

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			
COURSE OBJECTIVES: Students will try to learn: I. Advanced techniques to know the behaviour of structural elements subjected to both vertical and horizontal loads which are used for designing all types of structures. II. The design of earth retaining structures, flat slabs, deep foundations, material storage structures and industrial chimneys as per Indian standards for designing efficient and effective structures. III. Design independently civil engineering structures as per the requirements of client and provide detailed design drawings, quality control reports during construction for ensuring quality and economical structures.								
COURSE OUTCOMES (COs): After successful completion of the course students are able to: 1. Recall the concepts of the static and kinematic indeterminacy of structures for analysing the structures subjected to different loads. 2. Explain the concepts of stiffness, flexibility and approximate methods for analysing structural elements. 3. Analyse continuous beams, portal frames for the given loading conditions (vertical and horizontal loads) using the stiffness, flexibility, approximate methods for ensuring structural efficiency. 4. Infer the design concepts and IS codal provisions in the design of earth retaining structures, water tanks, deep foundations, flat slabs, storage bins and chimneys which will be guiding for designing structures by standard procedures. 5. Design retaining walls and water tanks includes tanks resting on ground and overhead tanks for water storage and earth retaining purposes. 6. Design flat slabs and deep foundations in terms of physical dimensions and reinforcement details for designing multi storied structures and bridges. 7. Classify the different material storage bins based on the purpose of storage for their designing. 8. Design bunkers, silos and chimneys which includes both reinforced concrete and steel for material storage and industry exhausts. 9. Make use of the design knowledge to tackle the real-world situations in multi-storeyed structures, bridge foundations and material storage structures for building effective and efficient structures.								
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.		