Birla Institute of Technology & Science, Pilani
Hyderabad Campus

FIRST/ SECOND SEMESTER 2018-2019

Course Handout Part II

Date: 01-01-2019

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 : Dr. Arkamitra Kar

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

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 Objective	Reference to TB	SLO
1-2	Objectives & Methods of Analysis & Design	Study the objectives and methods of RC Design; Compute Loads & Forces acting on structures.	T1,R1	(a)
3-4	Matrix method of structural analysis	Study static and kinematic indeterminacies; Analyze structures using flexibility & stiffness methods	R3, R4	(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		(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)
18 - 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	(b), (j), (k)
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.	
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	Apply R statistical package to develop prediction models	
11		
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.

Evaluation Scheme

Sl. No.	Evaluation component	Duration	Weightage	Date, time	Nature of component
1.	Mid-sem Exam	1.5 hrs	20%		CB
2.	Project	-	25%		OB
3.	Lab Assignments	2 hrs/week	15%	Weekly	OB, Open computer
4.	Pop quizzes/surprise tests	15 mins	10%		CB, open notes
5.	Comprehensive Exam	3 hrs.	30%		Open computer, no internet

Chamber Consultation Hour: To be announced in the class.

Notices: All Notice concerning to the course will be displayed through CMS and on **the Notice Board** of Civil Engg. Department.

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: 15% of the total marks are going to be awarded for *weekly assignments*, which will be *evaluated in class*.

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