Solution to problems in structural steel design to BS 5950:Part 1: 2000

Synopsis:

The aim of this book is to provide students and practicing engineers with a guide of structural steel design to meet the requirement of BS 5950:Part 1: 2000 Structural Use of Steelwork in Building. The emphasis has been to illustrate the clauses in the code rather than to match practical cases exactly. The first part of the book gives basic design concepts of structural elements comprising beam, column, connection, roof truss, and plate girder. In the second part, it presents worked examples of design of structural steel elements which are of commonly used in building frame structures. The examples have different design problem, which require different approach of loading analysis and design formula.

Solution to problems in structural steel design to BS 5950:Part 1: 2000

Table Of Content:

Figures

Table

Foreword by Vice Chancellor

Foreword by President

Preface

PART 1 NOTES ON STRUCTURAL STEEL DESIGN

CHAPTER 1 INTRODUCTION

Design Method

Structural Steel Sections

Material Properties

Design Strength

Structural Loadings

Section Classification

CHAPTER 2 BEAM

Distribution of Loads from Slabs to Beams

Restraining Conditions of Beams

Design Checks

CHAPTER 3 COLUMN

Modes of Failure of Column
Section Classification
Effective Length
Analysis and Design of Building Frame Structure
Design of Column Subjected to Axial Load Only (Clause 4.7.4)
Design of Column Subjected to Load at Nominal Eccentricity – Simple Contruction (Clause 4.7.7)
Design of Column Subjected to Top Axial Load and Moment (Clause 4.8.3)

CHAPTER 4 DESIGN OF CONNECTION

Introduction Bolted Connection Spacing of Bolts Mode of Failure Bolt Capacity Eccentric Connection Welded Connection Effective Length of Fillet Weld Eccentric Connection

Loading and Analysis

Design of Purlins

Design of Tension Members

Design of Compression Members

Slenderness of Angle and Channel Sections (Clause 4.7.2)

Determination of Segment Length LVV, LAA and LBB

CHAPTER 6 PLATE GIRDER

Design of Plate Girder Minimum Requirement of Web and Flange Shear Capacity Moment Capacity End Anchorage Design of Web Stiffeners

PART II PROBLEM EXAMPLES

CHAPTER 7 DESIGN OF BEAM

Problem 1.1 Simply Supported Beam with Full Restraint
Problem 1.2 Simply Supported Beam without Lateral Restraint
Problem 1.3 Simply Supported Beam with Lateral Restraint at Points Along the Span
Problem 1.4 Beam with Cantilever Span without Lateral Restraint
Problem 1.5 Beam with End Moment

CHAPTER 8 DESIGN OF COLUMN

- Problem 2.1 Axially Loaded Column
- Problem 2.2 Axially Loaded Column with Tie Beam at Mid-height
- Problem 2.3 Axially Loaded Column with Unsymmetrical Loading
- Problem 2.4 Columns in Simple Construction Design

Problem 2.5 Column in Rigid Construction Design

CHAPTER 9 DESIGN OF CONNECTION

Problem 3.1 Bolted and Welded Connections Subjected to Direct Shear
Problem 3.2 Bolted Connection Subjected In-plane Rotation
Problem 3.3 Welded Connection Subjected to In-plane Rotation
Problem 3.4 Welded Connection Subjected to Out-of-plane Rotation
Problem 3.5 Bolted Connection Subjected to Out-of-plane Rotation
Problem 3.6 End Plate Connection
Problem 3.7 Welded Connection Subjected to In-plane Rotation
Problem 3.8 Welded Connection with Unsymmetrical Weld
Problem 3.9 Double Angle Web Cleat Connection
Problem 3.10 Fin Plate Connection

CHAPTER 10 DESIGN OF TRUSS

- Problem 4.1 Cantilever Roof Truss with Rectangular Section Members and Purlins
- Problem 4.2 Roof Truss with Purlins on the Top Nodes
- Problem 4.3 Design of Purlins Using Channel Section
- Problem 4.4 Roof Truss with Purlins on the Top Rafter
- Problem 4.5 Truss with Tension Members Subjected to Coexistent Axial Force and Bending Moment

Problem 4.6 Calculation of Members Forces in a Roof Truss Subjected to Wind Load

CHAPTER 11 DESIGN OF PLATE GIRDER

Problem 5.1 Check of Design Capacity of Plate Girder

Problem 5.2 Design of Plate Girder