**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**
**KAKINADA – 533 003, Andhra Pradesh, India**
**DEPARTMENT OF CIVIL ENGINEERING**

| III Year – I Semester | PROFESSIONAL CORE COURSE | L | T | P | C |
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| PC502 DESIGN AND DRAWING OF REINFORCED CONCRETE STRUCTURES | | | | | |

**Course Learning Objectives:**

The objective of this course is:

- Familiarize Students with different design philosophies
- Equip student with design of members in flexural and shear
- Understand bond and torsion
- Familiarize with design of compression members under different types of loading
- Understand different types of footings and design

**Course Outcomes**:

At the end of this course the student will be able to

- Work on different types of design methods
- Carryout analysis and design of flexural members and detailing
- Design structures subjected to shear, bond and torsion
- Design different type of compression members and footings

**SYLLABUS:**

**UNIT –I Design Methods**

**Working stress method**: Elastic theory: design constants, modular ratio, neutral axis depth and moment of resistance - balanced, under-reinforced and over-reinforced sections. Design of singly and doubly reinforced beams, IS Code Provisions.

**Limit State Design**: Basic statistical principles –Characteristic strength – Characteristic loads - Partial load and safety factors – stress-strain curves for HYSD bars and MS bars. Assumptions – stress block parameters – Moment of Resistance.

**All units i.e. from unit II to unit V are to be taught in Limit State Design.**

**UNIT –II Design for Flexure and Shear: D**esign of singly reinforced beams- effective depth- Moment of Resistance- Doubly reinforced and flanged (T) beams- Minimum depth - Minimum and Maximum Flexural Tension Reinforcement - Design of Flanged Sections (T & L) - Effective width of flange - Analysis and Design Problems.

**Design for Shear and Torsion: A**nalysis and design of sections for shear and torsion – bond, anchorage and development length, I.S. code provisions. Design examples in simply supported and continuous beams, detailing.

**UNIT – III Slabs and Serviceability:** Classification of slabs, design of one - way slabs, one way continuous slab using IS Coefficients (Conventional) –Design of two - way slabs - simply supported slabs and slabs with various edge conditions using IS Coefficients. Design of Stair case
**Limit state of serviceability:** Deflection, cracking and IS code provisions for beams and slabs.

**UNIT – 1V Design of Compression members**: Effective length, Braced and un-braced columns – IS Code provisions, Design of short and long columns under axial loads, uniaxial bending and biaxial bending (Demonstration using SP 16)

**UNIT –V**
**Footings: T**ypes of footings – Design of isolated footings – pedestal, square, rectangular and circular footings subjected to axial loads, uni-axial bending moment.

**NOTE:** All the designs to be taught in Limit State Method Following plates should be prepared by the students.

1. Reinforcement detailing of T-beams, L-beams and continuous beams.
2. Reinforcement detailing of columns and isolated footings.
3. Detailing of one-way, two-way and continuous slabs and waist-slab staircase.

**FINAL EXAMINATION PATTERN:**

The end examination paper should consist of Part A and Part B. Part A consists of two questions in Design and Drawing out of which one question is to be answered. Part B should consist of five questions and design out of which three are to be answered. Weightage for Part – A is 40% and Part- B is 60%.

**Text Books:**

1. Limit State Design, A. K.Jain, Nem Chand Brothers
2. Reinforced Concrete Structures, N. Krishna Raju & R. N. Pranesh, and New Age Publications.
3. Structural Design and Drawing by N.Krishna Raju, Universities Press

**References:**

1. R C C Design, B.C Punmia, A. K. Jain and A. K Jain. Lakshmi Publications
2. Reinforced Concrete Structures, S. Unnikrishna Pillai &Devdas Menon, Tata C.Graw Hill, New Delhi.
3. Design of Reinforced concrete Structures, N.Subrahmanian, and Oxford University Press.
4. Limit state design of reinforced concrete structures by P C Varghese, PHI Learning pvt. Ltd.