GUJARAT TECHNOLOGICAL UNIVERSITY

CIVIL (STRUCTURAL ENGINEERING) (20)
ADVANCED DESIGN OF STEEL STRUCTURES
SUBJECT CODE: 2722007
SEMESTER: II

Type of course: Elective

Prerequisite: Elementary Design of Steel Structures and Structural Analysis

Rationale: Structural steel is a material used for steel construction, which is formed with a specific shape following certain standards of chemical composition and strength. The structural steel all over the world pre-dominates the construction scenario. There has been an increasing demand for structural steel for construction purposes in India. This material has been exhaustively used for the constructions of bridges, industrial structures, buildings and other structures all over the world because of its specific characteristics. The course on *Advanced Design of Steel Structures* acquaints the students to analyze and design steel structures as per Indian Standard code of practice.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks						Total Marks
L	T	P	C	Theory Marks		Practical Marks				
				ESE (E)	PA (M)	ESE (V)		PA (I)		
						ESE	OEP	PA	RP	
3	2#	2	5	70	30	20	10	10	10	150

Content:

Sr. No.	Content	Total Hrs	% Weightage
1	Introduction: Design requirements and design process, brittle fracture under impact load, Dead loads, imposed loads, wind loads, earthquake load, earth or ground water load, indirect forces and combination of loads.	02	--
2	Multi storey building: 2.1 Introduction, loading, Analysis for gravity loads, computer analysis of rigid frame using software 2.2 Design of Built up beams, built up column, beam- column, connections beam to beam & beam to column	08	20
3	Cold form steel: Introduction, advantages of cold formed sections, load buckling, beam, axially compressed column, combined bending & compression, Tension members, Design on the basis of testing, empirical method & examples.	08	20
4	Bridges: Introduction, steel used in bridges, classification of steel bridges load & load combination, Analysis and design of girder bridge, plate girder bridges, truss bridges, gusseted connection	08	20
5	Design of industrial shed considering gravity and wind load	08	20

Reference Books:

| 6 | Plastic Design: Plastic design of continuous beams, Rigid jointed portal frames. | 08 | 20 |

1. Design of Steel Structures – N. Subrhamanyan, Oxford.
2. Plastic Design of Low -rise frames, Horne, M.R., and Morris, L.J., Granada Publishing
3. Steel Structure -Design and Behaviour, Salmon, C.G., and Johnson, J.E. Harper and Row,
4. Design of Steel Structure - Duggal, Tata Mc Graw Hill.
5. Steel Design for Structural Engineers, Kuzamanovic,B.O. and Willems,N., Prentice Hall,
6. Cold-formed Steel Structures, Wie - Wen Yu., McGraw Hill Book Company, 1973.
7. Steel Structures, William McGuire, Prentice Hall, Inc., Englewood Cliffs, N.J.1986.
8. Guidelines to design cold form section by Tata Steel.
9. Design of Steel Structure- Shah and Gore, Structures Publishers, Pune
10. IS: 800, - Code of practice for General Construction in steel
11. IS: 875 - (Part I to V) - Code of practice for structural safety of building loading standards
12. IS: 226 - Structural steel (Standard Quality)
13. SP: 6(1) - Structural steel section
14. SP: 6(6) - Application of plastic theory in design of steel structures
15. IS 801: Code of Practice for Use of Cold Formed Light Gauge Steel Structural Members In General Building Construction.

Course Outcome:

After learning the course the students should be able to:
(a) analyse and design the industrial buildings,
(b) analysis and design of girder bridge, plate girder bridges, truss bridges and connections,
(c) compute the collapse loads, plastic moment capacities of continuous beams and portal frames,
(d) design of Built up beams, built up column, beam- column, beam to beam and beam to column connections
(e) design of axially loaded column, combined bending and compression and Tension members using cold formed steel section

List of Experiments/Tutorials:

Minimum two designs suitably selected from topics of the course. The report shall consist of full analytical treatment, design procedure, references and all necessary drawings in the form of neat dimensioned sketches.

Open Ended Problems:

Apart from above tutorials/experiments a group of students has to undertake one open ended problem/design problem. Few examples of the same are given below:

1. Modelling, analysis and design of an industrial building preferably selected from industry using open-source/commercial software.
2. Developing models of built up beams, built up column, beam-column, beam to beam & beam to column connections etc.
3. Modelling, analysis and design of steel bridges using open-source/commercial software.

Major Equipments: --

List of Open Source Software/learning website:

http://nptel.ac.in/
www.steel-insdag.org/

Review Presentation (RP): The concerned faculty member shall provide the list of peer reviewed Journals and Tier-I and Tier-II Conferences relating to the subject (or relating to the area of thesis for seminar) to the students in the beginning of the semester. The same list will be uploaded on GTU website during the first two weeks of the start of the semester. Every student or a group of students shall critically study 2 papers, integrate the details and make presentation in the last two weeks of the semester. The GTU marks entry portal will allow entry of marks only after uploading of the best 3 presentations. A unique id number will be generated only after uploading the presentations. Thereafter the entry of marks will be allowed. The best 3 presentations of each college will be uploaded on GTU website