DESIGN OF STEEL STRUCTURES – I
(Using Limit State Method)

Lectures / Tutorials : 4 / 1 Periods/Week Sessional marks : 40
Semester End Exam. : 3 Hours Semester End Exam. Marks : 60
Credits : 4

Course objectives:

- To introduce steel structures and its basic components
- To introduce structural steel fasteners like welding and bolting
- To design tension members, compression members, beams and beam-columns
- To design column splices and bases

Course outcomes:

- Learn the basic elements of a steel structure
- Learn the fundamentals of structural steel fasteners
- Able to design basic elements of steel structure like tension members, compression members, beams and beam-columns
- Able to design column splices and bases.

UNIT - I

Introduction

What are steel structures ? ; What a steel structure consists of ? ; Structural steel; Products of structural steel ; Standards , Codes and Specifications; Fatigue ;Brittle fracture ; Corrosion protection of steel structures ; Design philosophies ; Methods of structural analysis ; Plate(Local) buckling ; Classification of sections

Structural steel fasteners

Introduction; Welding - Shield metal arc-welding, Automatic submerged arc- welding, Types of welds, Quality of welds, Weld symbols and notation, Specifications for welding ; Bolting-Types of failure, Design specifications, High- strength bolts

Tension members

Introduction ; Net area ; Shear-lag ; Design of tension members

UNIT - II

Compression members

Introduction ; Euler's buckling theory ; Behaviour of real columns ; Types of sections ; Design of columns ; Validity of design strength calculations ; Design of compression members ; Design Procedure ; Built-up compression members.

UNIT – III

Beams

Introduction ; Flexural behaviour of beams which does not undergo lateral buckling; Flexural behaviour of beams which undergo lateral buckling ; Shear behaviour ; Web buckling and Crippling ; Design strength in bending ; Design strength in shear ; Limit state serviceability – Deflection

UNIT – IV

Beam-columns

Introduction; Analysis of beam-columns; Modes of failure; Design specifications

Column Splices and Bases

Introduction ; Column splices ; Column bases

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOK

Design of steel structures by K.S.Sai Ram, Pearson Education, 2010

REFERENCE BOOKS

1. Steel Structures - Design and Practice by N. Subramanian, Oxford University press, 2010.
2. Limit state design of steel structures by M.R.Shiyekar , PHI Learning,2010.

WEB REFERENCES:

http://nptel.iitm.ac.in/courses/IIT-MADRAS/Design_Steel_Structures_I/index.php