

ADVANCED STRUCTURAL ANALYSIS AND DESIGN

VII Semester: CE								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
ACE016	Core	L	T	P	C	CIA	SEE	Total
		3	1	-	4	30	70	100
Contact Classes: 45		Tutorial Classes: 15		Practical Classes: Nil			Total Classes: 60	
<p>COURSE OBJECTIVES: The course should enable the students to:</p> <ol style="list-style-type: none"> Enhance knowledge of matrix stiffness and flexibility methods for analyzing continuous beams, portal frames and trusses. Design advanced structures such as retaining walls against lateral earth pressure. Analyze and design the different types of piles and flat slabs as per the recommendations of Indian Standard codes. Explore and interpret the basic design concepts of water tanks, silos and bunkers. <p>COURSE OUTCOMES (COs):</p> <p>CO 1: Understand the basic concepts of static and kinematic indeterminacy. Know the concepts of stiffness method and flexibility method and analysis of various structural elements using these methods.</p> <p>CO 2: Understand the concepts of different approximate methods of analysis for lateral loads. Analysis of multi storey frame using portal method, cantilever method and substitute frame method.</p> <p>CO 3: Know the design concepts and IS code provisions for the retaining walls and water tanks. Design retaining walls and water tanks.</p> <p>CO 4: Know the design concepts and IS code provisions for the flat slabs and deep foundations. Design of flat slab, raft foundation and pile foundation.</p> <p>CO 5: Know the design concepts and IS code provisions for the chimneys, bunker and silos. Design of chimneys, bunker and silos.</p> <p>COURSE LEARNING OUTCOMES (CLOs):</p> <ol style="list-style-type: none"> Understand the concepts of static and kinematic indeterminacy. Know the concepts of stiffness method and flexibility method. Analysis of continuous beam with and without settlement of supports using stiffness method. Analysis of single storey portal frames including side sway using stiffness method. Analysis of pin jointed determinate plane frames using stiffness method. Analysis for continuous beams up to three degree of indeterminacy using flexibility method. Understand the concepts of different approximate methods of analysis for lateral loads. Analysis of multi storey frame using portal method. Analysis of multi storey frame using cantilever method. Analysis of multi storey frame using substitute frame method. Know the design concepts and IS code provisions for the retaining walls and water tanks. Understand the design of retaining walls. Understand the design of water tanks. Know the design concepts and IS code provisions for the flat slabs and deep foundations. 								

15. Understand the design of flat slab. 16. Understand the design of raft foundation. 17. Understand the design of pile foundation. 18. Know the design concepts and IS code provisions for the chimneys, bunker and silos. 19. Understand the design of chimney. 20. Understand the design of bunkers. 21. Understand the design of silos.		
UNIT-I	MATRIX METHODS OF ANALYSIS	Classes: 12
Static and kinematic indeterminacy, stiffness and flexibility methods; Stiffness method of analysis for continuous beams including settlement of supports; Single storey portal frames including side sway, pin jointed determinate plane frames; Flexibility method of analysis for continuous beams up to three degree of indeterminacy.		
UNIT -II	APPROXIMATE METHODS OF ANALYSIS	Classes: 12
Analysis of multi-storey frames for lateral loads: Portal method and cantilever method; Analysis of multi storey frames for gravity (vertical) loads; Substitute frame method.		
UNIT -III	DESIGN OF RETAINING WALLS AND TANKS	Classes: 12
Design of retaining walls. Design of water tanks. Design concepts and IS code provisions.		
UNIT -IV	DESIGN OF SLABS AND FOUNDATIONS	Classes: 12
Design of flat slabs, Design of raft and pile foundations; Design concepts and IS code provisions.		
UNIT -V	DESIGN OF CHIMNEY, BUNKER AND SILOS	Classes: 12
Design of chimneys, Design of bunkers and silos; Design concepts and IS code provisions.		
Text Books:		
1. G S Pundit and S P Gupta, "Structural Analysis: A Matrix Approach", Mc Graw Hill Education Publishers, 2 nd Edition, 2008. 2. S S Bhavikatti, "Structural Analysis- II", Vikas Publishing House Pvt. Ltd., 3 rd Edition, 2009. 3. Varghese, "Advanced reinforced concrete structures", Prentice Hall of India Pvt. Ltd, 2009. 4. Pillai and Menon, "Reinforced Concrete Design", Tata McGraw-Hill Publishing Company, 2009.		
Reference Books:		
1. Devdas Menon, "Structural Analysis", Narosa Publishing House, 2 nd Edition, 2008. 2. Devdas Menon, "Advanced Structural Analysis", Narosa Publishing House, 2 nd Edition, 2009. 3. C S Reddy, "Basic Structural Analysis", Tata McGraw-Hill Education, 2001. 4. B C Punmia, Ashok Kumar Jain and Arun Kumar Jain, "Reinforced Concrete Structures", Vol. 2, Laxmi Publications, 2012.		