



Concrete Structural Design



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Introduction:

Reinforced concrete structures are widely used in the industrial sector special in the oil and gas field for onshore.

Therefore, the basis of design for concrete structure for strength, serviceability, and robustness will be discussed in the scope of code concept. So ACI, BS, UBC, and ASCE will be discussed in the scope of practical wise to use the suitable design method to serve our business safety and operability.

The objective of this course is to train engineers to be familiar with using American Concrete Institute Standard ACI and British standard BS. The concept and basics of codes and standards will be introduced concerning the probability of failure specifically in ACI and BS.

The course will cover the basics of design for retaining wall, liquid tanks, foundation under machines, and foundation under steel tanks, separator, KOD. Moreover, the key steps in design and review design will be illustrated

Targeted Groups:

- Civil Engineer
- Structural Engineer
- Architectural Engineer

Course Objectives:

At the end of this course the participants will be able to:

- Explore the modern and effective procedures for the design of reinforced concrete structures in the Oil & Gas industry
- Gain knowledge on calculation for reinforced concrete elements used in the Oil & Gas industry
- Increase the knowledge and assist in using new tools for designing and reviewing the design for a new project or modify the existing one
- Gain knowledge on the design of foundation under all types of vibrating equipment, and the blast design of buildings
- Illustrate the real design issues that may assist the designer in providing the concrete structure that is safe, economical and constructible
- Understand the rule of thumb to check the concrete design with an associated checklist

Targeted Competencies:

- Review of different codes and standards
- The importance of construction and maintenance
- The dynamic analysis and design for concrete in the industrial plant
- Industry practice in the structure design
- Integration between different disciplines in designing
- Effect of sustainable design to enhance project investment life cycle

Course Content:

Unit 1: Introduction to Reinforced Concrete:

- The Fundamentals of Concrete Technology
- Comparison between ACI and BS for Concrete Design
- Principal, Limitations for Different Codes in Concrete ACI, BS codes, European Code
- Codes and Standards Philosophy
- Define the Different Loads on the Building
- Earthquake and Wind Load Effect
- Define Loads of Static and Dynamic Equipment
- Define the Loads on the Foundation of Tanks

Unit 2: First Principals of Structural Reinforced Concrete:

- The Basic Concept of Concrete Design
- The Principal of Concrete Design and Precaution
- Different Structure Systems
- Different Slab Types
- Design of Slab, Beam and Columns
- Loads Applied in a Horizontal Vessel Separators
- The Effect of Thermal Loads in Heaters
- Design of Heater Foundations
- Design of Foundation Under Tower

Unit 3: Geotechnical Problems & Design of Foundations:

- Soil Investigation
- Shallow Foundation Design Philosophy
- Pile Foundation Design Philosophy
- Anchor Bolt Design
- Foundation under Machines Design
- Checklist to Review Foundation under Rotating Equipment
- Precaution in Design Foundation under Vibrating Machines

Unit 4: Design of Special Reinforced Concrete Constructions I:

- Design Blast Resistance Building such as Control Room



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- Control Room Layout and Configuration
- Pipe Rack Configuration
- Define Loads which Affect Pipe Rack
- Pipe Rack Design
- Retaining Walls Design Principals and Checks
- Load and Forced in Retaining Walls

Unit 5: Design of Special Reinforced Concrete Constructions II:

- Design for Reinforced Concrete Liquid Tanks
- Structure System for Concrete Tanks
- Circular and Rectangular Tank
- Ring Beam Design for the Circular Tank
- Maintenance and Repair in Concrete Structure
- Integrity and Maintenance Management System Principal