

STRUCTURAL ANALYSIS PRINIPLES I

UNIT CODE: 0732 551 19A

TVET CDACC UNIT CODE: CON/CU/BUT/CC/06/6/MA

UNIT DURATION: 80 Hours

Relationship to Occupational Standards

This unit addresses the Unit of Competency: **Apply structural analysis principles I.**

Unit Description

This Unit describes the principles required to perform structural Analysis. It involves Computing stresses and strain, describing composite materials, computing shear force and bending moments, determining properties of sections, Computing horizontal shear stress distribution and theory of simple bending.

Summary of Learning Outcomes

1. Compute stress and strain
2. Describe composite materials
3. Compute shear force and bending moments
4. Determine properties of sections
5. Compute Horizontal shear stress distribution
6. Compute Theory of simple bending

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Compute stress and strain	1.1 Definition of Stress and strain 1.2 Stress and strain calculations 1.3 Stress-strain diagram's	• Practical assessment • Projects • Portfolio of evidence • Oral assessment • Third party report • Written assessment
2. Describe composite materials	2.1 Composite materials 2.2 Derivation of compatibility and equilibrium equations 2.3 Composite materials Problems 2.4 Composite material forces	• Practical assessment • Projects • Portfolio of evidence • Oral assessment • Third party report • Written assessment
3. Compute shear force and bending moments	3.1 Types of supports and loads 3.2 Shear and bending forces 3.3 Shear force diagrams 3.4 Bending moment diagrams	• Practical assessment • Projects • Portfolio of evidence • Oral assessment • Third party report • Written assessment
4. Determine properties of sections	4.1 Basic properties of section - beam 4.1.1 Area 4.1.2 centroid 4.1.3 Moment of inertia 4.2 Angle section properties	• Practical assessment • Projects • Portfolio of evidence • Oral assessment • Third party report • Written assessment

	4.2 .1 Structural section, including dimension, mass, section area. 4.3 Properties of steel section 4.3.1 Structural steel section including I-section, channels. 4.4 Properties of common plane section.	
5.Compute Horizontal shear stress distribution	5.1 Introduction to shear stress 5.2 Relationship between shear force, bending moment and shear stress 5.3 Shear stress formula and computation 5.4 Plotting shear force distribution across a section	• Practical assessment • Projects • Portfolio of evidence • Oral assessment • Third party report • Written assessment
6.Compute Theory of simple bending	6.1 Definition and basic principles of bending in beams. 6.2 Bending moment and shear force 6.3 derivation and explanation of simple bending equations 6.4 concept of neutral axis and and section modulus 6.5 analysing stress distribution in different cross section shapes	• Practical assessment • Projects • Portfolio of evidence • Oral assessment • Third party report • Written assessment

Suggested Methods of Instruction

- Demonstration
- Practical work

- videos
- Projects
- Site visits
- group discussions

Recommended Resources for 25 trainees

S/No.	Category/Item	Description/ Specifications	Quantity	Recommended Ratio (Item: Trainee)
A	Learning Materials			
1.	Textbooks	Recommended publisher	8 pcs	1:3
2	White board	For trainer's use	1	-
B	Learning Facilities & infrastructure			
1	Lecture/theory room	72 Square Meter	1	1:25
2	Computer Lab	96 Square Meter	1	1:25
C	Consumable materials			
1.	Ink	Assorted Colours for trainer's use	500ml per term.	-
2	White board Marker	Refillable type	10 pcs per term	-
D	Tools and Equipment			

1.	Calculator	Scientific	25 pcs	1:1
2.	Rulers	Clear	25 pcs	1:1
3.	Mathematical set	Oxford	25 pcs	1:1
4.	Computer	Desktop	13 pcs	1:2
5.	Trainer Drawing kit	Trainer Use	1 pc	-
6.	PPEs	Trainer Use (dust coat)	1 pc	-
7.	Pen	Trainee	1 pc	1:1

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