ADVANCED DESIGN OF CONCRETE STRUCTURES

Course Code: 15CE2201	**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 grid floor system.
CO3: Analyse and design a flat slab system.
CO4: Discuss fire and seismic resistance of concrete structures.
CO5: **A**nalyse 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, Deflection of slabs by IS 456 and comparison with foreign codes.

Estimation of Crack width in Reinforced Concrete Members: Introduction, Factors affecting crack width in beams, Mechanisms of flexural cracking, Calculation of crack width, Simple empirical method, Estimation of crack width in beams by IS 456.

UNIT – II (10-Lectures)

ANALYSIS AND DESIGN OF GRID FLOORS: Introduction, Analysis of flat grid floors, Analysis of rectangular grid floors by Timoshenko's plate theory. Analysis of grid by stiffness matrix method, Detailing of steel in flat grids.

UNIT–III (10-Lectures)

ANALYSIS AND DESIGN OF FLAT SLABS: Introduction, Proportioning of flat slabs, Determination of bending moment by direct design method, slab reinforcement details. Design for punching shear.

UNIT – IV (10-Lectures)

FIRE AND SEISMIC RESISTANCE OF CONCRETE STRUCTURES:

Design of Reinforced Concrete Members for Fire Resistance:

Introduction, ISO 834 standard heating conditions, Grading or classifications, Effect of high temperature on steel and concrete, Effect of high temperatures on different types of structural members, Analytical determination of the ultimate bending moment, Capacity of reinforced concrete beams under fire.

Ductile Detailing of Frames for Seismic Forces: Introduction, General principles, Factors that increase ductility, Specifications of materials for ductility, ductile detailing of beams – Requirements, Ductile detailing of columns and frame members with axial load (P) and moment (M) – Requirements.

UNIT – V (10-Lectures)

BUNKERS AND SILOS: Introduction, Design of rectangular bunkers, circular bunkers and silos

CHIMNEYS: Introduction, Design factors, Stresses due to self weight, wind and temperature, Combinations of stresses.

TEXT BOOKS

1. Bhavikatti S. S. *"Advance RCC Design",* 3rd Edition, New Age International Private Limited, 2008
2. Krishnam Raju, N. *"Design of Reinforced Concrete Structures",* 2nd Edition, CBS Publishers and Distributors, New Delhi, 2007.

REFERENCES

1. Varghese P.C. *"Advanced Reinforced Concrete Design",* 2ndEdition, Prentice - Hall of India, , 2008
2. Indian Standarad Code 456 2000, *"Code of Practice for plan & reinforced centre"*, British Standard Code-2000.
3. Special Publications -16, "Design Aids for Reinforced Concrete", to IS: 456.

4. Purushothaman P, "Reinforced Concrete Structural Elements", 3rd Edition, Tata Mc Graw- Hill Publishing Co, 2004.
5. Pillai and Devadas Menon, "Reinforced Concrete Design", 2nd Edition, Tata McGraw Hill Publishing Co. Ltd., 2003.