

20.2.0 BUILDING SERVICES

20.2.1 Introduction

This module unit is designed to equip the trainee with knowledge, skills and attitudes necessary for simple installation and maintenance of building, mechanical and electrical services.

The trainee must have knowledge of building construction methods.

20.2.2 General Objectives

By the end of the module unit, the trainee should be able to:

- a) Carry out simple installation of mechanical and electrical services
- b) Apply safety requirements in building services

20.2.3 Module Unit Summary and Time Allocation

Building Services

Code	Sub Module Units	Content	Total (Hours)		
			Theory	Practice	Total
20.2.01	Welding and Fabrication	<ul style="list-style-type: none">• Definitions• Materials• Welding and soldering• Safety regulations	2	8	10
20.2.02	Cold and Hot Water Supply Systems	<ul style="list-style-type: none">• Sources of water• Materials, tools and equipment• Cold and Hot water systems• Sanitary appliances and fittings	6	10	16
20.2.03	Drainage Systems and Rainwater Harvesting	<ul style="list-style-type: none">• Definitions• Materials and tools• Drainage systems• Disposal system• Rain water goods	4	10	14
20.2.04	Gas Supply	<ul style="list-style-type: none">• Materials and tools• Tools and equipment• Installation• Safety	4	12	16

Code	Sub Module Units	Content	Total (Hours)		
			Theory	Practice	Total
20.2.05	Ventilation	<ul style="list-style-type: none"> • Criteria • Ventilation types • Ventilation requirements • Installation 	6	14	20
20.2.06	Fire Fighting	<ul style="list-style-type: none"> • Types of fire • Methods of fire fighting • Fire fighting equipment • Safety regulations 	2	4	6
20.2.07	Electrical Services	<ul style="list-style-type: none"> • Tools • Safety regulations • Types of wiring systems • Power distribution in premises 	5	12	17
Total			29	70	99

20.2.01 WELDING AND FABRICATION

20.2.01C Competence

The trainee should have the ability to fabricate and weld items using arc and gas welding and interpret working drawings.

Theory

20.2.01T0 *Specific Objectives*

By the end of the sub-module unit, the trainee should be able to:

- a) define terms used in welding and fabrication
- b) identify different types of materials used in fabrication
- c) explain the process of arc and gas welding
- d) state safety regulations to be observed when welding

Content

20.2.01T1 Definition

- i) welding
- ii) fabrication

20.2.01T2 Forms of materials used in fabrication

20.2.01T3 Welding methods

- i) arc welding
- ii) gas welding
- iii) soldering

20.2.01T4 Safety

- i) personal safety
- ii) workplace safety

20.2.01T5 Materials used in fabrication

- i) sheet metal
- ii) plates
- iii) rods
- iv) sections

Practice

20.2.01P0 *Specific Objectives*

By the end of the sub-module unit, the trainee should be able to:

- a) prepare materials and equipment for quality joints
- b) carry out welding and soldering operations correctly

Content

20.2.01P1 Preparation of materials and equipment

20.2.01P2 Welding and soldering

Suggested

Teaching/Learning Activities

- Lecture
- Demonstration
- Site visits
- Discussions
- Practical exercises

Suggested Teaching/Learning Resources

- Charts/manuals
- Text books
- Materials and tools

Suggested Assessment Methods

- CATs
- Assignments
- Practical assignments
- Projects

20.2.02 COLD AND HOT WATER SUPPLY

20.2.02C Competence

- The trainee should have the ability to:
- Identify sources of water
 - Select materials, tools and equipment
 - Install a cold and hot water system

Theory

- 20.2.02T0 *Specific Objectives*
By the end of the sub-module unit, the trainee should be able to:
- state sources of water
 - identify materials, tools and equipment used in cold and hot water supply systems

- install cold and hot water systems
- identify and install sanitary appliances

Content

- 20.2.02T1 Sources of water
i) wells/springs
ii) surface water
iii) rain water
- 20.2.02T2 Materials, tools and equipment
- 20.2.02T3 Cold and hot water systems
- 20.2.02T4 Sanitary appliances and fittings

