



# INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad -500 043

## CIVIL ENGINEERING

### COURSE DESCRIPTOR

Course Title	ADVANCE STRUCTURAL DESIGN LABORTARY				
Course Code	ACE113				
Programme	B.Tech				
Semester	VII	CE			
Course Type	Core				
Regulation	IARE - R16				
Course Structure	Theory			Practical	
	Lectures	Tutorials	Credits	Laboratory	Credits
	-	-	-	3	2
Chief Coordinator	Mr. CH. Venugopal Reddy, Assistant Professor				
Course Faculty	Mr CH. Venugopal Reddy, Assistant Professor Mr. S Siva Rama Krishna, Assistant Professor				

#### I. COURSE OVERVIEW:

STAAD.Pro is one of the most widely used structural analysis and design software products worldwide. It supports over 90 international steel, concrete, timber & aluminium design codes. It can make use of various forms of analysis from the traditional static analysis to more recent analysis methods like p-delta analysis, geometric non-linear analysis, Pushover analysis (Static-Non Linear Analysis) or a buckling analysis. It can also make use of various forms of dynamic analysis methods from time history analysis to response spectrum analysis. The response spectrum analysis feature is supported for both user defined spectra as well as a number of international code specified spectra.

#### II. COURSE PRE-REQUISITES:

Level	Course Code	Semester	Prerequisites	Level
-	-	-	-	-

### III. MARKS DISTRIBUTION:

Subject	SEE Examination	CIA Examination	Total Marks
Advance 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 16<sup>th</sup> week 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 1	<b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	2	Seminar
PO 2	<b>Problem analysis:</b> Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences	2	Seminar
PO 3	<b>Design/development of solutions:</b> Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.	1	Guest Lectures
PO 5	<b>Modern tool usage:</b> Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.	3	Software

**3 = High; 2 = Medium; 1 = Low**

**VII. HOW PROGRAM SPECIFIC OUTCOMES ARE ASSESSED:**

Program Specific Outcomes (PSOs)		Strength	Proficiency assessed by
PSO 1	Engineering Knowledge: Graduates shall demonstrate sound knowledge in analysis, design, laboratory investigations and construction aspects of civil engineering infrastructure, along with good foundation in mathematics, basic sciences and technical communication.	2	Seminar

Program Specific Outcomes (PSOs)		Strength	Proficiency assessed by
PSO 2	Broadness And Diversity: Graduates will have a broad understanding of economical, environmental, societal, health, safety factors involved in infrastructural development, and shall demonstrate ability to function within multidisciplinary teams with competence in modern tool usage.	-	-
PSO 3	Self-Learning And Service: Graduates will be motivated for continuous self-learning in engineering practice and/or pursue research in advanced areas of civil engineering in order to offer engineering services to the society, ethically and responsibly.	-	-

**3 = High; 2 = Medium; 1 = Low**

### VIII. COURSE OBJECTIVES (COs):

The course should enable the students to:	
I	Study the basic elements with different loading type and supports with the aid of STAAD Pro software.
II	Analyze and design 2D Frame and multi-storey buildings with different load sets
III	Synthesize steel structures with truss elements subjected to lateral load.
IV	Modeling and analyze bridge truss and deck slab for moving loads.

### IX. 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
ACE113.01	CLO 1	To know the commands of stadd pro	PO 1	1
ACE113.02	CLO 2	To analyse the continuous beam and calculate shear force and bending moment.	PO 1, PO 2, PO 3	2
ACE113.03	CLO 3	Analyse the continuous beam and evaluate the shear force, bending moment.	PO 1, PO 2, PO 5	2
ACE113.04	CLO 4	Evaluate the multistoried frame by analysis.	PO 1, PO 3, PO 5	1
ACE113.05	CLO 5	Design the multistoried frame for the shear force and bending moment.	PO 1, PO 3, PO 5	1
ACE113.06	CLO 6	Analyse the multistoried building for shear force and bending moment.	PO 1, PO 2, PO 5	2
ACE113.07	CLO 7	Design Of Multi-Storeyed Building	PO 1, PO 3, PO 5	2
ACE113.08	CLO 8	Evaluate Wind Load Analysis on Rcc Building	PO 1, PO 2, PO 3, PO 5	3
ACE113.09	CLO 9	Evaluate Analysis ,Design of Steel Truss	PO 1, PO 3, PO 5	2
ACE113.10	CLO10	Analyse And Design of Isolated Footing	PO 1, PO 2, PO 3, PO 5	1
ACE113.11	CLO11	Analyse And Design of Combined Footing	PO 1, PO 2, PO 3, PO 5	2
ACE113.12	CLO 12	Analysis of Bridge deck.	PO 1, PO 3, PO 5	1

