# C.U.SHAH UNIVERSITY – Wadhwan City

**FACULTY OF**: -Technology and Engineering (Diploma Engineering)
**DEPARTMENT OF**: - Civil Engineering
**SEMESTER**: - V **CODE**: -2TE05DCS1
**NAME** –Design of Concrete Structure

**Teaching & Evaluation Scheme**:-

| Subject Code | Subject Name | Teaching Scheme (Hours) | | | | Credits | Evaluation Scheme | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Theory | | | | Practical (Marks) | | | | Total |
| | | | | | | | | | | | Internal | | University | | |
| | | Th | Tu | Pr | Total | | Sessional Exam | | University Exam | | Pr | TW | Pr | Tw | |
| | | | | | | | Marks | Hours | Marks | Hours | | | | | |
| 2TE05DCS1 | Design of Concrete Structure | 04 | 02 | 00 | 06 | 05 | 30 | 1.5 | 70 | 03 | -- | 20 | 30 | -- | 150 |

**Objectives:** To equip the students with the Limit state design method, Limit state of collapse and serviceability of Design of Concrete Structure with emphasis on analysis of Beam and Lintel. To enable the students to visualize structural dynamics problems with a proper blend of structural Analysis and vibration theory.

**Pre-requisite**: Basic knowledge of Axially Loaded Short Column,, Isolated Column Footing& Slab and Staircase.

**Course Outlines:-**

| Sr. No. | Course Contents | Teaching Hours |
|---|---|---|
| 1 | **Introduction to is – 456:2000**<br>Importance of use of steel as reinforcement, Limit state design method ,Limit state of collapse and serviceability, Characteristic strength of concrete and grades of concrete, Characteristic strength of steel and grades of steel, Partial safety factors for material, Types of loads, load combinations and partial safety factors for loads. Limit state of collapse – FLEXURE and its assumptions, Limit state of collapse – SHEAR and its assumptions. | 09 |
| 2 | **General is Requirements for Design According to is - 456:2000:-** Exposure conditions and minimum cover to the reinforcement, spacing of bars<br>in a layer and different layers, Define effective depth, Effective span for different support conditions ,Basic factors for control of deflection and different modification factors, Requirements of minimum and maximum flexural reinforcement in beam, Short column, minimum eccentricity and requirements of longitudinal and lateral reinforcement in column, Bond stress: □bd and development length of bar | 09 |
| 3 | **Beam and Lintel:** Classification of rectangular beam according to reinforcement: balanced section, under reinforced section, over reinforced section, singly reinforced section and doubly reinforced section**,** Singly reinforced rectangular beam: (Annexure-G, IS – 456:2000). Depth of neutral axis: Xumax, X. Limiting percentage of steel: ptlim. Moment of resistance factor: Q. Use of SP-16 tables for d Xumax , ptlim and Q. Limiting moment of resistance: Mulim. Moment of resistance: Mu. Design of tension reinforcement: AST for given Mu, its check<br>Against requirement of reinforcement. Use of SP-16 tables for AST, Doubly reinforced rectangular beam: (Annexure-G, IS – 456:2000). Need of doubly reinforced section. Moment of resistance: Mu. Design of tension reinforcement: AST and compression reinforcement: ASC for given Mu, its check against requirement of reinforcement. | 10 |

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|---|---|---|
| 4 | **Slab and Staircase:** Classification of slab panel according to span ratio: One way slab and Two way slab**,** Live Load on slab according to IS – 875:1987 (Part-II)<br>Effective span for One way simply supported slab, Design of One way simply supported slab with checks for flexure, shear, bond, deflection and cracking, Shear force and bending moment coefficient for One way continuous slab, Effective span for One way continuous slab, Design of One way continuous slab with checks for flexure, shear, bond, deflection and cracking, Provisions for Two way slab (Annexure-D, IS – 456:2000) | 12 |
| 5 | **Axially Loaded Short Column:** Effective length of column**,** Check for eccentricity**,** Factored/Design load capacity: Pu for different types of cross-section for given percentage of ASC**,** Increase in factored load capacity for helically reinforced circular column**,** Design of longitudinal and lateral reinforcement for axially loaded short Column | 10 |
| 6 | **Isolated Column Footing:** Bearing capacity of soil, Types of footing, Critical sections for flexure and shear, Bearing stress at junction of column and footing, provision of dowel bars, Design of rectangular pad footing with checks for flexure, One way and Two way shear, bearing, bond and cracking, Design of rectangular slopped footing with checks for flexure, One way and Two way shear, bearing, bond and cracking | 10 |

**Term work**: Shall consist of at least 25 problems based on the Course under Design of Concrete Structure.

**Learning outcomes**: Ability to analyse Limit state design method ,Limit state of collapse and serviceability. Knowledge of Beam and Lintel. Ability to solve Design of longitudinal and lateral reinforcement for axially loaded short Column.

**Laboratory Experiences:**

1. IS – 456:2000, IS – 875:1987, IS – 13920-1993
2. SP-16: Design Aids to IS – 456
3. SP-34: Reinforcement detailing
4. Limit state design of RC structures (Vol.-I) by H J Shah
5. Limit state design of RC structures by A K Jain
6. Limit state design of RC structures by B C Punmia
7. Limit state design of RC structures by P C Verghese