

DESIGN ENGINEERING STRUCTURES

UNIT CODE: CON/OS/CET/CR/05/6/A

UNIT DESCRIPTION

This unit specifies the competencies required to design engineering structures. This involves load estimation, designing structural elements, assessing of cost effectiveness of designs, analysing site test data and modifying structural designs.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT These describe the key outcomes which make up workplace function (to be stated in active)	PERFORMANCE CRITERIA These are assessable statements which specify the required level of performance for each of the elements (to be stated in passive voice) <i>Bold and italicized terms are elaborated in the Range</i>
1. Calculate load estimates	1.1 <i>Intended use</i> of the structure is determined as per client needs 1.2 <i>Layout</i> of the structure is created from the architectural drawings as per design standards and structural use 1.3 <i>Codes of practice/manuals</i> required to obtain the required loading are determined based on structural use. 1.4 Load analysis/estimation is carried out as per code procedures
2. Design structural elements	2.1 <i>Design methods</i> are selected based on cost effectiveness and client needs as per code standards 2.2 <i>Design software</i> are determined as per organizational standards. 2.3 <i>Structural elements</i> are designed as per design standards
3. Assess cost effectiveness of the design	3.1 Alternative cost saving design methods and materials are determined based on site conditions 3.2 Preliminary designs are reviewed to determine elements that can be reduced or replaced as per design standards.
4. Modify structural designs	4.1 <i>Preliminary designs</i> are modified to suite site conditions as per code of practice standards. 4.2 Preliminary hypotheses are retested for practicality to site conditions as per design standards 4.3 New hypotheses are established to support new designs and reflect site conditions as per the required conditions

RANGE

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

VARIABLE	RANGE
	May include but are not limited to:

1	Intended use	<ul style="list-style-type: none"> • Commercial • Residential • Industrial
2	Layout	<ul style="list-style-type: none"> • Foundation layout • Beam layout • Slab layout • Column layout
3	Codes of practice/manuals	<ul style="list-style-type: none"> • British Standard Codes • Euro codes
4	Design methods	<ul style="list-style-type: none"> • Frame Analysis • Wall Bearing structural analysis • Wind analysis • Earthquake analysis
5	Software	<ul style="list-style-type: none"> • Excel spreadsheets • AutoCAD Structural Design Software • Prokon • Revit • Rendering software • Robot
6	Structural elements	<ul style="list-style-type: none"> • Slabs • Columns • Beams • Walls • Foundations • Stairs
7	Preliminary designs	<ul style="list-style-type: none"> • Slab design • Beam design • Column design

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit of competency.

Skills

The individual needs to demonstrate the following skills:

- Structural design methods
- Load analysis methods and procedures
- Engineering Surveying
- Layout design
- Data interpretation and analysis
- Computer Aided Design
- Measurement
- Critical thinking
- Problem solving
- Interpersonal

Knowledge

The individual needs to demonstrate knowledge of:

- Engineering CAD software
- Codes of practice.
- Quantitative data analysis
- Research methods
- Engineers Code of Ethics
- Finance
- Occupational safety and health
- Materials Science
- Laboratory operation and procedures
- Building regulations
- Basic Mathematics and Physics
- Geography
- Basic Survey Knowledge
- Engineers Act

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

<p>1. Critical Aspects of Competency</p>	<p>Assessment requires evidence that the candidate:</p> <p>1.1 Created a layout of the structure from architectural drawings</p> <p>1.2 Determined the codes of practice required to obtain relevant loadings</p> <p>1.3 Analysed loading for the structure</p> <p>1.4 Selected a cost effective design method</p> <p>1.5 Determined software to be used in the design process</p> <p>1.6 Designed structural elements</p> <p>1.7 Conducted research and selected alternative design methods and materials</p> <p>1.8 Established hypotheses for use in modifying preliminary design</p> <p>1.9 Reviewed preliminary designs and modified the design to reflect site conditions</p>
<p>2. Resource Implications</p>	<p>The following resources should be provided:</p> <p>2.1 Computer laboratories</p> <p>2.2 Civil engineering software</p> <p>2.3 Civil Engineering laboratories</p> <p>2.4 Writing materials</p> <p>2.5 Legal documents (Engineers Act, NCA Act, Engineers code of ethics)</p> <p>2.6 Civil engineering codes of practice and manuals</p> <p>2.7 Qualified trainers</p>
<p>3. Methods of Assessment</p>	<p>Competency in this unit may be assessed through:</p> <p>3.1 Observation</p> <p>3.2 Projects</p> <p>3.3 Written tests</p>

	3.4 Oral presentation
4. Context of Assessment	Competency may be assessed on the job, off the job or a combination of these. Off the job assessment must be undertaken in a closely simulated workplace environment.
5. Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

easytvvet.com