

NATIONAL INSTITUTE OF TECHNOLOGY
JAMSHEDPUR, JHARKHAND -831014
DEPARTMENT OF CIVIL ENGINEERING
SPRING SEMESTER 2019-2020
Course Handout

Date: 02.01.2020

Course No : CE4206
Course title : High Rise Structures
Instructor-in-charge : DR. PRAHLAD PRASAD
Course description

Introduction to multistoried buildings. Necessity and constraints of multistoried buildings with respect to the economic growth.

Load action on multistoried buildings: Dead load, live load, construction load, snow, rain, and ice load, wind load, seismic load, Water and earth pressure load, impact and dynamic loads, blast loads, and combination of loads

The vertical structural plane: Dispersion of vertical forces, Dispersion of lateral forces, Optimum ground level space, Shear wall arrangement, Behavior of shear walls under lateral loading

Common multi storey building structures and their behavior under lateral load: The wearing wall structure, The shear core structure, Rigid frame systems, The wall-beam structure: Interspatial and staggered truss systems, Frame shear wall building systems, Flat slab building structures, shear truss-frame interaction system with rigid belt trusses, Tubular systems, composite buildings, comparison of high-rise structural systems.

Approximate structural analysis and design of multistoried building structures: The approximate analysis of bearing wall buildings; The cross wall structure, the long wall structure, The rigid frame structure: Approximate analysis for vertical loading, approximate analysis for lateral loading, Approximate design of rigid frame buildings, The rigid frame-shear wall structure.

Scope

- * To provide concept of understanding of building structures under the prescribed boundary conditions
- * To understand the necessity of multistoreyed buildings for a robust economic growth
- * To provide the basic issues of structural integrity & structural plan density of multistoreyed buildings
- * To understand strength, weakness of analysis procedures to be used for multistoreyed buildings
- * To understand strength, weakness of design approach to be used for multistoreyed buildings
- * To understand the design & analysis procedures by using software's of multistoreyed buildings
- * Identification and quantification of materials and the structural systems for multistoreyed buildings
- * Understanding of behavior of multistoreyed buildings under dynamic loadings using case study

Objectives

- At the onset of the course, the students will be focused the necessity of multistoreyed building structures in order to keep pace of economic growth
- During the introductory classes, students will understand the vulnerability and threat to the integrity of multistoreyed building structures due to disasters (e.g. earthquake, blast etc) using case study
- Identification of a structural system based on loading and their probable performance will be the priority as one of the major objectives.
- At the end, students will be in a position to develop algorithm for structural forms to meet out the challenging task of multistoreyed building structures in order to achieve performance assigned during the design period.
- At the end of the course materials, students will be in a position to give commentary for the probable performance using the economy aspect during any uncalled situations (disasters)

Text Books

T1: High-Rise Building Structures, “Wolfgang Schueller” School of Architecture Syracuse University, A Wiley-Inter Science Publication John Wiley & Sons, New York, London, Sydney, Toronto

T2: Tall Building Structures, “ Bryan Stafford Smith Alex Coull, Wiley India Pvt. Ltd.

Reference Books/Materials

R1: Designer’s Guide to the Dynamic Response of Structures, “Alan Jeary, City University of Hong Kong”, E & FN Spon, A imprint of Thomson Profession, London, Tokyo, Madras

Simiu, E. (1975), “Equivalent static wind loads for tall building design”, Proc. 4th Int. Conf. on Wind Bulding and Structures, London, Cambridge University Press

Lecture No.	Learning objectives	Topic to be covered	Refer to chapter (Book)
1-2	Understanding of structure and loading on structure	Introduction	1 (T ₁ & T ₂)
3-5	Load action on multistoried buildings:	Concept of evaluation of load	2 (T ₁ & T ₂)
6-20	Dispersion of loads	Load dispersion under vertical and lateral direction	4(T ₁ & T ₂)
21-35	Common multi storey building structures and their behavior under lateral loading	Behavior of multistory building	5 (T ₁ & T ₂)
36-45	Approximate analysis and design of multi storey building structures	Concept of and analysis and design	7(T ₁ & T ₂)

Evaluation scheme

EC No	Evaluation Component	Duration	Weight age	Date & Time	Nature of the Component
1	Mid Sem. Exam	2 Hrs	30%		Closed Book
2	End Sem. Exam.	3 Hrs	50%		Closed Book
3	Assignment		20%		Take home

Chamber consultation hour: Thursday 6.0 pm, Chamber

Notices: All notices regarding the course will be displayed only on the **Department of Civil Engineering notice board.**

Instructor In-charge

CE14206