Unit 2: Construction Technology

Unit code	**Y/615/1388**
Unit type	**Core**
Unit Level	**4**
Credit value	**15**

Introduction

The basic principles of construction technology have not changed for hundreds of years. However, the materials and techniques used to achieve these basic principles are constantly evolving; to enable the construction industry to deliver better quality buildings. Scarcity of resources and the continuing demand of more sophisticated clients, end users and other stakeholder interests, are driving the construction industry to provide buildings which facilitate enhanced environmental and energy performance, and greater flexibility, in response to ever increasing financial, environmental, legal and economic constraints

This unit will introduce the different technological concepts used to enable the construction of building elements; from substructure to completion, by understanding the different functional characteristics and design considerations to be borne in mind when selecting the most suitable technological solution.

Topics included in this unit are: substructure, superstructure, finishes, building services and infrastructure components. On successful completion of this unit a student will be able to analyse scenarios and select the most appropriate construction technology solution.

Learning Outcomes

By the end of this unit students will be able to:

1. Explain the terminology used in construction technology.
2. Describe the different techniques used to construct a range of substructures and superstructures, including their function and design selection criteria.
3. Identify the different types of civil engineering/infrastructure technology used in support of buildings.
4. Illustrate the supply and distribution of a range of building services and how they are accommodated within the building.

Essential Content

LO1 **Explain the terminology used in construction technology**

Types of construction activity:

Low, medium and high rise buildings, domestic buildings, for example house, flats and other multi-occupancy buildings, commercial buildings, for example offices and shops, industrial buildings, for example, light industrial and warehouses.

Construction technology terminology:

Loadbearing and non-loadbearing, structural stability, movement and thermal expansion, durability, weather and moisture resistance, aesthetics, fire resistance, sound insulation, resistance to heat loss and thermal transmission, dimensional co-ordination and standardisation, sustainability and scarcity of availability, on-site and off-site construction, legal requirements, buildability, health and safety.

Construction information:

Drawings, specification, schedules, CAD, Building Information Modelling (BIM).

Sustainability:

Supply chain.

Lifecycle.

'Cradle-to-grave'.

'Cradle-to-cradle'.

Circular economies.

LO2 **Describe the different techniques used to construct a range of substructures and superstructures, including their function and design selection criteria**

Pre-design studies:

Desk-top, Site Reconnaissance, Direct Soil Investigation techniques.

Substructure functions and design considerations:

Different methods for gathering disturbed and undisturbed samples, influence of soil type on foundation design, including water and chemical content, potential loads, position of trees and the impact on foundations, economic considerations, legal considerations (health and safety work in excavations), building regulations, plant requirements.

Types of foundations:

Shallow and deep foundations, strip and deep strip foundations, pad foundations, raft foundations, piled foundations (replacement and displacement piles).

Types of superstructure:

Traditional construction, framed construction: steel, composite concrete and steel, timber.

Walls; roofs; structural frames; claddings; finishes; services.

Walls:

External walls: traditional cavity, timber frame, lightweight steel.

Cladding: panel systems, infill systems, composite panel systems, internal partition walls.

Roofs:

Pitched and flat roof systems, roof coverings.

Floors:

Ground floors, intermediate floors, floor finishes.

Staircases:

Timber, concrete, metal staircases, means of escape.

Finishes:

Ceiling, wall and floor finishes.

LO3 **Identify the different types of civil engineering/infrastructure technology used in support of buildings**

Site remediation and de-watering:

Contamination management: cut-off techniques, encapsulation.

Soil remediation: stone piling, vibro-compaction.

De-watering: permanent sheet piling, secant piling, grout injection freezing, temporary techniques, such as pumping, wells, electro-osmosis.

Substructure works:

Basement construction: steel sheet piling, concrete diaphragm walls, coffer dams, caissons, culverts.

Superstructure works:

Reinforced concrete work: formwork, reinforcement, fabrication, concrete, steel.

LO4 **Illustrate the supply and distribution of a range of building services and how they are accommodated within the building**

Primary service supply

Cold water, gas, electricity.

Services distribution

Hot and cold water, Single phase and 3-phase electricity, air conditioning ductwork.

Services accommodation:

Raised access flooring, suspended ceilings, partitioning, rising ducts.

Learning Outcomes and Assessment Criteria

<table>
<tr><th>Pass</th><th>Merit</th><th>Distinction</th></tr>
<tr><td colspan="2">LO1 Explain the terminology used in construction technology</td><td rowspan="3">LO1
D1 Evaluate how the functional characteristics and design selection criteria impact on the eventual design solution</td></tr>
<tr><td>P1 Describe the differences between residential, commercial and industrial buildings.
P2 Explain how the functional characteristics and design selection criteria are informed by proposed building use.
P3 Discuss the ways in which sustainability can be promoted in building projects.</td><td>M1 Apply the terminology used in construction technology to a given building construction project.</td></tr>
<tr><td colspan="2">LO2 Describe the different techniques used to construct a range of substructures and superstructures, including their function and design selection criteria</td></tr>
<tr><td>P4 Describe the pre-design studies carried out and types of information collected for a given construction site.
P5 Explain the functional characteristics and design criteria for primary and secondary elements of a building substructure and superstructure.</td><td>M2 Analyse how site conditions impact on the design of foundations.
M3 Illustrate how the component parts of an element allow it to fulfil its function.</td><td rowspan="3">LO2 LO3
D2 Prepare a design report identifying superstructure, substructure and civil engineering structures necessary for a given building construction project.</td></tr>
<tr><td colspan="2">LO3 Identify the different types of civil engineering/infrastructure technology used in support of buildings</td></tr>
<tr><td>P6 Describe techniques used for remediating the site prior to construction commencing.
P7 Describe the types of substructure works carried out by civil engineers.</td><td>M4 Compare different types of structural frame used to carry the primary and secondary elements of the superstructure.</td></tr>
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Pass	Merit	Distinction
LO4 Illustrate the supply and distribution of a range of building services and how they are accommodated within the building		
P8 Describe the supply arrangements for primary services. **P9** Explain the distribution arrangements for primary services.	**M5** Demonstrate the elements of the superstructure used to facilitate the primary services.	**LO4** **D3** Appraise how the distribution of the primary services impact on the overall design of the building.

Recommended Resources

Textbooks

BRYAN, T. (2010) *Construction Technology: Analysis and Choice*, Oxford: Blackwell.

CHARTLETT, A. and Maybery-Thomas, C. (2013) *Fundamental Building Technology.* 3rd Ed. Abingdon: Routledge.

CHUDLEY, R. et al. (2012) *Advanced Construction Technology*. 5th Ed. Harlow: Pearson Education Limited.

CHUDLEY, R. and Grenno, R. (2016) *Building Construction Handbook*. Abingdon: Routledge.

FLEMING, E. (2005) *Construction Technology: An Illustrated Introduction*. Oxford: Blackwell.

Links

This unit links to the following related units:

Unit 3: Science & Materials

Unit 6: Construction Information (Drawings, Detailing, Specification)

Unit 7: Surveying, Measuring & Setting Out

Unit 14: Building Information Modelling

Unit 15: Principles of Refurbishment

Unit 18: Principles of Structural Design

Unit 25: Management for Complex Buildings

Unit 27: Construction Technology for Complex Buildings

Unit 35: Alternative Construction Methods

Unit 46: Advanced Materials