3/4 B.Tech. FIFTH SEMESTER

CE5T1   DESIGN AND DRAWING OF CONCRETE STRUCTURES–1   Credits: 4

Lecture: 4 periods/week   **Internal assessment: 30 marks**
Tutorial: 1 period /week   **Semester end examination: 70 marks**

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, slabs, staircases.

Learning outcomes:

At the end of the course the student will have:
- Technical capability for the design of reinforced concrete structural elements.
- Knowledge on flexure, shear & torsion.
- Ability to design and detailing as per codal provisions.

UNIT –I
INTRODUCTION TO CONCEPT OF WORKING STRESS DESIGN:
Materials, Constituents of concrete, recommendations of IS 456 – 2000, grades of concrete, elastic theory, design constants.

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

UNIT –III
DESIGN OF FLEXURE:
Limit state analysis and design of singly reinforced, doubly reinforced, T and L beam sections.

UNIT – IV
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 – V
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.

UNIT –VI

FOOTINGS:
Different types of footings – Design of isolated, square, rectangular and circular footings.

UNIT – VII
SLABS:
Design of one way slab, Two-way slabs, continuous slab-IS codal provisions.

UNIT –VIII
STAIR CASES:
Introduction, Types of stair cases, Loads and load effects on stair slabs, design of stair slabs transversely and longitudinally-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 T-beams and L-beams.
2. Reinforcement detailing of continuous beams.
3. Reinforcement particulars of columns and footings.
4. Detailing of One way, Two way and continuous 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.

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

Web Reference books: NPTEL

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