Practice

- 20.2.02P0 *Specific Objectives*
By the end of the sub-module unit, the trainee should be able to:
- select suitable water sources
 - demonstrate use of tools and equipment
 - install cold and hot water systems
 - install sanitary appliances

Content

- 20.2.02P1 Water sources
- 20.2.02P2 Materials, tools and equipment
- 20.2.02P3 Hot and cold water systems
- 20.2.02P4 Sanitary appliances

	<i>Suggested Teaching/Learning Activities</i>		Theory
	<ul style="list-style-type: none"> - Lectures - Discussions - Demonstrations - Excursions 	20.2.03T0	<i>Specific Objectives</i> By the end of the sub-module unit, the trainee should be able to: <ul style="list-style-type: none"> a) define the terms used in drainage systems b) select materials and tools c) describe the types of drainage systems d) describe installation of rainwater goods e) describe the various treatment systems
	<i>Suggested Teaching/Learning Resources</i>		
	<ul style="list-style-type: none"> - Textbooks - Internet - Manuals/charts - Journals - Materials and tools 		
	<i>Suggested Assessment Methods</i>		
	<ul style="list-style-type: none"> - CATs - Assignments - Practical assessment - Projects 		
20.2.03	DRAINAGE SYSTEMS AND RAIN WATER HARVESTING	20.2.03T1	<i>Content</i> Definitions <ul style="list-style-type: none"> i) two pipe system ii) one pipe system
		20.2.03T2	Materials and tools
		20.2.03T3	Types of systems <ul style="list-style-type: none"> i) combined ii) partially separate iii) separate
20.2.03C	Competence	20.2.03T4	Disposal systems <ul style="list-style-type: none"> i) cess pools ii) septic tank iii) soak pits
	The trainee should have the ability to:	20.2.03T5	Rain water goods <ul style="list-style-type: none"> i) gutter ii) down pipes and fittings iii) brackets
	<ul style="list-style-type: none"> i) Select appropriate tools and materials ii) Install drainage systems iii) Install rain water harvesting goods 		

Practice

- 20.2.03P0 *Specific Objectives*
By the end of the sub-module unit, the trainee should be able to:
- identify materials and tools
 - install and test drainage systems
 - construct disposal systems
 - install rainwater goods

Content

- 20.2.03P1 Materials and tools
20.2.03P2 Drainage systems
20.2.03P3 Disposal systems
20.2.03P4 Installation of rain water goods

Suggested Teaching/Learning Methods

- Discussions
- Lectures
- Demonstrations

Suggested Teaching/Learning Resources

- Text books
- Internet
- Materials and tools

Suggested Assessment Methods

- CATs
- Assignments
- Practicals
- Projects

20.2.04 GAS SUPPLY

20.2.04C Competence

- The trainee should have the ability to:
- Select and use tools and materials for gas supply
 - Install a gas supply system

Theory

- 20.2.04T0 *Specific Objectives*
By the end of the sub-module unit, the trainee should be able to:
- identify materials and tools for gas installation
 - describe the procedure of installing gas supply system to a house
 - state safety regulations in gas supply installation

Content

- 20.2.04T1 Materials and tools
- copper pipes
 - steel pipes
 - fittings and valves
 - Poly propylene (PPR)
 - hack saw
 - pipe wrenches
 - adjustable spanner
 - vice
 - measuring tap

- x) flaring tools
 - xi) blow lump
 - xii) polyfusion apparatus
- 20.2.04T2 Gas supply installation
- 20.2.04T3 Safety regulations
- i) installation
 - ii) testing
 - iii) controls

Practice

- 20.2.04P0 *Specific Objectives*
By the end of the sub-module unit, the trainee should be able to:
- a) interpret gas design layouts
 - b) describe gas supply system

Content

- 20.2.04P1 Gas system working drawing
- i) distribution and controls
 - ii) safety
 - iii) application
- 20.2.04P2 Supply system
- i) LPG
 - ii) Biogas
 - iii) Acetylene

