ADVANCED REINFORCED CONCRETE DESIGN
(Professional Elective I)

Course Code: 19CE2250	L	P	C
	3	0	3

Course Outcomes:
At the end of the course the student will be able to

CO1:Estimate the crack width and deflection with regard to the serviceability.
CO2:Analyse and design a flat slab system and PT slab system.
CO3:Analyse and design corbels, brackets and nibs.
CO4:Discuss concrete walls for vertical loads.
CO5:Analyse and design bunkers, silos and chimneys.

UNIT – I (10-Lectures)
DEFLECTION AND CRACK WIDTH ESTIMATION:

Deflection of Reinforced Concrete Beams and Slabs: Introduction, Short-term deflection of beams and slabs, Deflection due to imposed loads, Short-term deflection of beams due to applied loads, calculation of deflections by IS 456, including long-term deflections due to creep and shrinkage – Deflection requirements according to IS 456, deflection of slabs.

Estimation of Crack width in Reinforced Concrete Members: Introduction, Factors affecting crack width in beams, Mechanisms of flexural cracking, Calculation of crack widths, simple empirical method, Estimation of crack width in beams by IS 456 shrinkage and thermal cracking.
LO1 : Evaluate short term and long term deflections in beams and slabs.
LO2 : Estimate the crack width in beams and slabs.

UNIT–II (10-Lectures)
ANALYSIS AND DESIGN OF FLAT SLABS: Introduction, Proportioning of flats labs, Determination of bending moment and shear force, direct design method, equivalent frame method – Reinforcement Detailing –Yield line theory slabs.

YIELD LINE ANALYSIS

Yield line analysis and case studies

LO1 : Analyse and design of flat slab system.
LO2 : Analyse and design of PT flat slab system.

UNIT – III **(10-Lectures)**

DESIGN OF CORBELS, BRACKETS AND NIBS
Introduction – Allowable shear, Dimensioning, Analysis and Design of Corbels and Brackets. Design of Nibs- Reinforcement detailing.
LO1 :Discuss the applications of corbel, bracket and nib.
LO2 :Analyse and design of corbels and brackets.

UNIT – IV **(10-Lectures)**
DESIGN OF CONCRETE WALLS CARRYING VERTICAL LOADS
Slenderness ratio of walls –Slenderness limits – Design of RC walls as per IS 456, design of plain walls, reinforcement, General considerations, design procedure – Types of loads on the walls – Concentrated loads on walls.- Reinforcement Detailing.
LO1:Discuss shear wall design in RC buildings.
LO2 :Apply various provisions including detailing in design of shear walls.

UNIT – V **(10-Lectures)**
RC BUNKERS AND SILOS: Introduction, Design of rectangular bunkers, circular bunkers and silos,including Reinforcement Detailing.

RC CHIMNEYS: Introduction, Design factors, Stresses due to self weight, wind and temperature, Combinations of stresses- Reinforcement Detailing.
(No derivations, only applications of principles to be covered)

LO1 : Analyse and design of bunkers and silos.
LO2 : Analyse and design of chimneys

Text Books

1. Pillai and DevadasMenon, –Reinforced Concrete Design‖, 2nd Edition, Tata McGraw Hill Publishing Co. Ltd., 2003.

2. Varghese P.C. –Advanced Reinforced Concrete Design‖, 2ndEdition, Prentice – Hall of India, , 2008.

3. KrishnamRaju, N. –Design of Reinforced Concrete Structures‖, 2nd Edition, CBS Publishers and Distributors, New Delhi,2007.

References

1. Park R.andPaulay T, Design of Reinforced concrete structures, John Willay and sons, New York, 1974.

2. Varghese P.C. –Limit State Design of Reinforced Concrete‖, 2ndEdition, Prentice – Hall of India, 2012.

3. Bhavikatti S. S. –Advance RCC Design‖, 3rd Edition, New Age International Private Limited, 2008.

4. Indian Standard Code 456- 2000, –Code of Practice for plain and Reinforced Concrete‖, British Standard Code-2000.

5. Special Publications SP-16, –Design Aids for Reinforced Concrete‖, of IS: 456-2000.

6. Special Publications SP-34, :handbook andconcrete reinforcement and detailing‖

7. PurushothamanP, –ReinforcedConcrete Structural Elements‖, 3rdEdition, Tata McGraw- Hill Publishing Co, 2004.