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SARVAJANIK UNIVERSITY
Sarvajanik College of Engineering and Technology
Bachelor of Technology
Civil Engineering

B. Tech. IV Semester VII

Subject Name : Advanced Steel Design **Subject Code:** BTCL14706
Type of course : PEC - V
Prerequisite : Structural Analysis (BTCL13404) & Basic Steel Design (BTCL13601)
Rationale : Many Civil Engineering Applications uses Steel as Basic Material. Many Industries are being constructed using steel as Primary Material because of ease, speed and large column free area facilitated by steel structures. This course will provide detailed knowhow on design and detailing of steel structures as per prevailing Indian standards.

Teaching and Examination Scheme:

TEACHING SCHEME				Theory Marks			Practical Marks		Total
L	T	P	C	TEE	CA1	CA2	TEP	CA3	
3	0	0	3	60	25	15	-	-	100

CA1: Continuous Assessment (assignments/projects/open book tests/closed book tests **CA2:** Sincerity in attending classes/class tests/ timely submissions of assignments/self-learning attitude/solving advanced problems **TEE:** Term End Examination **TEP:** Term End Practical Exam (Performance and viva on practical skills learned in course) **CA3:** Regular submission of Lab work/Quality of work submitted/Active participation in lab sessions/viva on practical skills learned in course

Content:

Sr. No.	Topics	Teaching Hrs.	Module Weightage
1.	**Loads & Load Combinations:** Basic understanding on Various Loads & Load Combinations to be considered in design of steel structures	2	5%
2.	**Connections:** Stiffened and unstiffened, Moment &Shear resisting Connections, Design and Detailing of various connection - Roof Truss to Column, Column to Beam, Beam to Beam	6	15%
3.	**Design of Industrial Building:** Structural Components and Layout Industrial building, Types of Trusses and its Applications, Dead Load, Live Load and Wind Load Calculations, Design of Purlins & Trusses, Design of Side Rails and Columns, Design of Foundation System	12	25%
4.	**Design of Plate Girders:** Structural Components of Plate Girder, Modes of Failure of Plate Girders, Design of Welded Plate Girder	6	15%
5.	**Design of Foot-Over Bridges:** Structural System of Foot-Over Bridges, Identification of Loads acting on Bridges and its calculations, Design of Foot-Over Bridges& its Supporting system.	12	25%

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6.	**Plastic Design:** Introduction on Plastic Analysis Methods, Design of continuous beams and portal frame using plastic design approach.	07	15%

Suggested Specification table with Marks (Theory/Practical):

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

Legends: R: Remembrance, **U:** Understanding; **A:** Application, **N:** Analyze, **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 Text Books:

Sr. No.	Title of book /article	Author(s)	Publisher and details like ISBN	Year of Publication	Publication Edition
1.	Design of Steel Structures-Limit States Method	Subramanian.N	Oxford University Press ISBN-10 : 9780199460915 ISBN-13 : 978-0199460915	2018.	1st
2.	Design of Steel Structures by Limit State Methods as Per IS 800-2007	S. S. Bhavikatti,	Dreamtech Press ISBN-10 : 9389307058 ISBN-13 : 978-9389307054	2019	5th
3.	Limit State Design in Structural Steel	M. R. Shiyekar,	PHI Learning Private Limited ISBN-10 : 8120353501 ISBN-13 : 978-8120353503	2017	3rd
4.	Limit State Design of Steel Structures	S. K. Duggal,	McGraw Hill Education ISBN-10 : 9353164877 ISBN-13 : 978-9353164874	2019	3rd
5.	Limit State Design of Steel Structures IS : 800-2007	V. L. Shah and Veena Gore,	Structure Publishers, Pune ISBN: 9788190371759.	2009	1st
6.	Design of Steel Structures - Vol. II	Ramchandra.	Standard Book House, Delhi. ISBN-13: 9788189401412	2016	19th
7.	Plastic Methods of Structural Analysis	Neal B. G.,	Chapman and Hall London. ISBN-10 : 0412154005 ISBN-13 : 978-0412154003	1977	3rd

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8.	Design of steel structures	A.S. Arya. J.L. Ajamani:	Nemchand and Brothers. ISBN-10 : 8185240620	2011	1st
9.	Design of Steel Structures	P. Dayaratnam,	S Chand Publishing ISBN-10 : 8121923204 ISBN-13 : 978-8121923200	2012	1st
10.	Design of Steel Structures	I.C. Syal and S. Singh,	Standard Publishes ISBN-10 : 8180141276 ISBN-13 : 978-8180141270	2020	1st
11.	SP6: ISI Handbook for Structural Engineers				
12.	IS 800 - 2007, General Construction In Steel — Code Of Practice				

Course Outcome:

Sr. No.	CO Statement **After learning this subject, students will be able to**	Marks % weightage
CO-1	Design and Detail an Industrial Building considering various terrain and loading conditions as per Prevailing IS Codes *(R, U, N, A, C – Cognitive Level)*	30
CO-2	Design and Detail Plate Girder for different industrial purposes as per Prevailing IS Codes *(R, U, N, A, C – Cognitive Level)*	30
CO-3	Design and Detail the Foot-Over Bridge as per Prevailing IS Codes *(R, U, N, A, C – Cognitive Level)*	25
CO-4	Use Principles of Plastic Design in Analysis and Design of Beams and Portal Frames *(R, U, N, A, C – Cognitive Level)*	15

Mapping with POs:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO-1	3	3	3	3	1	2	2	3	2	2	-	2	1	2	2
CO-2	3	3	3	3	1	2	2	3	2	2	-	2	1	2	2
CO-3	3	3	3	3	1	2	2	3	2	2	-	2	1	2	2
CO-4	3	3	3	3	1	2	2	3	2	2	-	2	1	2	2
Rationale*	12	12	12	12	4	8	8	12	8	8	-	8	4	8	8

Rationale*: Most of the Cos are matching with POs. It helps to develop structures with material like Steel. It provides light weight structural solution as well as speed of construction.

LIST OF PRACTICALS:

- Students have to solve at least one problem based on different topics and prepare the sketchbook containing drawings based on solution of problems.

List of Open Source/learning website:

- https://nptel.ac.in/courses/114/105/114105031/
  - Method of Plastic Analysis – Lecture 34
- https://youtu.be/jWtlDmi8YDM
  - Industrial Buildings

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