GUJARAT TECHNOLOGICAL UNIVERSITY
Master of Engineering
Subject Code: 3722007
SUBJECT NAME: ADVANCED STEEL DESIGN
Semester: II

Type of course: Core III

Prerequisite:

It is assumed that all students have a working familiarity with the elementary design of steel structural members.

Rationale:

This course examines advanced design concepts for structural steel applicable to various types of steel structures; the primary code source applies to building design, which is supplemented by a strong theoretical background in steel behavior applicable to non-typical structures.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE (E)	PA (M)	ESE (V)	PA (I)	
3	0	2	4	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs	% Weightage
1	**Properties of Steel:** Mechanical Properties, Hysteresis, Ductility. Compactness and non-compactness, slenderness, residual stresses.	05	05
2	**Plastic Behaviour of Structural Steel :** Introduction, Plastic theory, Plastic hinge concept, Plastic collapse load, conditions of plastic analysis, Theorem of Plastic collapse, Methods of Plastic analysis	08	15
3	**Design of Industrial Buildings:** Introduction, selection of bay width, structural framing, purlins, girts and eave strut, plane trusses, Design of Gantry girders.	10	20
4	**Design of cold formed sections:** Advantages, stiffened and un stiffened elements, local buckling and post buckling strength, shear lag and flange curling, unusually wide flange section, short span sections, members subjected to axial tension, compression and bending. Design of beams and columns, Introduction to pre-engineered buildings using cold formed sections.	12	25
5	**Design of Steel Stacks:** Introduction, Proportioning of stack, Codal provisions, Loads on Stacks, Load combinations, Stresses in Self-supporting stacks, Design procedure for self-supporting stacks, Guyed steel stacks.	06	20
6	**Design of composite structures:**	06	15

	Composite Floor and Roof System Design, Composite beam, Open web steel joist / joist girder, Serviceability requirements.		

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10	**20**	**25**	**10**	**15**	**20**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

- N. Subramanian Design of Steel Structures: Theory and Practice, Oxford University.
- V. L. Shah and Veena Gore, Limit State Design of Steel Structures IS : 800-2007, Structures.
- S. S. Bhavikatti, Design of Steel Structures by Limit State Methods as Per IS 800-2007, I & K. International.
- M. R. Shiyekar, Limit State Design in Structural Steel, PHI Learning.
- S. K. Duggal, Limit State Design of Steel Structures, Tata McGraw Hill.
- M. L. Gambhir, Fundamentals of Structural Steel Design, McGraw Hill Education.
- IS Codes: IS: 800, IS: 875, SP: 6 and Steel Table.
- Design of Steel Structures - Vol. II, Ramchandra. Standard Book House, Delhi.
- Design of Steel Structures - Arya A. S., Ajmani J. L., Nemchand and Bros., Roorkee.
- Plastic Methods of Structural Analysis, Neal B. G., Chapman and Hall London.

Course Outcome:

Sr. No.	CO statement	Marks % weightage
CO-1	Apply unified code philosophy to steel building design	10
CO-2	Apply plastic method for design of beams and frames.	20
CO-3	Design & detail Industrial building, steel stacks & composite structures as per the IS code	40
CO-4	Use of cold form sections in the steel structure including pre-engineered building.	20
CO-5	Develop design basis report	10

List of Experiments/Assignments:

Tutorial work shall consist of presentations / problems / preparation of learning material based on above topics. Apart from above assignments a group of students has to undertake one open ended design problem based on engineering application.

Major Equipments:

(None)

List of Open Source Software/learning website:

http://nptel.ac.in/