



Technology Training that Works

Structural Design for Non-Structural Engineers

LIVE ONLINE COURSE

THE COURSE

Construction is the largest industry in the world and all structures need to be designed first. Structural engineering deals with the analysis and design aspects required to ensure a safe, functional and economical structure.

During the design process the designer constantly interacts with specialists such as architects and operational managers. Once the design has been finalised, the implementation requires additional people to handle aspects such as statutory approvals, planning, quality assurance and material procurement. The entire exercise can be undertaken in highly-coordinated way only if all participants fully understand the 'project language'. However, in order to understand this language, it is necessary to first have a thorough grasp of the principles of structural analysis and design.

Participants in the live online course will gain a basic knowledge of structural engineering that includes principles of analysis of structures and their application, behaviour of materials under loading, selection of construction materials, and design fundamentals for RCC as well as steel structures. The emphasis has been kept on the determination of the nature and the magnitude of the developed under loads, and the way structures offer resistance to it. Being the most widely used construction materials, RCC and steel has been covered in detail though masonry and timber are also discussed.

YOU WILL LEARN HOW TO:

- Fully understand the role of a structural engineer
- Predict the behaviour of structural members under loading
- Understand the concept of stress functions such as tension, compression, shear and bending
- Perform a basic analysis of statically determinate as well as statically indeterminate structures
- Analyse the deformation of structural members under loading
- Understand the significance of material properties in design
- Undertake the basic design of Reinforced Cement Concrete (RCC) structures
- Undertake the basic design of steel structures
- Undertake the basic design of masonry and timber structural members

PRE-REQUISITES:

Please bring a scientific calculator (or computer) to the workshop to assist with the calculations.



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WHO SHOULD ATTEND?

Anyone associated with the construction industry would benefit from this workshop. In view of the vastness of the sector, the following personnel would typically be able to gain immediate benefit from the workshop.

- Architects
- Building inspectors
- Building maintenance personnel
- Concrete technologists
- Construction supervisors
- Insurance surveyors
- Municipal officials
- Project managers
- Quantity surveyors
- Reinforcement detailers
- Structural fabricators
- Structural rehabilitation staff

COURSE OUTLINE

This is an intensive online course. The course is split up in to two sections – Live sessions and recorded lectures. All 8 hours will be provided upon course completion for review.

LIVE SESSIONS

SESSION ONE

DESIGN OF STEEL STRUCTURES

- Properties of structural steel
- Steel structural sections
- Design of steel structures
- Joints and fasteners for steel structures
- Design of tension members
- Design of compression members
- Design of beams
- Design of truss and allied structures

SESSION TWO

DESIGN OF RCC STRUCTURES

- Properties of concrete
- Principle of reinforced concrete design
- Design norms for reinforced concrete beams
- Design of reinforced concrete slabs
- Design of reinforced concrete foundations
- Design of axially loaded columns
- Pre-stressed concrete
- Multi-storied buildings

SESSION THREE

DESIGN OF MASONRY AND TIMBER STRUCTURES

- Masonry structures
- Design of masonry structures
- Strength of timber
- Design of timber structures



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SESSION FOUR

LIMIT STATE AND PLASTIC DESIGN

- Limit state theory
- RCC design by limit state
- Steel structural design by limit theory

RECORDED LECTURES

RECORDING ONE

INTRODUCTION TO STRUCTURAL ENGINEERING

- Elements of structural design
- Course objectives
- Course outcomes

RECORDING TWO

ANALYSIS OF STATICALLY DETERMINATE STRUCTURES

- Classification of structures
- Types of loads
- Stress in structural members
- Types of supports in structures
- Equilibrium of bodies
- Bending moment and shear force
- Effect of moving loads
- Analysis of pin-jointed frames
- Influence lines

RECORDING THREE

PRINCIPLES OF STRENGTH OF MATERIALS

- Mechanical properties of materials
- Development of internal stresses
- Flexural stresses in beams
- Relationship between horizontal and vertical shear
- Determination of bending shear stress
- Deformation of beams
- Combined stresses
- Analysis of columns

RECORDING FOUR

ANALYSIS OF STATICALLY INDETERMINATE STRUCTURES

- Structural classification based on degree of indeterminacy
- Principle of superposition
- Analysis of statically indeterminate beams
- Multi-span or continuous beams
- Slope deflection method
- Moment distribution method
- Influence line diagram for statically indeterminate structures



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RECORDING FIVE

DESIGN THEORIES AND LOADS

- Stress-strain relationship for different materials
- Design philosophies
- Combination of loads
- Theories of failure

SUMMARY & OPEN FORUM

CLOSING