

ADVANCED STEEL STRUCTURAL DESIGN
(Professional Elective – V)

Course Code: 20CE1171

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Pre-requisites: Structural analysis, Design of Steel Structures

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Explain the concept of beam column and design a beam column

CO2: Design a plate girders including stiffeners

CO3: Analyse and design of gantry girder for a given capacity

CO4: Analyse and design of Industrial truss and its components

CO5: Design a pre-engineered building

UNIT- I

(10 Lectures)

DESIGN OF BEAM-COLUMNS:

Introduction – General behavior of beam-columns – code provision for local capacity check and overall buckling check – Design of beam-columns.

Learning outcomes:

1. Explain different types of beam-column connections (L2)
2. Analyze force system in beam-column connections and its failure modes (L4)
3. Design and detailing of beam-column assembly (L3)

UNIT-II

(10 Lectures)

DESIGN OF PLATE GIRDER:

Preliminary design considerations - concept of tension field action – design of end panels. Design of plate girder using IS 800-2007- Design of vertical stiffeners – design of longitudinal stiffeners – design of torsional stiffeners – Introduction to steel plate shear wall.

Learning outcomes:

1. Explain different types of plate girder (L2)
2. Describe force system and design concepts of plate girders and steel plate shear wall (L2)
3. Design the plate girder elements as per codal provisions (L3)

UNIT-III

(10 Lectures)

DESIGN OF GANTRY GIRDER:

Loading considerations, Analysis – Maximum load effect – Selection of gantry girder section – Design of gantry girders for primary loads only.

Learning outcomes:

1. Explain different types of loads and load combination on gantry girder (L2)
2. Explain the selection criterion for gantry girder (L2)
3. Design and detailing aspects of gantry girder (L3)

UNIT-IV

(10 Lectures)

DESIGN OF INDUSTRIAL BUILDING:

Introduction to roof truss – Different types of trusses - Design loads Load combinations as per IScode recommendations - Design of simple roof trusses involving the design of purlins and other members.

Learning outcomes:

1. Explain different types of roof truss and it's significance in industrial buildings (L2)
2. Calculate the design loads on roof trusses (L3)
3. Design a purlin on roof trusses (L3)

UNIT- V

(10 Lectures)

PRE-ENGINEERED BUILDINGS:

Introduction – connection details – design of typical portal frame from industrial shed using pre-fabricated elements.

Learning outcomes:

1. Describe the portal frame pre-engineered buildings and its significance (L2)
2. Explain the design concepts of pre-engineered buildings (L2)
3. Explain the connection detailing system of pre-engineered buildings (L2)

TEXT BOOKS:

1. Subramanyam, N., "Design of Steel Structures", Oxford University press, 1st Edition, 2008.
2. Duggal, S.K., "Limit state Design of Steel Structures", TMH, 1st Edition, 2014.

REFERENCES:

1. IS 800: 2007 General Construction in Steel Code of Practice
2. Edmin H. Gaylord, J. Charles. N. Gaylord & James E. Stallmeyer, "Design of steel Structures", 3rd Edition, Mc. Graw – Hill International, 1992
3. Steel Tables.