

University of Engineering and Technology, Taxila

Department of Civil Engineering

Course Title: Structural Engineering (CE-407)

Pre-requisite(s): Theory of structures-II

Credit Hours: 2 + 1

Contact Hours: 2 + 3

Text Book(s):

1. Analysis of Structures and Stiffness Methods by Dr. Saeed Ahmad, Publication of HEC
2. Structural Analysis by Alexander Chajes

Reference Book(s):

- Structural Analysis by Hibbeler, R. C.
- Analysis of Structures by William and Todd
- Design of Concrete Structures by Nilson and Darwin

Catalogue Data:

Analysis of Determinate and Indeterminate Structures Using Stiffness Approach

Course Objectives:

To familiarize students with advanced method of analysis of structures.

To develop the skills for using the state-of-the-art methods of structural Analysis.

Course Learning Outcomes:

At the end of this course, the student will:

CLO:1 Have a skill to apply methods of analysis on pre stressed and bridge structures.

CLO:2 Have a skill to apply advanced methods of analysis on frame structures.

Course Contents:

- **Pre-stressed Concrete**

Pre-stressed Vs reinforced concrete, Types of pre-stressing, Losses in pre-stressing, Analysis and design of simple pre-stressed concrete members, Introduction to various pre-stressing systems.

- **Bridge Engineering**

Types of bridges. Site selection, Bridge loadings, Load distribution on bridge deck, Introduction to design of deck for a simple concrete bridge.

- **Advanced Structural Analysis**

Introduction to Matrix Analysis of Structures

Flexibility Methods – Direct and Indirect Flexibility, Methods applications to beams, trusses and frames

Introduction to Stiffness Method - Local and Global Coordinate System, Formation of Element Stiffness Matrix, Deformation Transformation Matrix and Structure Stiffness Matrix, Application to beams, trusses & plane frame

- **Introduction to Structural Dynamics**

Single Degree of Freedom, Free and Forced vibration, Damped and Un-damped vibration, Introduction to multi degree of freedom.

Grading Policy:

Sr. No.	Grading	% of Total Marks
1	Assignments	10
2	Quizzes	10
3	Midterm Exam	20
4	Final Exam	40
5	Practical	20
Total		100

Student Learning Outcome:

Students who pass the course will be able to apply modern tools and state-of-the-art methods for analysis of varying types of structures.

Course Professional Outcome/Industrial Usage:

Students appreciate the need to become advanced structural engineers.

PLOs	CLOs	
	CLO-1 (Methods-Prestressed and Bridge structures)	CLO-2 (Advanced Methods for frame structures)
PLO 1 (Engineering Knowledge)		
PLO 2 (Problem Analysis)	✓	✓
PLO 3 (Design/Development of Solutions)	✓	✓
PLO 4 (Investigation)	✓	✓
PLO 5 (Modern Tool Usage)		
PLO 6 (The Engineer and Society)		
PLO 7 (Environment and Sustainability)		
PLO 8 (Ethics)		
PLO 9 (Individual and Team work)		
PLO 10 (Communication)		
PLO 11 (Project Management)		
PLO 12 (Lifelong Learning)		

Assessment Modules	CLOs	
	CLO 1	CLO 2
Assignments		✓
Quizzes	✓	✓
Midterm Exam	✓	✓
Final Exam	✓	✓