

REPUBLIC OF SOUTH AFRICA

SYLLABUS

FOR

BUILDING AND CIVIL TECHNOLOGY N3

CODE NUMBER: 11010273

Examination Instruction no. 14/97

DATE OF IMPLEMENTATION:
May 1997

FIRST EXAMINATION DATE:
August 1997

BUILDING AND CIVIL TECHNOLOGY N3

1. AIMS

1.1 General aims

After having completed the instructional offering Building and Civil Technology, the student must have a satisfactory building knowledge to enter into a training programme of the building industry successfully.

1.2 Specific aims

The student must be taught the following: foundations; site work; brickwork; structural elements; plumbing; electrical work; finishing; outer surface finishing; beams and framed structures; site management; cost estimation.

2. DURATION OF INSTRUCTIONAL OFFERING

Full-time: 1 trimester

Part-time: 1 trimester

3. EVALUATION

The students must be evaluated continually.

4. EXAMINATION

4.1 One three hour examination paper, comprising 100 marks and covering the complete syllabus will be written at the end of each trimester.

4.2 The student must obtain 40% in the examination to pass the instructional offering.

4.3 Knowledge, comprehension, application and analysis, synthesis and evaluation (ASE) are important aspects in determining the level of difficulty and should be as follows:

KNOWLEDGE	COMPREHENSION	APPLICATION	ASE
60%		30%	10%

5. GENERAL INFORMATION

5.1 All work must conform to:

- * The latest National Building Regulations
- * All relevant SABS-codes

5.2 The correct use of suitable technical and subject terminology must be stressed.

5.3 Neat, labelled freehand drawings must be made when drawings are required. The student's artistic ability is not to be evaluated.

5.4 The student should be taught to relate the length of his answer to the marks allocated to the question.

5.5 All safety aspects applicable to the learning content must be brought under the attention of the students.

5.6 The weighted value of a module:

- * Gives an indication of the percentage of the total content of the work which is covered by the module
- * Gives an indication of the percentage of the time available for the instructional offering, which is to be spent on the module
- * Gives an indication of the percentage of the total of the marks for an examination paper, which is to be allocated to the module

6. LEARNING CONTENT

6.1 The modules for Building and Civil Technology N3 consist of the following:

MODULE	THEME	WEIGHT VALUE
1	Site management	8
2	Legislation	8
3	Site work	8
4	Foundation	8
5	Concrete	8
6	Masonry	8
7	Structural elements	8
8	Water supply and drainage	8
9	Electrical	8
10	Finishing	8
11	External works	8
12	Cost estimation	12
	TOTAL	100

7. DETAILED SYLLABUS

MODULE 1: SITE MANAGEMENT

On completion of this module, students should be able to:

1.1 Describe and discuss the functions and responsibilities of the following in respect of the erection of a single-storey building:

- * Owner
- * Architect/draughtsman
- * Engineer
- * Local authority
- * Contractor
- * Site supervisor
- * Contracts manager
- * Clerk of works

1.2 Describe management procedure with regard to:

- * Planning
- * Leadership
- * Control
- * Motivation
- * Communication

MODULE 2: LEGISLATION

On completion of this module students should be able to describe the stipulations of:

2.1 The Occupational Health and Safety Act relating to:

- * General duties of employers to their employees
- * General duties of employers regarding listed work
- * General duties of employees at work
- * Function of health and safety committees

2.2 The Compensation for Occupational Injuries and Diseases Act relating to:

- * Right of employee to employer
- * Notice of accident by employee to employer
- * Notice of accident by employee to commissioner
- * Employer to keep record

2.3 The Labour Relations Act with regard to:

- * Unfair labour practices
- * Dismissal
- * Disciplinary and grievances procedures
- * Conditions of employment

MODULE 3: SITE WORK

On completion of this module students should be able to:

- 3.1 Describe and discuss with the aid of freehand drawings the the setting-out procedure and general methods followed to set out a rectangular building with a maximum number of four rooms by means of profile boards. The 3-4-5 method of setting out a square and the measuring of diagonal lines to test for squareness, is included.
- 3.2 Describe and discuss with the aid of freehand drawings the horizontal checks of foundation excavations with the aid of instruments, such as a spirit level and straight edge, pipe level (U tube), and levelling instruments. Provision must be made for step foundations.
- 3.3 Describe and discuss with the aid of freehand drawings the prevention of excavations from collapsing
- 3.4 Describe and discuss with the aid of freehand drawings of keeping excavations free of water by means of:
 - * Sub-soil drainage
 - * Well points
- 3.5 Describe and discuss with the aid of freehand drawings the layout, erection and safe use of the following types of scaffolding:
 - * Steel trestles and scaffold frames
 - * Independent scaffolding
 - * Mobile scaffolding
- 3.6 Compare the uses of the scaffolding listed in paragraph 3.5

MODULE 4: FOUNDATIONS

On completion of this module, students should be able to describe with the aid of drawings:

