

3/4 B.Tech. FIFTH SEMESTER

CE5T1 DESIGN AND DRAWING OF CONCRETE STRUCTURES-1 Credits: 3
Lecture: 3 periods/week Internal assessment: 30 marks
Tutorial: 1 period /week Semester end examination: 70 marks

Pre-requisites: Mechanics of solids, concrete technology, building planning and drawing

Learning objectives:

- To gain the knowledge about the behavior of reinforced concrete elements and load transferring system.
- To know about different loads acting on the structure and codes of practice.
- To be able to apply different design methods.
- To design RCC beams, columns and slabs.

Course outcomes:

At the end of the course the student will have:

1. Knowledge on working stress method of design.
2. Technical capability for the design of reinforced concrete structural elements by limit state method.
3. Knowledge on flexure, shear & torsion.
4. Ability to design and detailing as per code provisions for columns.
5. Ability to design and detailing as per code provisions for slabs.

UNIT –I

INTRODUCTION TO CONCEPT OF WORKING STRESS DESIGN

Recommendations of IS 456 – 2000, grades of concrete, elastic theory, design constants. modular ratio, neutral axis depth and moment of resistance, balanced, under-reinforced and over-reinforced sections, working stress method of design of singly reinforced beams.

UNIT –II

CONCEPT OF LIMIT STATE DESIGN

Concepts of limit state design – Basic statistical principles – Characteristic loads – Characteristic strength – Partial load and safety factors – representative stress-strain curves for cold worked deformed bars and mild steel bars. Assumptions in limit state design – stress - block parameters – limiting moment of resistance.

DESIGN FOR FLEXURE

Limit state analysis and design of singly reinforced, doubly reinforced, T and L beam sections.

UNIT – III

DESIGN FOR SHEAR, TORSION AND BOND

Limit state analysis and design of section for shear and torsion – concept of bond, anchorage and development length, I.S. code provisions. Design examples in simply supported and continuous beams, detailing.

UNIT –IV

DESIGN OF COLUMNS

General Requirements: Short Columns, Long Columns, Assumptions; Design of axially loaded columns; Design of axially loaded circular columns with helical reinforcement; Interaction diagrams; Design of short columns and slender columns of rectangular section in the following cases : Axial compression and Uni-axial bending & Axial compression and bi-axial bending by using SP:16

UNIT – V

DESIGN OF SLABS

Design of one way slab, Two-way slabs, and continuous slab-IS codal provisions.

NOTE: All the designs to teach in Limit State Method

Following plates should be prepared by the students.

1. Reinforcement particulars of singly and doubly reinforced beams.
2. Reinforcement particulars of T-beams and L-beams.
3. Reinforcement detailing of continuous beams.
4. Reinforcement particulars of columns.
5. Reinforcement particulars of slabs.

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%.

Learning resources:

Text books:

1. Reinforced concrete design, (3rd edition) by Unni Krishna Pillai, S. and Devdas Menon, Tata McGraw-Hill, New Delhi, 2010.
2. Limit State Design, (7th edition) by Punmia, B.C., Laxmi Publications Pvt. Ltd., New Delhi, 2009.
3. Limit State Design of Reinforced concrete, (2nd edition) by Varghese P.C., PHI Learning Pvt. Ltd., New Delhi., 2008.

Reference books:

1. Design of R.C. Structural Elements, (2nd edition) by Bhavikatti S.S., 2009.
2. Fundamentals of reinforced concrete design by Gambhir, M.L., Printice Hall of India Private Ltd., New Delhi.2009.
3. Reinforced concrete structural elements by Purushotham, P., Tata McGraw-Hill, 994.
4. Reinforced concrete design, (3rd edition) by Krishna Raju, N.and Pranesh, R.N., CBS, New Delhi, 2008.
5. Design of concrete structures, (13th edition) by Arthus Nilson, H. and David Darwin., Tata McGraw-Hill, 2010.

e-learning resources:

NPTEL

IS CODE: IS -456 – 2000. This code is permitted in the examination.