

**B.E. Semester: VIII**  
**Department of Civil Engineering**

**Subject Name: Design of Special RC Structures (CV803-N-A)**

**Course Category: Program Course Elective – IV (PCE)**

**A. Objectives of the Course:**

- The objective of the subject is to provide a coherent development to the students for the courses in sector of Reinforced Concrete Designing
- To present the foundations of many basic engineering concepts related designing of special structures like retaining wall, water tanks, flat slabs, chimney, bunker, silo and fly overs
- To calculate the design forces and to understand and calculate member response of special structures like retaining wall, water tanks, flat slabs, chimney, bunker, silo and fly overs
- The objective of the course is also to develop the detailing skills for the special RC structures
- The construction procedure for various special RC structures

**B. Teaching & Evaluation Scheme**

Teaching Scheme				Credit	Evaluation Scheme					Total Marks
L hrs	T hrs	P hrs	Total Hrs		Theory		IE	CIA	Pra/Viva	
					Hrs	Marks	Marks	Marks	Marks	
2	2	0	4	4	3	70	30	20	30	150

**C. Detailed Syllabus**

**1. Design of Retaining Wall:**

Introduction, Types of Retaining Wall, Behaviour of Cantilever and Counterfort Retaining Wall, Analysis for Self Weight, and various earth loads, Design and Detailing of Cantilever and Counterfort Retaining Wall

**2. Design of Water Tank:**

Introduction, Type of Water tanks, Analysis for Self Weight, Water Pressure and Earth Pressure, Design and Detailing of Underground – Square, Rectangle and Circular Water Tank, On Ground - Square, Rectangle and Circular Water Tank and Overhead - Intz Tank and Conical Tank

**3. Design of Flat Slab:**

Introduction to Flat Slabs, Behaviour and Modes of Failure, Analysis for Gravity Loads, Designing and Detailing of Flat Slabs with and without Drop and Column Capital for Gravity Load

**4. Introduction to Other Special RC Structures:**

Uses, Forces to be considered in Analysis and Behaviour of Chimney, Bunker, Silo, Diaphragm Wall, Flyovers

**D. Lesson Planning**

Unit No	Title of the Unit	Minimum Hours	Weightage (%)
1	Design of Retaining Wall	06	24
2	Design of Water Tank	12	32
3	Design of Flat Slab	08	26
4	Introduction to Other Special RC Structures	04	18
Total:		30	100

**E. Assignments:**

- 1 Design Example for each type of Retaining Wall, for each design detailed drawing sheet must be prepared in A2 size after manual calculation prepare design spread sheet and after manual drawing prepare AutoCAD drawing
- 1 Design Example for each type of Water tank with A2 size Detailed drawing Sheet
- 1 Design Example for Flat Slab with A2 size Detailed drawing Sheet

**F. Instructional Method and Pedagogy (Continuous Internal Assessment Scheme CIA):**

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Lecture may be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lectures, practical and Tutorial which carries 05 Marks.
- At regular intervals assignments is given. In all, a student should submit all assignments of 05 marks each.
- Classroom participation and involvement in solving the problems in Tutorial rooms carries 05 Marks.
- Viva Voce will be conducted at the end of the semester of 05 Marks.
- One internal exam of 30 marks is conducted as a part of Mid Semester evaluation.

## **G. Students Learning Outcomes:**

On the successful completion of this course

- The students will be able to understand various uses of special RC structures
- The students will be able to identify the various forces acting on the elements of special structures and also will be able to understand the member response under the forces
- The students will be able to analyse the various forces and will be able to calculate member response under those forces for retaining wall, water tank, flat slab
- The students will be able to design the elements of retaining wall, water tank, flat slab
- The students will be able to detail the elements of retaining wall, water tank, flat slab
- The students will be familiar with construction procedure for various special RC structures

## **H. Recommended Study Materials**

### **a. Text book & Reference Books:**

1. Dr. H. J. Shah; Design of Reinforced Concrete Volume I and II, Charotar Publication
2. Dr. B. C. Punamia, Dr. A. K. Jain and Er. Ashokkumar Jain; RCC Designs, Lakshmi Publications
3. S. Subramanian, Design of Reinforced Concrete Structures, Oxford
4. David Darwin, Design of Concrete Structures, McGraw Hill
5. N. Krishnaraju, Design of Reinforced Concrete Structures, CBS Publisher

6. Devdas Menon, Reinforced Concrete Design, McGraw Hill Education

**b. Web Materials:**

1. <http://www.cdeep.iitk.ac.in/nptel>
2. <http://www.nptel.iitm.ac.in> B. Web Materials:

**c. Indian Codes of Practice:**

1. IS 456: 2000, Indian Standard Plain and Reinforced Concrete - Code of Practice
2. IS 3370 Part I :2009. Concrete Structures for Storage of Liquids - Code of Practice (General requirements)
3. IS 3370 Part II: 2009. Concrete Structures for Storage of Liquids - Code of Practice (Reinforced concrete structures)
4. IS 4995- Part I:1974. Criteria for design of reinforced concrete bins for storage of granular and powdery materials, General requirements and assessment of bin loads.
5. IS 4995- Part II:1974. Criteria for Design of Reinforced Concrete Bins for Storage of Granular and Powdery Materials, Design Criteria
6. IS 4998-Part I: 1992.Criteria for design of reinforced concrete chimneys, Assessment of loads
7. IS 4998-Part II: 1992.Criteria for design of reinforced concrete chimneys, Design criteria
8. IRC:5 -2015 Standard specifications and code of practice for road bridges: Section I: General features of design
9. IRC :6 -2014 Standard specifications and code of practice for road bridges: Section II (load and stresses)
10. IS 9556:1980. Code of practice for design and construction of diaphragm walls

