

Nirma University
Institute of Technology
School of Engineering
Civil Engineering Department

M.Tech - Civil Engineering (CASAD)

Course Code: 3CL1101

Course Name: Advanced Structural Analysis

Course Outcomes:

At the end of the course, students will be able to -

1. analyze skeletal structures using stiffness system and member approach
2. demonstrate application of stiffness method to special problems
3. apply finite element method for bar and beam problems.

Course Code: 3CL1102

Course Name: Structural Dynamics

Course Outcomes:

At the end of the course, students will be able to -

1. illustrate methodologies to derive dynamic equilibrium equation for structural systems
2. analyze Single Degree of Freedom System subjected to free and forced vibrations
3. determine natural frequencies and mode shapes of Multi Degree of Freedom System and uniform beam.

Course Code: 3CL1103

Course Name: Design of Concrete Structures

Course Outcomes:

At the end of the course, students will be able to -

1. assess gravity and lateral loading on the structures and apply appropriate codal stipulations

2. analyze and design structural elements such as continuous beam, slender column, corbel, deep beam, grid floor and shear wall
3. analyze and design frame structure, slab bridge & water retaining structures and assess serviceability criteria.

Course Code: 3CL1104

Course Name: Design of Steel Structures

Course Outcomes:

At the end of the course, students will be able to -

1. apply plastic method for design of beams and frame
2. evaluate the critical load on beam and column using stability criteria
3. analyze and design castellated beam and industrial shed
4. analyze and design multi-storey building and bridge.

Course Code: 3CL1105

Course Name: Advanced Concrete Technology

Course Outcomes:

At the end of the course, students will be able to -

1. propose usage of appropriate Supplementary Cementitious Materials
2. recommend applications of repair materials and chemical admixtures in field
3. demonstrate different types and techniques of concrete in practice.

Course Code: 3CL1201

Course Name: Finite Element Method for Structural Engineering

Course Outcomes:

At the end of the course, students will be able to –

1. apply theory of elasticity for stress and strain analysis
2. formulate finite element properties for structural mechanics problems
3. analyze continuum problems of solid mechanics domain.

Course Code: 3CL12D101

Course Name: Advanced Foundation Engineering

Course Outcomes:

At the end of the course, students will be able to –

1. examine soil properties through subsurface exploration
2. analyze and design shallow foundation and retaining structures
3. analyze and design deep foundation.

Course Code: 3CL12D102

Course Name: Structural Health Monitoring

Course Outcomes:

At the end of the course, students will be able to –

1. classify the distress in the structures
2. assess the health of structures using static and dynamic field methods
3. relate applications of smart materials in structural health monitoring.

Course Code: 3CL12D103

Course Name: Structural Evaluation and Strengthening

Course Outcomes:

At the end of the course, students will be able to –

1. identify causes and mechanism of distress in structures
2. propose appropriate techniques for damage assessment of structures
3. apply suitable types of repair materials and techniques
4. design strategies for strengthening of structures.

Course Code: 3CL12D104

Course Name: Hydraulic Structures

Course Outcomes:

At the end of the course, students will be able to –

1. outline and model components of hydraulic structures for real-life practice
2. design dam components
3. design canal components.

Course Code: 3CL12D105

Course Name: Design of Masonry Structures

Course Outcomes:

At the end of the course, students will be able to –

1. infer types of masonry elements and mechanical properties of masonry
2. design masonry and reinforced masonry structural elements
3. interpret codal provisions for seismic resistance and strengthening of masonry structures.

Course Code: 3CL12D001

Course Name: Design of Plates and Shells

Course Outcomes:

At the end of the course, students will be able to –

1. evaluate response of thin plate under lateral loading
2. analyze different types of shell subjected to various loading
3. design concrete shell roofs.

Course Code: 3CL12D002

Course Name: Prestressed Concrete Structures

Course Outcomes:

At the end of the course, students will be able to –

1. assess losses and deflection in prestressed concrete structural elements
2. design prestressed concrete structural elements
3. analyze and design composite prestressed concrete structures.

Course Code: 3CL12D003

Course Name: Marine Structures

Course Outcomes:

At the end of the course, students will be able to –

1. analyze and design marine structures
2. plan and design protection work for marine structures
3. assess performance of structures under marine environment.

Course Code: 3CL12D004

Course Name: Earthquake Engineering

Course Outcomes:

At the end of the course, students will be able to –

1. interpret earthquake ground motion and develop response & design spectrum
2. estimate lateral load and its distribution for reinforced concrete and masonry buildings
3. appraise concept of ductility and related codal specification for earthquake resistant design.

Course Code: 3CL12D005

Course Name: Chimney, Silo and Transmission Line Tower

Course Outcomes:

At the end of the course, students will be able to –

1. design chimney structures
2. design storage structures
3. design transmission line tower.

Course Code: 3CL12D006

Course Name: Industrial Structures

Course Outcomes:

At the end of the course, students will be able to –

1. estimate loads and load combinations for industrial structures
2. design elements and systems for industrial structures
3. analyze and design pre-engineered, movable and oscillating structures.

Course Code: 3CL12D007

Course Name: Bridge Structures

Course Outcomes:

At the end of the course, students will be able to –

1. assess different type of loads on substructures and superstructure of the bridge
2. analyze and design superstructure of bridge
3. analyze and design substructure and foundation of bridge.

Course Code: 3CL12D008

Course Name: Nonlinear Analysis of Structures

Course Outcomes:

At the end of the course, students will be able to –

1. classify nonlinearities and select appropriate nonlinear models for different materials
2. evaluate structural response using nonlinear analysis
3. choose appropriate computational techniques for nonlinear systems.

Course Code: 3CL12D009

Course Name: Tall Buildings

Course Outcomes:

At the end of the course, students will be able to –

1. identify various structural systems, materials and assess loading for tall buildings
2. illustrate behaviour of tall buildings subjected to gravity and lateral loading
3. analyze and design tall buildings.

Course Code: 3CL12D010

Course Name: Blast Resistant Structures

Course Outcomes:

At the end of the course, students will be able to –

1. estimate blast load on structures
2. design structural elements against blast loading
3. evaluate progressive collapse potential of structures

Course Code: 3SS1201

Course Name: Research Methodology and IPR

Course Outcomes:

At the end of the course, students will be able to –

1. formulate a research problem for a given engineering domain
2. analyse the available literature for given research problem

3. develop technical writing and presentation skills
4. comprehend concepts related to patents, trademark and copyright.

Course Code: 3CL1202

Course Name: Experimental Techniques in Structural Engineering

Course Outcomes:

At the end of the course, students will be able to –

1. list objectives, scope, techniques and expected outcomes for an experiment
2. develop experimental setup for testing of structural elements
3. interpret outcomes of an experiment.

Course Code: 3CL1203

Course Name: Minor Project

Course Outcomes:

At the end of the course, students will be able to –

1. propose planning of appropriate structural forms
2. analyze and design structures using computational tools
3. build detailed design report and structural drawings.

Course Name Major Project: Part-I (Full Time)

Course Outcomes:

At the end of the course, students will be able to –

1. choose domain of project work related to structural engineering
2. discover appropriate literature and decide objective & scope of the project work
3. solve designated problem through analysis & design and/or experimentation
4. build and discuss the project report.

Course Name: Major Project Part–II (Full Time)

Course Outcomes:

At the end of the course, students will be able to –

1. solve independently problem related to structural engineering
2. dissect appropriate literature to discover possible solution for the identified research problem
3. develop analytical approach and/or experimental program to solve research problem
4. build the project report and discuss outcomes of research problem.