4.1 The function of the foundations

4.2 How the design of foundations are influenced by the following soil conditions:

- * Sandy
- * Clay
- * Filled
- * Swampy
- * Rocky

4.2 The use, layout and construction detail particulars of:

- * Strip foundation with or without steel reinforcement
- * Float foundation (raft foundation)
- * Isolated and combined column foundation
- * Cantilever column foundations
- * The use of ground beams with column foundations
- * In-situ pile foundations

4.3 The principles and uses of underpinning

MODULE 5: CONCRETE

On completion of this module students should be able to:

5.1 Describe and discuss the following properties of concrete:

- * Bonding and hardening
- * Factors that influence hardening relating to:
 - Age
 - Curing
 - Type of concrete
 - Cement/water ratio
 - Mixture ratio
 - Compaction

5.2 Describe and discuss the following with regard to concrete:

- * Cement
 - Composition
 - Handling and storing
- * Aggregates
 - Reasons for use
 - Types
 - Properties
 - Grading
- * Water
 - Requirements of water in concrete mixtures

5.3 Describe and discuss the manufacturing of concrete in respect of the following:

- * Composition, classification and uses
- * Measuring quantities
- * Mixing of concrete

5.4 Describe concrete in respect of the following:

- * Transportation of concrete
- * Casting of concrete
- * Agitating and curing

5.5 Describe and discuss with the aid of drawings, and explain the reasons for executing the following concrete tests:

- * Workability (slump test)
- * Strength (test cubes of 150 mm)

5.6 Describe and discuss mortar (dagha) and plaster in respect of the following:

- * Composition and application

5.7 Describe and discuss reinforced concrete with regard to:

- * The purpose of using steel reinforcement in concrete
- * The types of steel reinforcement with regard to:

- Mild steel
- High tensile steel

5.8 Explain the concepts of cover for steel reinforcement with regard to:

- * Foundations
- * Superstructures

MODULE 6: MASONRY

On completion of this module students should be able to:

6.1 Describe the function of walls under the following headings:

- * Strength of walls
- * Resistance to dampness
- * Thermal insulation
- * Sound insulation
- * Fire resistance

6.2 Describe the difference in the manufacture of clay bricks and cement blocks

6.3 Describe the following:

- * Mortar selection for brickwork
- * Mortar selection for blockwork
- * Cavity walls
- * Damp proof courses
- * Pointing and jointing

MODULE 7: STRUCTURAL ELEMENTS

On completion of this module students should be able to describe and discuss with the aid of freehand drawings:

7.1 Structural timber with regard to:

- * Grading according to SABS
- * Use of the various grades

7.2 Structural steel with regard to:

- * Types of structural profiles and their general uses
- * Methods of joining and uses
 - Bolt joints
 - Welded joints (butt and corner only) with symbols
- * Connections
 - Base plate and column connections
 - Beam and column connections
 - Beam and beam connections
- * Erection of steel structures
 - Fixing in position to concrete base

MODULE 8: WATER SUPPLY AND DRAINAGE

On completion of this module students should be able to identify and illustrate:

8.1 Plumbing symbols and abbreviations

8.2 The cold and hot-water installation in a house, from the water meter to the supply points with the following heating units:

- * Combination geyser
- * Pressure valve

8.3 The plan and setting out of a sewerage layout with all abbreviations for a house

MODULE 9: ELECTRICAL WORK

On completion of this module students should be able to identify and illustrate:

9.1 The use of symbols for the following electrical components in a house installation:

- * Distribution box
- * Earthing
- * Power networks
- * Heating appliances
- * Lighting

9.2 The circuit diagrams with the following:

- * main distribution box
- * earth leakage relay
- * heating appliances
- * wall plugs
- * lights control from one or two points

MODULE 10: FINISHING

On completion of this module students should be able to describe and discuss with the aid of freehand drawings:

10.1 The floor finishes with regard to:

* Use and construction particulars of:

- Wooden suspension floors
- Parquet
- Granolithic
- PVC tiles
- Clay tiles

10.2 The wall finishes with regard to:

* The use, preparation and application of the following:

- Panelling
- Piles
- Plaster

10.3 Other finishes with regard to preparation of metal and wood surfaces and application of paint and varnish.

MODULE 11: EXTERNAL WORKS

On completion of this module students should be able to describe with the aid of freehand drawings:

11.1 The purpose, preparation of surfaces, edge finishes and placing of paving blocks or bricks

11.2 The following road building terms:

- * Formation
- * Sub base
- * Base
- * Base course
- * Wearing course
- * Transverse drop
- * Channel

MODULE 12: COST ESTIMATION

On completion of this module, students should be able to:

- 12.1 Calculate the following quantities for a building with a maximum of two rooms:
- * Volume of excavations, bulking must be taken into consideration
 - * Cement, stone and sand for the foundation and concrete floor slab, with given unit quantities
 - * Bricks, cement and sand for up to one-and-a-half brick walls
- 12.2 Calculate the construction costs of the items in paragraph 12.1 with given unit costs of materials and labour
- 12.3 Describe the concept of profit and loss with regard to aspects listed in paragraph 12.1