APPLY PRINCIPLES OF STRUCTURAL DESIGN

UNIT CODE: CON/OS/ARC/CC/07/6/A

UNIT DESCRIPTION

This unit describes the competence required to analyze structural principles, evaluate design materials, design structural elements and select optimal structural design

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT **These describe the** Key outcomes which make up workplace function.	**PERFORMANCE CRITERIA** **These are assessable statements which specify the required level of performance for each element.** ***(Bold and italicized terms are elaborated in the Range)***
1. Analyze structural principles	1.1 Structural analysis of beams, trusses and frames is determined as per ***standard manuals*** 1.2 Deflection analysis of beams trusses and frames is determined as per standard manuals 1.3 Stability analysis of beams, trusses and frames is determined as per standard manuals 1.4 Column analysis is performed 1.5 Loads and load paths are computed as per concepts 1.6 Structural analysis is performed using computer aided design software
2. Evaluate design materials	2.1 ***Design materials*** are identified based on their properties and codes 2.2 Design materials are tested as per the ***structural principles***
3. Design structural elements	3.1 Structural elements are identified as per codes 3.2 ***Structural elements*** are designed as per the codes and structural principles
4. Select optimal structural design	4.1 Structural arrangement is performed based on quality and performance 4.2 Structural elements are costed 4.3 Structural elements are selected based on quality and performance

RANGE

Variable	**Range**
1. Standard manuals may include but not limited to:	• BS (British) Standards • Euro code

	• KEBS
2. Design materials may include but not limited to:	• Masonry • Timber • Steel • Concrete • Composite materials • Plastic • Glass
3. Structural principles concrete may include but not limited to:	• Equilibrium • Geometric stability • Strength and rigidity
4. Structural elements may include but not limited to:	• Columns • Beams • Trusses • Plates • Shells • Arches

REQUIRED KNOWLEDGE

- Occupational health and safety procedures
- Principles of structural design
- Engineering mathematics
- Workshop technology
- Structural elements
- Structural materials
- Costing
- Design software
- Carpentry and joinery
- Technical drawing
- Surveying
- Construction materials, tools and equipment

SKILLS

- Measuring
- Costing
- Drawing and design skills
- ICT skills
- Interpretation of structural designs
- Precision skills
- Planning and organizing
- Analytical skills

- Management skills
- Mathematical skills
- Observation skills

EVIDENCE GUIDE

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

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1 Observed safety precautions 1.2 Analyzed structural principles 1.3 Performed structural analysis using computer aided design software 1.4 Identified and tested design materials 1.5 Identified and designed structural elements 1.6 Selected optimal structural design
2. Resource Implications	The following resources should be provided: 2.1 Access to relevant workplace or appropriately simulated environment where assessment can take place 2.2 Materials relevant to the proposed activity or tasks
3. Methods of Assessment	Competency may be assessed through: 3.1 Observation 3.2 Oral questioning 3.3 Written tests 3.4 Drawings 3.5 Practicals
4 Context of Assessment	Competency may be assessed 4.1 on the job 4.2 off the job 4.3 During industrial Attachment
5 Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.