JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
KAKINADA – 533 003, Andhra Pradesh, India
DEPARTMENT OF CIVIL ENGINEERING

III Year – II Semester	PROFESSIONAL CORE COURSE	L	T	P	C
		3	0	0	3
PC 601 DESIGN AND DRAWING OF STEEL STRUCTURES					

Course Learning Objectives:

The objective of this course is to:

- Familiarize Students with different types of Connections and relevant IS codes
- Equip student with concepts of design of flexural members
- Understand Design of tension and compression members in trusses
- Familiarize students with types of Columns, column bases and their Design
- Familiarize students with Plate girder and Gantry Girder and their Design

Course Outcomes:

At the end of this course the student will be able to

- Work with relevant IS codes
- Carryout analysis and design of flexural members and detailing
- Design compression members of different types with connection detailing
- Design Plate Girder and Gantry Girder with connection detailing
- Produce the drawings pertaining to different components of steel structures

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.

All units i.e. from unit II to unit-VI to be taught in Limit State Design and in Welded connections only.

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.

UNIT –III Compression and Tension Members: Effective 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.

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

UNIT – V Design of Plate Girder: Design consideration – I S Code recommendations Design of plate girder - Welded – Curtailment of flange plates, stiffeners – splicing and connections. **Design of Gantry Girder:** impact factors - longitudinal forces, Design of Gantry girders.
NOTE: Welding connections should be used in Units II – VI. 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 ofColumn including lacing and battens,
Plate 4 Detailing of Column bases – slab base and gusseted base,
Plate 5 Detailing of steel roof trusses including joint details and
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 and design out of which three are to be answered. Weightage for Part – A is 40% and Part-B is 60%.

TEXT BOOKS
1. Steel Structures Design and Practice, N. Subramanian, Oxford University Press.
2. Limit State Design of steel structures, S. K. Duggal, Tata Mc Graw Hill, New Delhi

REFERENCES
1. Structural Design in Steel, SarwarAlamRaz, New Age International Publishers, New Delhi
2. Structural Design and Drawing by N.Krishna Raju, Universities Press
3. Design of Steel Structures by K.S.Sai Ram, Person India Education Services

IS Codes:

1) IS-I800:2007, Indian Standard Code for General Construction in Steel, 3rd revision, Indian Standards Institution, New Delhi, 2008.
2) IS – 875, Code of practice for design loads (other than earth quake) for buildings and structures (Part-1-Part 5), Bureau of Indian standards.
3) Steel Tables.

These codes and steel tables are permitted to use in the examinations.