20.2.05 VENTILATION

- 20.2.05C Competence**
The trainee should have the ability to ventilate a single storey building

Theory

- 20.2.05T0 *Specific Objectives*
By the end of the sub-module unit, the trainee should be able to:
- a) explain the ventilation criteria
 - b) describe types of ventilation systems
 - c) explain ventilation requirements for different types of buildings

Content

- 20.2.05T1 Ventilation criteria
- i) air movement
 - ii) fumes
 - iii) smell
 - iv) product of construction
- 20.2.05T2 Ventilation systems
- 20.2.05T3 Ventilation requirements

Practice

- 20.2.05P0 *Specific Objective*
By the end of the sub-module unit, the trainee should be able to install ventilation openings.

Content

- 20.2.05P1 Ventilation openings in a building

20.2.06 FIRE FIGHTING

Practice

20.2.06C Competence

The trainee should have the ability to:

- i) Classify types of fire
- ii) Install fire fighting system
- iii) Operate fire fighting equipment

Theory

20.2.06P0 *Specific Objectives*
By the end of the sub-module unit, the trainee should be able to:

- a) install fire fighting system
- b) carry out fire drills
- c) locate fire assembly point

20.2.06T0 *Specific Objectives*
By the end of the sub-module unit, the trainee should be able to:

- a) describe different types of fires
- b) explain methods of fire fighting
- c) describe fire fighting equipment
- d) explain fire safety regulations

Content

20.2.06T1 Types of fires
20.2.06T2 Methods of fire fighting
20.2.06T3 Fire fighting equipment

- i) hose reels
- ii) sprinklers
- iii) fixed dry and wet risers
- iv) fire extinguishers

20.2.06T4 Fire safety regulations

Content

20.2.06P1 Installation of fire fighting equipment
20.2.06P2 Fire drills
20.2.06P3 Fire assembly points

Suggested Teaching/Learning Activities

- Discussion
- Demonstration
- Fire drills

Suggested Teaching/Learning Resources

- Text books
- Computer
- Site visits
- Fire fighting equipment

Suggested Assessment Methods

- Oral tests
- Written tests
- Assignments
- Observation

20.2.07 ELECTRICAL SERVICES

20.2.07C Competence

The trainee should have the ability to:

- i) Interpret electrical symbols in drawings
- ii) Isolate power in a building

Theory

20.2.07T0 *Specific Objectives*

By the end of the sub-module unit, the trainee should be able to:

- a) list hand and power tools for electrical works
- b) explain the types of electrical safety regulations
- c) explain the various wiring systems and their associated fittings
- d) describe electrical distribution layouts in a building

Content

- 20.2.07T1 Tools
- i) screw/drivers
 - ii) pliers
 - iii) phase testers
 - iv) knives
 - v) power drill

- 20.2.07T2 Electrical safety regulations
- i) Factory Act
 - ii) IEEE Regulations

iii) OSHA

iv) WIBA

20.2.07T3 Wiring systems and materials

i) PVC sheath

ii) conduit

- steel

- PVC

iii) trunking

iv) types of cables

v) fittings

20.2.07T3 Power distribution layouts

i) main supply

ii) internal supply

Practice

20.2.07P0 *Specific Objectives*

By the end of the sub-module unit, the trainee should be able to:

- a) identify hand and power tools
- b) demonstrate safe working practices
- c) interpret electrical drawing and symbols
- d) install two point power and lighting systems

Content

20.2.07P1 Hand and power tools

20.2.07P2 Safety regulations

20.2.07P3 Interpretation of electrical drawings and symbols

20.2.07P4 Installation of two point power and lighting circuits

- i) wiring diagram
- ii) installation
- iii) testing

*Suggested
Teaching/Learning
Methods*

- Discussion
- Demonstration
- Practice

*Suggested
Teaching/Learning
Resources*

- Text books
- Manuals
- IEEE Regulations
- Display boards
- ICT
- Electrical materials
and fittings

*Suggested Assessment
Methods*

- Oral tests
- Written tests
- Assignments
- Practical projects

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