22CEPE08	ADVANCED CONCRETE DESIGN			Semester		VI

PREREQUISITES		Category	PE	Credit		3
Knowledge of mathematics, Strength of Materials, Structural analysis and design of reinforced concrete elements.		**Hours/Week**	L	T	P	TH
			3	0	0	3

Course Learning Objectives

1	To study the behaviour of combined footings, retaining walls and flat slab.
2	To obtain the knowledge of analysis and design of slabs with different shapes and end conditions using yield line theory.
3	To acquire the design principles of water tanks
4	To analyse and design the building frames for vertical and lateral loads.
5	To gain knowledge about the framed structures reinforcing details

Unit I	COMBINED FOOTINGS	9	0	0	9

Introduction – need for combined footing – Behaviour and design of rectangular combined footings – pad type – slab and beam type – Design of trapezoidal combined footings for axially loaded column – Behaviour and design of mat and raft foundation (Theory only).

Unit II	RETAINING WALLS	9	0	0	9

Introduction – loads on retaining wall – stability requirements – types of retaining wall – Cantilever retaining wall – check for structural stability – design of concrete thickness and reinforcement for stem, heel and toe slab – counterfort retaining wall – check for structural stability– design of concrete thickness and reinforcement for stem, counter fort, heel and toe slab.

Unit III	FLAT SLAB DESIGN & YIELD LINE THEORY	9	0	0	9

Design of flat slabs – interior panel and end panel – column strip – middle strip – with and without column head – reinforcement details – Yield line – characteristics – Application of virtual work method to square, rectangular, circular and triangular slabs.

Unit IV	WATER TANK DESIGN (L.S.D)	9	0	0	9

Types of water tanks – joints – codal provisions – Elevated water tank – circular and rectangular tank – flat and domed roofs – Underground rectangular tanks– Design of staging and foundations

Unit V	BUILDING FRAMES	9	0	0	9

Substitute frame method – load patterns – assumptions – portal and cantilever methods of analysis – Reinforcement detailing of frames- Methods of analysis

Total= 45 Periods

Text Books:
1	Punmia B.C., Asokkumar jain & Arun kumar jain., Limit State Design of Reinforced Concrete, Laxmi Publications Pvt. Ltd., New Delhi,2007
2	Subramanian N., Design of Reinforced Concrete Structures, Oxford University Press, 2018.
3	Shah H.J., Reinforced Concrete Vol.-II, Charotar Publishing House, Anand, 2000.
4	Dayaratnam P., Brick and Reinforced Brick Structures, OXFORD & IBH Publishing Co. Pvt. Ltd., New Delhi,2004.
Reference Books:
1	Krishna Raju N., Design of Reinforced Concrete Structures, CBS Publishers & Distributors,New Delhi,2008
2	Syal I.C. and Goel A.K., Reinforced Concrete Structures, A.H. Wheelers & Co. Pvt.Ltd., 1994

3	Ram Chandra, Limit State Design, Standard Book House.2006.
4	IS 456:2000, Plain and Reinforced concrete Code of practice (Third Revision).
5	SP :16, Design aids for Reinforced Concrete to IS 456-1978.
6	SP : 34 – 1987 Handbook on Concrete Reinforcement and Detailing
7	IS 3370:1967 Code of practice for Concrete Structures for Storage of liquids (Part – I, II & IV)

Course Outcomes: Upon completion of this course, the students will be able to:		Bloom's Taxonomy Mapped
CO1	Design the combined footings and draw the reinforcement details	Apply
CO2	Design and draw the reinforcement details of retaining walls and flat slab.	Apply
CO3	Analyse and design the slabs based on yield line theory and draw the reinforcement details.	Apply
CO4	Design the water tanks and draw the reinforcement details	Apply
CO5	Analyse and design the building frames by approximate method and draw the reinforcement details	Apply

COURSE ARTICULATION MATRIX

COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	1	-	-	-	2	2	2	1	-	-	-	-	-
CO2	1	2	1	-	-	-	2	2	2	1	-	-	-	-	-
CO3	1	2	1	-	-	-	2	2	2	1	-	-	-	-	-
CO4	1	2	1	-	-	-	2	2	2	1	-	-	-	-	-
CO5	1	2	1	-	-	-	2	2	2	1	-	-	-	-	-
Avg	1	2	1	-	-	-	2	2	2	1	-	-	-	-	-
3/2/1 – indicates strength of correlation (3- High, 2- Medium, 1- Low)															