buckling class – slenderness ratio / strength design – laced – battened columns –column splice – column base – slab base.

UNIT – III

Design of Beams – Plastic moment – Bending and shear strength laterally / supported beams design – Built up sections – large plates Web buckling Crippling and Deflection of beams, Design of Purlin.

UNIT – IV

Design of eccentric connections with brackets, Beam end connections – Web angle – Unstiffened and stiffened seated connections (bolted and Welded types) Design of truss joints

UNIT – V

Plate Girder: Design consideration – I S Code recommendations Design of plate girderWelded – Curtailment of flange plates stiffeners – splicings and connections. Gantry Girder : Gantry girder impact factors – longitudinal forces, Design of Gantry girders.

Note: The students should prepare the following plates.

Plate 1 Detailing of simple beams

Plate 2 Detailing of Compound beams including curtailment of flange plates.

Plate 3 Detailing of Column including lacing and battens.
Plate 4 Detailing of Column bases – slab base and gusseted base
Plate 5 Detailing of steel roof trusses including particulars at joints.
Plate 6 Detailing of Plate girder including curtailment, splicing and stiffeners.

FINAL EXAMINATION PATTERN: The end examination paper should consist of Part A and Part B. part A consist of two questions in Design and Drawing out of which one question is to be answered. Part B should consist of five questions on design out of which three are to be answered. Weightage for Part – A is 40% and Part- B is 60%.

Course outcome:

- *The student will be able to: Understanding of the ASD and LRFD design philosophies and behavior of structural steel.*
- *Ability to analyze and design of tension members, columns, beams, beam-columns.*
- *Ability to analyze and design of simple bolted and welded connections.*
- *Ability to design steel framing system and connections of a building in a team setting.*
- *Familiarity with structural steel fabrication process and construction through field trip and/or speaker presentation.*
- *Familiarity with professional and ethical issues and the importance of lifelong learning in structural engineering.*

TEXT BOOKS

1. Design of Steel Structures by K.S.SaiRam , Pearson Pubilishers.
2. Limit State Design of Steel Structures by S.K. Duggal, Tata Mcgraw Hill, New Delhi.
3. Design of Steel Structures by Bhavikatti. IK INT Publication House, New Delhi, 2010.

REFERENCES

1. Structural Design and Drawing by N.KrishnaRaju, University Press, Hyderabad.
2. Structural Design in Steel by SarwarAlamRaz, New Age International Publishers, New Delhi
3. Steel Structures by Subramanyam.N, Oxford University press, New Delhi
4. Design of Steel Structures by Edwin Gaylord, Charles Gaylord,JamesStallmeyer, Tata Mc.Graw-Hill, New Delhi.

Codes/Tables: IS Codes:

1) IS -800 – 2007
2) IS – 875 – Part III
3) Steel Tables.
4) Railway Design Standards Code. and steel tables to be permitted into the examination hall.