**3 = High; 2 = Medium; 1 = Low**

**X. MAPPING COURSE LEARNING OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Learning Outcomes (CLOs)	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CLO 1	1												1		
CLO 2	2	2	1										2		
CLO 3	1	2			2								1		
CLO 4	1		1		2								2		
CLO 5	1	1	2										2		
CLO 6	1	2			2								1		
CLO 7	2		2		2								2		
CLO 8	3	3	2		2								2		
CLO 9	2	2	3		3								1		
CLO 10	1	1	1		1								1		
CLO 11	2	2	2		1								1		
CLO 12	1		2		2								1		

**3 = High; 2 = Medium; 1 = Low**

**XI. ASSESSMENT METHODOLOGIES – DIRECT**

CIE Exams	PO 1,PO 2, PO 3 PO 5, PSO 1	SEE Exams	PO 1,PO 2,PO3 PO 5, PSO 1	Assignments	-	Seminars	-
Laboratory Practices	PO 1,PO 2 PO 3 PO 5, PSO 1	Student Viva	PO 1,PSO 1	Mini Project	-	Certification	-

**XII. ASSESSMENT METHODOLOGIES – INDIRECT**

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

**XIII. SYLLABUS**

LIST OF EXPERIMENTS	
<b>Week-1</b>	<b>INTRODUCTION TO STAAD PRO</b>
Introduction & commands	
<b>Week-2</b>	<b>ANALYSIS OF CONTINUOUS BEAM</b>
Analysis of continuous beam for different loads	

<b>Week-3</b>	<b>ANALYSIS OF SINGLE STOREY FRAME</b>
Analysis of single frame.	
<b>Week-4</b>	<b>ANALYSIS OF MULTI-STOREY FRAME</b>
Analysis of multistoried frame.	
<b>Week-5</b>	<b>DESIGN OF MULTI-STOREY FRAME</b>
Design of multi storied frame for different loads.	
<b>Week-6</b>	<b>ANALYSIS OF MULTI-STOREYED BUILDING</b>
Analysis of multi storied building.	
<b>Week-7</b>	<b>DESIGN OF MULTI-STOREYED BUILDING</b>
Design of multistoried building.	
<b>Week-8</b>	<b>WIND LOAD ANALYSIS ON RCC BUILDING</b>
Wind load analysis for RCC Building.	
<b>Week-9</b>	<b>ANALYSIS AND DESIGN OF STEEL TRUSS</b>
Analysis and design of steel truss.	
<b>Week-10</b>	<b>ANALYSIS AND DESIGN OF ISOLATED FOOTING</b>
Analysis and design of isolated footing..	
<b>Week-11</b>	<b>ANALYSIS AND DESIGN OF COMBINED FOOTING</b>
Analysis and design of combined footing.	
<b>Week-12</b>	<b>ANALYSIS OF BRIDGE DECK</b>
Analysis of bridge deck.	

#### **XIV. COURSE PLAN:**

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

<b>Week</b>	<b>Topics to be covered</b>	<b>Course Learning Outcomes (CLOs)</b>	<b>Reference</b>
1	Introduction & commands	CLO1	T1,T2
2	Analysis of continuous beam for different loads	CLO 2	T1,T2
3	Analysis of single frame .	CLO 3	T1,T2
4	Analysis of multistoried frame.	CLO 4	T1,T2
5	Design of multi storied frame for different loads.	CLO 5	T1,T2
6	Analysis of multi storied building.	CLO 6	T1,T2
7	Design of multistoried building.	CLO 7	T1,T2
8	Wind load analysis for RCC Building.	CLO 8	T1,T2
9	Analysis and design of steel truss.	CLO 9	T1,T2
10	Analysis and design of isolated footing.	CLO 10	T1,T2
11	Analysis and design of combined footing.	CLO 11	T1,T2
12	Analysis of bridge deck.	CLO 12	T1,T2

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

<b>S NO</b>	<b>Description</b>	<b>Proposed actions</b>	<b>Relevance with POs</b>	<b>Relevance with PSOs</b>
1	To improve standards and analyze the concepts.	NPTEL Videos	PO 1	PSO 1
2	Encourage students to solve real time applications and prepare towards actual construction.	Guest Lecture	PO 3	PSO 1

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