

INSTITUTE	DIPLOMA STUDIES
PROGRAM	DIPLOMA ENGINEERING (CIVIL ENGINEERING)
SEMESTER	5
COURSE TITLE	ELEMENTARY DESIGN OF RCC AND STEEL SECTIONS
COURSE CODE	09CI0510
COURSE CREDITS	5

Objective:

- 1 To know the design of beam and slab
- 2 To know the design of columns and isolated footing
- 3 To learn the concept of limit state design for tension and compression steel members
- 4 To learn the concept of limit state design of steel beams
- 5 To understand concept of design of RCC elements.
- 6 To know the design of beam and slab.
- 7 To know the design of columns and isolated footing.
- 8 To learn the concept of limit state design for tension and compression steel members.
- 9 To learn the concept of limit state design of steel beams.

Course Outcomes: After completion of this course, student will be able to:

- 1 Get insights of the design steps of RCC and Steel Structures
- 2 Design of singly RCC beam and one way and two way slab
- 3 Design of axially loaded column and isolated footing
- 4 Design of bolted and welded connections
- 5 Design of steel tension members

Pre-requisite of course: basics of applied mechanics and mos

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
3	0	4	50	30	20	25	25

Contents : Unit	Topics	Contact Hours
1	Introduction to RCC structure Introduction to Reinforced Cement Concrete (RCC) , Advantages and limitation of RCC, Necessity of steel as a reinforcing material, Various grades of concrete and steel, , Introduction to IS codes & IS code requirements for design and detailing	4

Contents : Unit	Topics	Contact Hours
2	Design of RCC beam Assumptions for Limit State of Collapse due to Flexure, , Concept of Balance Section, Under Reinforced Section, Over Reinforced Section. , General features of singly reinforced & doubly reinforced beams,, Necessity of providing doubly reinforcements, Design problems of singly-reinforced rectangular beam	6
3	Design of slab Definition and classification of slabs as one-way and two-way slabs, support conditions, main and distribution steel., Specifications regarding spacing and cover for reinforcement, effective, span, minimum reinforcement, Design procedure on design of simply supported one way slab. , Design procedure on design of simply supported two way slab with corners free to lift.	8
4	Design of RCC column and footing Definition and classification of column, Limit state of compression members, Effective length of column., Provisions of IS 456 for minimum steel, cover, maximum steel, spacing of ties etc., Design of axially loaded short column(Square, Rectangular), Design procedure of isolated footings(pad footing only).	6
5	Introduction to steel structure Advantages and limitation of Steel structure , Mechanical properties of structural steel, Stress strain behavior of mild steel and high strength steel, Standard shapes of rolled steel section, , Types of bolts & their use., Advantages and disadvantages of bolted connections, lap and butt joints, modes of failure for bolted joints (in tension, shear and bearing). , Specifications for cross-sectional area, pitch, spacing, gauge, end distance, edge distance, bolt holes for bolted connections,	6
6	Design of bolted and welded connection Simple numerical on design strength of bolt in shear, tension and bearing , Introduction and types of welds (butt and fillet, Advantages and disadvantages of welded connections, size of weld, throat thickness, , Procedure for analysis and design of welded joint (only fillet weld) for members subjected to axial load	6
Total Hours		36

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	Assignment 1 IS code provisions for RCC and Steel structure design	4
2	Assignment 2 Design of singly beams (3 examples)	8
3	Assignment 3 Design of one way and two way slab (4 examples)	8

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
4	Assignment 4 Design of axially loaded column (4 examples), Design of isolated footing (2 examples)	12
5	Assignment 5 Types of bolt and symbols, Types of welded connection , Design of bolted connection plate to plate and plate to angle connection (3 example each), Design of welded connection pate to plate connection only (3 example)	24
Total Hours		56

Textbook :

- 1 Design of RCC structure , R.P. Rethaliya, Atul prakashan, 2022
- 2 Design of Steel Structure, R.P. Rethaliya, Atul prakashan, 2022

References:

- 1 RCC Theory and Design , RCC Theory and Design , M.G shah and kale, Tata McGraw Hill Publisher Co.Ltd New Delhi, 2018
- 2 Design of Steel structures, Design of Steel structures, S.K.Duggal, Tata McGraw Hill Publisher Co.Ltd New Delhi, 2018

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery					
Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking / Creative
20.00	30.00	30.00	20.00	0.00	0.00

Instructional Method:

- 1 The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.
- 2 The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.
- 3 Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory.
- 4 Students will use supplementary resources such as online videos, videos, e-courses, Virtual Laboratory.

Supplementary Resources:

- 1 <https://archive.nptel.ac.in/courses/105/105/105105105/>