Birla Institute of Technology & Science, Pilani
Hyderabad Campus

SECOND SEMESTER 2023-2024
Course Handout Part II

Date: 09-01-2024

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 F416
Course Title : Computer Applications in Civil Engineering
Instructor-in-Charge : Prof. Arkamitra Kar
Instructor : Ms. Pujitha Ganapathi C

Scope and Objective of the Course:

● Introduction to matrix methods of structural analysis.

● Introduction on how to use the commercially available software, relevant to civil engineering structures

● Emphasis on MS-Excel, STAAD Pro V8i, RISA-2D, R.

● Analysis and design of reinforced concrete beams, slabs, columns, and foundations using software packages mentioned above.

Expected Course Outcome:

After attending this course, the student will develop an ability to:

● Apply the basics of matrix method of analysis of structures

● Analyze and design civil structural elements using commercial software packages, according to the guidelines of Indian Standard Codes of Practice

● Apply knowledge of software commonly found in practice – STAAD Pro, RISA, MS Excel.

● Apply these acquired skills for providing solutions to real-life civil engineering structures.

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

Textbooks:
1. Amin Ghali, Adam Neville, and Tom G. Brown, "Structural Analysis: A Unified Classical and Matrix Approach", 2009, 6th Ed., CRC Press.

Reference books

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1. IS 456:2000 "Code of practice for Plain and Reinforced concrete", Bureau of Indian Standards, New Delhi.

2. Special Publication (SP)-16, Design aids for reinforced concrete to IS 456:1978, Bureau of Indian Standards, New Delhi.
3. IS 875 – Part III (2015) "Code of practice for Design Loads (Other than Earthquake) for Buildings and Structures Part 3 Wind Loads", Bureau of Indian Standards, New Delhi.
4. IS 1893 – Part 1 (2016) "Criteria for Earthquake Resistant Design of Structures", Bureau of Indian Standards, New Delhi.

Course Plan:

Lecture No.	Topics Covered	Learning Outcomes	Chapter in the Text Book	SLO
1-2	Objectives & Methods of Analysis & Design	Study the objectives and methods of RC Design; Compute Loads & Forces acting on structures.	1,2	(a)
3-4	Matrix method of structural analysis	Study static and kinematic indeterminacies; Analyze structures using flexibility & stiffness methods	4,5	(a)
5	Introduction to civil engineering software	Study the documentation for software used in civil engineering applications, with emphasis on structural engineering; Study their application to existing practical problems	22	(a), (j)
6 - 16	Application of MS-Excel	Formulate MS-Excel programs to analyze and design structural elements	MS-Office	(b), (k)
17 - 18	Application of RISA	Analyze 2-D structural elements Using RISA	Software Documentation	(b)
19 - 34	Application of STAAD Pro	Analyze and Design beams, columns, slabs, and foundations using STAAD Pro v8i.	Software Documentation	(b), (j), (k)
35-42	Application of R	Apply R statistical package to develop prediction models	Software Documentation	(b), (j), (k)

Laboratory Schedule

Week	Lab Work Description	SLO
1	Formulate MS-Excel programs to analyze loads on structures	
2	Formulate MS-Excel programs to design beams and columns	
3	Formulate MS-Excel programs to design foundations	
4	Analyze 2-D trusses and beams Using RISA	
5	Analyze and Design beams, using STAAD Pro v8i.	
6	Analyze and Design beams, using STAAD Pro v8i.	(b), (j), (k)
7	Analyze and Design beams, using STAAD Pro v8i.	
8	Analyze and Design columns using STAAD Pro v8i.	
9	Analyze and Design foundations using STAAD Pro v8i.	
10		
11	Apply R statistical package to develop prediction models	
12		

*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.

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Evaluation Scheme

Sl. No.	Evaluation component	Duration	Weightage	Date, time	Nature of component
1.	Mid-sem Exam	90 mins.	30%	12/03 - 4.00 - 5.30PM	OB
2.	Project	-	10%	-	OB
3.	Lab Assignments	As per Timetable	20%	Weekly	OB
4.	Surprise Tests (5)	15 mins	5%	-	OB
5.	Comprehensive Exam	180 mins.	35%	09/05 AN	OB

Chamber Consultation Hour: To be announced in the class.

Notices: All Notice concerning to the course will be displayed through CMS and on **the Announcement Board** of the Google Classroom.

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

Evaluation: Curved gradation policy will be adopted; however, the student is expected to score _at least 30%_ of the total marks to achieve a completed grade.

Weekly assignments: 20% of the total marks are going to be awarded for _weekly lab assignments_, which will be _evaluated during the laboratory classes_.

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 F416