Computer Application in Civil Engineering-IV
01CI1606

Objective of the Course:

- Develop an understanding to use commercially available FEM packages for the structural analysis and design.
- To model, analyze and design structures using commercially available software.

Credit Earned: 01

Prerequisite: Structural Analysis and Structural Design

Students learning outcomes:

After successful completion of the course, it is expected that students will be able to,

1. Create analytical models of structures in FEM software, ensuring accurate representation of geometry and material properties for structural analysis and design.
2. Simulate real-world conditions by applying various types of loads to structural models.
3. Evaluate structural behavior by interpreting analysis results to assess performance and safety.
4. Generate detailed structural drawings and documentation from the analysis and design results using software tools.

Teaching and Examination Scheme

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE (E)	IA (M)	CSE (I)	Viva (V)	Term Work (TW)	
00	00	02	01	00	00	00	25	25	50

Detailed Syllabus

Sr No.	Title of the unit	Number of hours
1	**Modelling, Analysis and Design of Structures Using Commercially Available Software Packages**	**12**
	1.1 Fundamentals of FEM software, Introduction to structural design process. Introduction to various software available for analysis and design, Creating geometry of various types of structures, defining materials and properties of materials in software.	02

	1.2 Defining the structural elements in software, assigning properties of material to structural members, defining various types of boundaries or support in software.	02
	1.3 Use of various commands for repetitions of tasks, Quickdraw commands, Define various types of loads and load combinations.	02
	1.4 Assigning various types of load and load combinations to structures. Analysis Commands. Design concepts, defining various parameters used for the design of structures.	03
	1.5 Preparation of structural layout of RC and Steel buildings, Modeling of Advanced Concepts like seismic analysis using the Response Spectrum Method.	03
2	**Detailing of Structures**	**08**
	2.1 Introduction to detailing of a structural member as per Indian standards, Introduction to detailing using AutoCAD, Export results of FEM software	04
	2.2 Design & and detailing of slabs, beams, columns, and foundation. Develop the design basis report of structural design.	04
3	**Project – Structural Design**	**08**
	3.1 The project work has to be a design project from the following projects. Students have to carry out structural design projects from the following: 1. Multistoried reinforced concrete structure 2. Industrial structure It is compulsory to submit at least one structural design project from concept level to execution level.	04
	3.2 Each structural design project must be submitted with design basis report (DBR) which includes: • Framing system & plan of structures • Details of materials & properties being considered • Loads & load combination • Modelling of structures with all relevant details • Design results • Detailed drawings	04
	Total	**28**

Suggested Theory Distribution

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve an effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
5%	20%	30%	25%	10%	10%

Instructional Method and Pedagogy:

1. At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
2. Lectures will be taken in class room with the use of multi-media presentations, white board– mix of both.
3. Attendance is compulsory in lectures and laboratory which carries a 5% component of the overall evaluation.
4. Minimum two internal exams will be conducted and average of two will be considered as a part of continuous evaluation
5. Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval. It carries a weightage of 5%.
6. Surprise tests/Quizzes will be conducted which carries 5% component of the overall evaluation.
7. The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.

Recommended Study Material

1. Structural Design of Multi-storeyed Buildings, Varyani U. H., 2nd Ed., South Asian Publishers, New Delhi.
2. Structural Analysis and Design of Tall Buildings, Taranath B. S., Mc Graw Hill, 1988
3. Advanced Design of Concrete Structures – Krishana Raju N., Tata Mc-Graw Hill, Delhi
4. Design of Multi Storeyed Buildings, Vol. 1 & 2, CPWD Publications.
5. Tall Building Structures, Smith Byran S. and Coull Alex, Wiley India
6. High Rise Building Structures, Wolfgang Schueller, Wiley
7. Tall Building Structures on Elastic Subgrade and Research of Semi-Analytical method by Gong Yaoqing. Beijing: Tsinghua University
8. Tall Chimneys, Manohar S. N., Tata Mc Graw Hill Publishing Company, New Delhi
9. Advanced Reinforced Concrete, Varghese A. V., Prentice Hall of India.
10. Advanced Reinforced Concrete Design, Varghese P. C., Prentice Hall of India, New Delhi.
11. Unified Theory of Concrete Structures, Hsu T. T. C. and Mo Y. L., John Wiley & Sons, 2010.
12. Design of Steel Structures – N. Subramanyan, Oxford.
13. Steel Structure -Design and Behaviour, Salmon, C.G., and Johnson, J.E. Harper and Row
14. Design of Steel Structure - Duggal, Tata Mc Graw Hill.
15. Steel Structures, William McGuire, Prentice Hall, Inc., Englewood Cliffs, N.J.1986

IS Codes:

1. Criteria for earthquake resistant design General provision & Building - IS: 1893 (Part I)- 2016
2. Code of Practice for Ductile Detailing of RC Structures - IS: 13920 (2016).
3. Code of Practice for earthquake resistant design & Construction of buildings – IS 4326 (2013).
4. Guide lines for Improving Earthquake Resistance low strength masonry buildings - IS 13828 (1993)

Web Links

1. https://www.nicee.org/EQTips.php
2. www.nicee.org
3. www.eeri.org
4. www.gsdma.org
5. www.ndma.gov.in
6. www.nptel.iitm.ac.in/courses