

SECOND SEMESTER 2018-2019

Course Handout Part-II

Date: 07-01-2019

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 F428

Course Title : Earthquake Resistant Design and Construction

Instructor-in-charge : Dr. Kalyana Rama J S

1. Scope and Objective of the Course:

Earthquakes are one of the most destructive forces that nature unleashes on earth. Since earthquakes are so far unpreventable and unpredictable, the only course open to us is to design and construct the structure in such a manner that the loss of property and life is minimized. The course deals with various aspects of seismic design and construction of buildings, bridge, tanks, chimneys, retaining structures. Now provisions of BIS codes on earthquake engineering are mandatory for any new construction after June 30, 2007. EQ codes and their provisions are to be studied in-depth. Aim of the course is to know the various aspects in the analysis, design and construction in order to produce safe and economical EQ resistant structures.

2. Text Book:

T1. Duggal, S K (2007) "Earthquake Resistant Design of Structures" Oxford University Press.

T2. Agarwal, P. and Shrikhande, M. (2006), "Earthquake Resistant Design of Structures" Prentice-Hall of India.

3. Reference Books:

R1. IS: 1893(All parts), 4326, 13827, 13828, 13920, 13938 and other relevant BIS codes

R2. Villaverde R. (2009) "Fundamental Concepts of Earthquake Engineering" CPC press.

R3. Kramer S.L., (1996) "Geotechnical Earthquake Engineering" Pearson Education.

R4. Krishna, J., Chandrasekaran, A.R. and Chandra, B. (1994) "Elements of Earthquake Engineering." South Asian Publisher.

R5. Saran, S. (2006), "Soil Dynamics and Machine foundation" 2nd edition, Galgotia Publisher.

5. Course Plan

Lecture No.	Course Outcomes	Topics to be covered	Chapter in Textbook/Reference book
1-8	Formulate an equation of motion and evaluate displacement, velocity and acceleration response of SDOF and MDOF system	Free and forced vibrations-Undamped and damped, Response of SDOF and MDOF structures, natural frequencies and mode shapes	6,7,10,11 T2
9-11	Study the basic causes of EQ and Evaluate the size and strength of EQ	Causes of earthquake, seismic waves, magnitude and intensity, Seismic Risk, Seismic hazard in India and development of seismic zoning map.	1,T1
12-13	Determine site characteristics	Characterization of EQ ground motion parameters	3,T1
14-16	Evaluate liquefaction potential and apply suitable remedial measure	Phenomena of liquefaction and Factors Affecting Liquefaction, Various methods of evaluation of liquefaction. Anti-liquefaction measure. Code of practice	Lecture Notes
17-20	Understand the concept and principle of EQ resistant design using Indian Code of practice.	EQ resistant design philosophy, basic principles of EQ resistant design, regular and irregular buildings, reasons of failure during earthquake, Codal provisions of IS: 1893- 2002 (Part-1) for multistoried buildings, torsion response of buildings	IS:1893-Part1 5, T1
21-24	Calculate EQ forces on a structure using various methods	Equivalent frame analysis, Response Spectrum method, Time history method of analysis.	18, T2 IS:1893-Part1
25-30	Design and detail of RCC structures as per standard guidelines to satisfy ductility criteria	Causes of failure of RCC structures, case studies. Concept of ductility, Ductile design, Beams, columns, joints, strong columns and weak beams concept. Design and detailing of beam column joint, Design and detailing of RC shear wall.	8, T1, IS:13920

31-32	Detail steel connections and bracing members for earthquake resistant design	Causes of failure of steel structures, case studies, detailing of steel connections, bracing members.	9,T1, IS800-2008
33-35	Analyze stack-like structures for seismic loads	Seismic analysis of chimneys, cooling towers, etc. as per Indian Standards	IS1893- Part-4
36-38	Analyze water tanks for seismic loads	Seismic analysis of water tanks as per Indian Standards	IS1893- Part-2
39-40	Apply suitable retrofit and strengthening techniques for various seismic zones	Seismic retrofit of existing buildings. seismic strengthening of damaged buildings.	IS:13935

6. Evaluation Scheme

Component	Duration	Weightage	Date & Time	Remarks
Mid Semester Exam	1.5 Hour	25%	16/3 11.00 -12.30 PM	Closed Book
Take home Assignments	-	10%	Continuous	Open book
Seminars	-	5%		Open book
Project	-	20%		Open Book
Comprehensive Examination	3 Hours	40 %	13/05 AN	Closed Book

7. Chamber Consultation Hour: To be announced in the class

8. Notice: Notices will be displayed on Department of Civil Engineering Notice Board and CMS.

9. 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

