



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad -500 043

CIVIL ENGINEERING

COURSE DESCRIPTOR

Course Title	STRUCTURAL DESIGN LABORATORY				
Course Code	BSTB09				
Programme	M.Tech				
Semester	I	STE			
Course Type	Core				
Regulation	IARE - R18				
Course Structure	Theory			Practical	
	Lectures	Tutorials	Credits	Laboratory	Credits
	-	-	-	4	2
Chief Coordinator	Dr. J S R Prasad, Professor, Department of Civil Engineering				
Course Faculty	Dr. J S R Prasad, Professor, Department of Civil Engineering				

I. COURSEOVERVIEW:

Structural Design Laboratory will summarize the key engineering, operational, safety, and sustainability considerations for the design of RC framed buildings. Introduces the design and behavior of large-scale structures and structural materials. Emphasizes the development of structural form and the principles of structural design. Introduces design methods for concrete, and steel applied to multi-storied buildings. Laboratory to solve structural problems by building and testing simple mathematical models. **STAAD.Pro** is one of the most widely used structural analysis and design software products worldwide. It can be used for analysis and design of all types of structural projects from buildings, bridges to towers, tunnels, metro stations, water/wastewater treatment plants and more.

II. COURSEPRE-REQUISITES:

Level	Course Code	Semester	Prerequisites	Level
-	-	-	-	-

III. MARKSDISTRIBUTION:

Subject	SEE Examination	CIA Examination	Total Marks
Structural Design Laboratory	70 Marks	30 Marks	100

IV. DELIVERY / INSTRUCTIONAL METHODOLOGIES:

✗	Chalk & Talk	✗	Quiz	✗	Assignments	✗	MOOCs
✓	LCD / PPT	✓	Seminars	✗	Mini Project	✓	Videos
✓	Open Ended Experiments						

V. EVALUATION METHODOLOGY:

Each laboratory will be evaluated for a total of 100 marks consisting of 30 marks for internal assessment and 70 marks for semester end lab examination. Out of 30 marks of internal assessment, continuous lab assessment will be done for 20 marks for the day to day performance and 10 marks for the final internal lab assessment.

Semester End Examination (SEE): The semester end lab examination for 70 marks shall be conducted by two examiners, one of them being Internal Examiner and the other being External Examiner, both nominated by the Principal from the panel of experts recommended by Chairman, BOS.

The emphasis on the experiments is broadly based on the following criteria:

20 %	To test the preparedness for the experiment.
20 %	To test the performance in the laboratory.
20 %	To test the calculations and graphs related to the concern experiment.
20 %	To test the results and the error analysis of the experiment.
20 %	To test the subject knowledge through viva – voce.

Continuous Internal Assessment (CIA):

CIA is conducted for a total of 30 marks (Table 1), with 20 marks for continuous lab assessment during day to day performance, 10 marks for final internal lab assessment.

Table 1: Assessment pattern for CIA

Component	Laboratory		Total Marks
	Day to day performance	Final internal lab assessment	
CIA Marks	20	10	30

Continuous Internal Examination(CIE):

One CIE exams shall be conducted at the end of the 16th EXP of the semester. The CIE exam is conducted for 10 marks of 3 hours duration.

Preparation	Performance	Calculations and Graph	Results and Error Analysis	Viva	Total
2	2	2	2	2	10

VI. HOW PROGRAM OUTCOMES ARE ASSESSED:

Program Outcomes (POs)		Strength	Proficiency assessed by
PO 3	Capable to apply the core, multidisciplinary knowledge for understanding the problems in structural engineering and allied fields.	2	Presentation on realworld problems
PO 4	Apply appropriate techniques, resources, modern engineering and Information Technology (IT) tools including predictions, modeling of complex structural engineering activities.	2	Open Ended Experiments
PO 5	Able to identify and analyze the impact of Structural Engineering in development projects and find a suitable solution from number of alternatives.	2	Presentation on realworld problems
PO 6	Conceptualize and design civil engineering structures considering various socio-economic factors.	1	Open Ended Experiments

3 = High; 2 = Medium; 1 = Low

VII. COURSE OBJECTIVES(COs):

The course should enable the students to:	
I	The course should enable the students to: Design and Detail all the Structural Components of Frame Buildings.
II	Design and Detailing complete Multi-Storey Frame Buildings.

