Birla Institute of Technology & Science, Pilani
Hyderabad Campus

SECOND SEMESTER 2019-2020

Course Handout Part II

Date: 06-01-2020

In addition to part-I (General Handout for all courses appended to the time table) this portion gives further specific details regarding the course.

Course No. : CE F241
Course Title : Analysis of Structures
Instructor-in-Charge : Chandu Parimi

Course Description:

Static and kinematic Indeterminacy, Energy principles; Force Methods of analysis: strain energy method, consistent deformation method, Displacement Methods of analysis: Slope-deflection method, Moment distribution method; Introduction to Matrix Methods of structural analysis: Flexibility and Stiffness Methods, Influence Line Diagrams; Analysis of Moving/Rolling loads (for determinate structures), Introduction to approximate analysis of frames and trusses, Analysis of Three-hinged, two- hinged and fixed Arches, Analysis of indeterminate trusses. Exposure to relevant software.

Learning objectives:

1	able to Analyze beams and frames using Displacement based methods
2	able to Analyze beams and frames using Force based methods
3	able to Analyze frames using approximate methods
4	able to use STAADPro to solve a structure and understand the underlying stiffness methods(matrix methods)
5	able to draw influence lines and calculate effect of moving loads

Student Learning Outcomes* (SLOs) assessed in this course – **(a), (e) and (k).**

Textbooks:

1. Hibbler, R. C., Structural Analysis, Pearson Education; Ninth edition (27 October 2017).

Reference books:

1. Leet, K. M., and Uang Chia-Ming, “Fundamentals of Structural Analysis,” Mc-Graw Hill Publication, New Delhi 1988.
2. Gupta, S.P., Pandit, G. S. and Gupta Rajesh. Theory of Structures (Vol. I & II), TMH, New Delhi, 1999.
3. H. Norris et al., Elementary Structural Analysis, Mcgraw-Hill 4 Sub edition, 1990.
4. D S Prakash Rao, Structural Analysis – A Unified Approach, Universities Press 1996
5. C. S. Reddy, Basic Structural Analysis, TMH, 2nd Ed., 1996.
6. D Menon, Structural Analysis, Narosa Publishers, India, 2008, Reprint 2016.
7. S S. Bhavikatti, Structural Analysis, Volume 2, Vikas Publishing House Pvt Limited, 2005.
8. Willilam, W. & Gere J.M. “Matrix Analysis of Framed Structures”, CBS Publishers & Distributers, 1986.

Course Plan:

Lecture No.	Learning Objective	Topics to be covered		Chapter in the Text Book	SLO
1-3	able to Identify the static and kinematic indeterminacy of various structures	Introduction	Fundamentals of Structural Analysis, Static and Kinematic Indeterminacy	T1 Ch.2	(a)
4-6	able to Analyze beams and frames using Force based methods	Force Methods	Consistent Deformation Method	R3 Ch.9	(a), (e), (k)
7-10			Strain Energy Method	R6 Ch.15	
11-13	able to Analyze beams and frames using Displacement based methods	Displacement Methods	Slope-Deflection Method	T1 Ch.11	
14-16			Moment Distribution Method	T1 Ch.12	
17-21	able to use STAADPro to solve a structure and understand the underlying stiffness methods	Matrix Methods	Stiffness Matrix method and STAAD Pro	T1 Ch.14, T1 Ch.15, T1 Ch.16, R7 Ch.11	
22-23			Introduction to Flexibility Matrix Method	R7 Ch.11	
24-26	able to Analyze trusses using Force based methods	Indeterminate Trusses	Redundancy and Analysis of indeterminate trusses	T1 Ch.14,	
27-30	able to draw influence lines and calculate effect of moving loads	Moving Loads on beams	Influence Line Diagrams and Analysis determinate beams under Moving Loads	T1 Ch.6, T1 Ch.9	(a), (e)
31-33	able to Analyze frames using approximate methods	Approximate methods for analysis of Frames	Frames subjected to vertical loads	T1 Ch.7	(a), (e), (k)
34-37			Frames subjected to Horizontal loads	T1 Ch.7	
38-42	Able to determine the internal forces and deformations of a given arch system	Arches	Two Hinged Arches Fixed Arches	R4 Ch.12	(a), (e)

***Student Learning Outcomes (SLOs):**

SLOs are outcomes (a) through (k) plus any additional outcomes that may be articulated by the program.

(a) an ability to apply knowledge of mathematics, science and engineering
(b) an ability to design and conduct experiments, as well as to analyze and interpret data
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
(d) an ability to function on multidisciplinary teams
(e) an ability to identify, formulate, and solve engineering problems
(f) an understanding of professional and ethical responsibility
(g) an ability to communicate effectively

(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
(i) a recognition of the need for, and an ability to engage in life-long learning
(j) a knowledge of contemporary issues
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Evaluation Scheme:

Component	Duration	Weightage (%)	Date & Time	Nature of Component
Mid Sem Test	90 min	20%	6/3 11.00 -12.30 PM	CB
Assignments		25%	Once a week	OB
Project		15%		OB
Classroom Interaction		10%	Every Lecture class	OB
Compre. Exam	3 hrs	30%	12/5 AN	OB

Chamber Consultation Hour: To be announced in the class.

Notices: Notice concerning to the course will be displayed on Notice Board of CE Dept & Google Classroom

Make-up Policy: Makeup will be given only to the genuine cases with prior permission.

Academic Honesty and Integrity Policy: Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.

INSTRUCTOR-IN-CHARGE
CE F241