

Course Code	Course Name	L-T-P-Credits	Year of Introduction
CE304	DESIGN OF CONCRETE STRUCTURES - II	3-0-0-3	2016

**Pre-requisites : CE301 Design of Concrete Structures - I**

**Course objectives:**

- To provide knowledge in the structural design of selected advanced structures of concrete and enable them to design reinforced concrete structures for real-world applications.

**Syllabus :**

Columns subjected to compression , uniaxial bending and biaxial bending- design using SP16 charts for limit state-design of slender columns- design of wall/strip footing- design of rectangular footings-eccentrically loaded rectangular footing- circular footings-detailing-combined footings-rectangular and trapezoidal (design principles only)- design of cantilever retaining wall without surcharge-detailing - design principles of counter fort retaining wall and detailing- Circular slabs- simply supported, fixed and partially fixed subjected to udl- design of water tanks-design philosophy and requirements-joints-IS code recommendations- design of rectangular and circular water tanks using IS code coefficients (IS 3370)- Pre-stressed concrete-concept of prestressing- materials-methods of prestressing – prestressing systems- losses of prestress. analysis of prestressed beams ( rectangular and I-sections) at stages of transfer and service

**Expected Outcomes:**

The students will be able to

- Design eccentrically loaded and slender columns using SP 16 design charts and different
- types of foundations
- Design and detail cantilever retaining wall and understand the design principles of Counter fort retaining wall
- Design and detail circular slabs and domes
- Design rectangular and circular water tanks using IS code coefficients (IS 3370).
- Gain knowledge of prestressed concrete fundamentals and analyse pre and post tensioned beams.

**Text Books / References:**

- N. Krishnaraju, Prestressed Concrete , Tata McGraw- Hill, 5e, 2012
- Pillai S.U & Menon D – Reinforced Concrete Design, Tata McGraw Hill Book Co., 2009
- Punmia, B. C, Jain A.K and, Jain A.K , R C C Designs, Laxmi Publications Ltd., 10e, 2015
- Relevant IS codes (IS 456, IS 875IS 1343, IS 3370, SP 16, SP 34 )

**COURSE PLAN**

Module	Contents	Hours	Sem. Exam Marks %
I	Analysis and design of short columns under eccentric loading- Columns subjected to compression and uniaxial bending- design using SP16 charts for limit state Columns subjected to combined axial load and biaxial bending moments-code procedure for design- design using SP16 charts for	8	15

	limit state Slender columns- behavior of slender columns-braced and unbraced columns-design procedure- design using SP16 charts for limit state		
II	Foundations- classification-IS code provisions for design of isolated footings- design principles of rectangular footings- Design of rectangular footings-uniform thickness and sloped- eccentrically loaded rectangular footing of uniform thickness-detailing. Combined footings (design principles only)- analysis of combined footings-rectangular and trapezoidal.	8	15
<b>FIRST INTERNAL EXAMINATION</b>			
III	Retaining walls-Types- Cantilever retaining wall- earth pressure and forces acting-stability-proportioning-structural behavior of components -design example of cantilever retaining wall without surcharge-detailing Counterfort retaining wall- design principles of components and detailing (design not required)	6	15
IV	Circular slabs- stresses- reinforcements- simply supported, fixed and partially fixed subjected to uniformly distributed loads Design and detailing of spherical and conical domes	6	15
<b>SECOND INTERNAL EXAMINATION</b>			
V	Introduction to design of water tanks-design philosophy and requirements-joints- IS code recommendations Design of rectangular water tanks using IS code coefficients (IS 3370). Design of circular water tanks using- IS code coefficients (IS 3370)	7	20
VI	Introduction to Pre-stressed concrete: Concept of pre-stressing- Materials-High strength concrete and high tensile steel. Analysis of pre-stressed beams (Rectangular and I-sections) at stages of transfer and service. Losses in Prestress	7	20
<b>END SEMESTER EXAMINATION</b>			

- Note:**
1. All designs shall be done as per current IS specifications
  2. Special importance shall be given to detailing in designs
  3. SI units shall be followed.
  4. Students shall submit a term project on design and detailing of any structure of real- world application at the end of the semester.

**QUESTION PAPER PATTERN (End semester examination) :**

**Maximum Marks :100**

**Exam Duration: 3 Hrs**

- Part A -Module I & II : 2 questions out of 3 questions carrying 15 marks each  
Part B - Module III & IV: 2 questions out of 3 questions carrying 15 marks each  
Part C - Module V & VI : 2 questions out of 3 questions carrying 20 marks each

- Note :**
1. Each part should have at least one question from each module
  2. Each question can have a maximum of 4 subdivisions (a,