VIII. COURSE LEARNING OUTCOMES(CLOs):

CLO Code	CLO's	At the end of the course, the student will have the ability to:	PO's Mapped	Strength of Mapping
BSTB09.01	CLO 1	Determine of the effects of loads on physical structures	PO3	2
BSTB09.02	CLO 2	Have isometric and point of view perspectives and 3D shapes.	PO3	2
BSTB09.03	CLO 3	Design concrete structures like columns/beams/slabs/footings according to the international codes.	PO3, PO4	1
BSTB09.04	CLO 4	generate text/graphics input	PO3	2
BSTB09.05	CLO 5	Perform code check, member selection and optimized part selection comprising of design/analysis cycles.	PO3	2
BSTB09.06	CLO 6	Utilize built-in command file editor and straightforward command language.	PO5,PO6	1
BSTB09.07	CLO 7	Perform exact and numerically productive plate/shell component consolidating out-of-plane shear and in-plane rotation.	PO3	1

CLO Code	CLO's	At the end of the course, the student will have the ability to:	PO's Mapped	Strength of Mapping
BSTB09.08	CLO 8	Complete component stress yield incorporating in-plane stresses, out-of-plane shear, bending and main stresses at nodal and also user indicated focuses.	PO3, PO4	2
BSTB09.09	CLO 9	Finish complete object-oriented instinctive 3D/2D graphic model creation.	PO3	1
BSTB09.10	CLO10	Accomplish user determined design parameters to alter the design.	PO3, PO4	1

3 = High; 2 = Medium; 1 = Low

IX. MAPPING COURSE LEARNING OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

(CLOs)	Program Outcomes (POs)						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CLO 1			2				
CLO 2			2				
CLO 3			2	1			
CLO 4			2				
CLO 5			2				
CLO 6					2	1	
CLO 7			1				
CLO 8			2	2			
CLO 9			1				
CLO 10			2	1			

3 = High; 2 = Medium; 1 = Low

X. ASSESSMENT METHODOLOGIES –DIRECT

CIE Exams	PO3, PO4, PO5, PO6	SEEEExams	PO3, PO4, PO5, PO6	Assignments	-	Seminars	-
Laboratory Practices	PO3, PO4, PO5, PO6	Student Viva	PO3, PO4, PO5, PO6	Mini Project	-	Certification	-

XI. ASSESSMENT METHODOLOGIES -INDIRECT

✓	Early Semester Feedback	✓	End Semester OBE Feedback
✗	Assessment of Mini Projects by Experts		

XII. SYLLABUS

LIST OF EXPERIMENTS	
EXP-1	INTRODUCTION TO STAAD PRO SOFTWARE
Introduction & commands	
EXP-2	ANALYSIS OF CONTINUOUS BEAM
Analysis of continuous beam for different loads	
EXP-3	ANALYSIS OF SINGLE STOREY FRAME
Analysis of single frame.	
EXP-4	ANALYSIS OF MULTI-STOREY FRAME
Analysis of multistoried frame.	
EXP-5	DESIGN OF MULTI-STOREY FRAME
Design of multi storied frame for different loads	
EXP-6	ANALYSIS OF MULTI-STOREYED BUILDING
Analysis of multi storied building.	
EXP-7	DESIGN OF MULTI-STOREYED BUILDING
Design of multistoried building.	
EXP-8	WIND LOAD ANALYSIS ON RCC BUILDING
Wind load analysis for RCC Building	
EXP-9	ANALYSIS AND DESIGN OF STEEL TRUSS
Analysis and design of steel truss.	
EXP-10	ANALYSIS AND DESIGN OF ISOLATED FOOTING
Analysis and design of isolated footing.	
EXP-11	ANALYSIS AND DESIGN OF COMBINED FOOTING
Analysis and design of combined footing	
EXP-12	ANALYSIS OF BRIDGE DECK
Analysis of bridge deck	
Text Books:	
1. T.S. Sarma, "Staad.Pro v8i for Beginners" Notion press, 2014 2. SivakumarNaganathan, "Learn Yourself Staad Pro V8i", Lap Lambert Academic Publishing GmbHK, 2012.	
Reference Books:	
1. Dr. Subramanian Narayanan, Design of steel Structures- Oxford Publication	
Web References:	
1. https://onlinecourses.nptel.ac.in/noc17_ce21/preview	
E-Text Books:	
1. https://civildigital.com/staad-pro-v8i-video-tutorials/	

XIII. COURSEPLAN:

The course plan is meant as a guideline. Probably there may be changes.

EXP	Topics to be covered	Course Learning Outcomes (CLOs)	Reference
1	Introduction & commands of Staad Pro	CLO1	T1
2	Analysis of continuous beam for different loads	CLO 2	T1
3	Analysis of single storey frame.	CLO 3	T1
4	Analysis of multistoried frame.	CLO 4	T1
5	Design of multistoried frame for different loads.	CLO 5	T1
6	Analysis of multistoried building	CLO 4	T1
7	Design of multistoried building	CLO 5	T1
8	Wind load analysis for RCC Building	CLO 6	T1
9	Analysis and design of isolated footing.	CLO 7	T1
10	Analysis and design of combined footing	CLO 8	T1
11	Behavior of Beams under Shear.	CLO 9	T1
12	Analysis of bridge deck	CLO 10	T1

XIV. GAPS IN THE SYLLABUS - TO MEET INDUSTRY / PROFESSION REQUIREMENTS:

S NO	Description	Proposed actions	Relevance with POs
1	Performance based design of structures	NPTEL/ Videos	PO3, PO5, PO6
2	Time history Analysis	NPTEL/ Videos	PO3, PO4, PO6

Prepared by:
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HOD, CE