9.1.0 CONSTRUCTION MATERIALS

9.J.1 Introduction

This module unit deals with the study of properties of materials to construction works. The purpose of this module unit is to equip trained with knowledge, skills and attitudes necessary to undergo sources, manufacturing/production process and use of the construction materials.

9.1.2 General Objectives

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

- acquire sufficient knowledge, skills and attitudes to understand properties of the materials in construction
- b) appreciate manufacturing process
- c) appreciate the use of different materials in construction
- d) observe safety measures when using the materials

9.1.3 Module Unit Summary and Time Allocation - (44 Hours)

		Content		Time Hours
	Module Unit	Strie	Theory	Pract
9.1.01	Introduction to Materials	General Properties of Materials Classifications of Materials Mineral and Organic Materials	1	2
		 Origin Classification Principal-Types in Each Class Production Methods Defects and Repairs Tests on Building Stones Uses of Stones 	2	2

Code	Sub Module	Content	Time Hours		
	Unit		Theory	Pract	Total
9.1.03	Timber and Timber Products	Growth andCellular StructureConversion andSeasoning	2	2	4
		 Defects Classification of Commercial Timber Stress Grading Timber 			
		 Preservation Timber Products Timber as a Construction Material Tests on Timber 			
9.1.04	Clay Products	TypesManufacturingProcess	2	2	4
10.105		• Glazes • Tests			
9.1.05	Plastics and Rubbers	 Methods of Manufacturer Plastic as a Construction Material 	1	1	2
iel.		 Forms of Rubber Properties and Uses of Rubber Selection of Rubber 			
0105		 Safety Precautions 	1	2	3
9.1.06	Paints and Varnishes	FunctionsProductionTypesApplicationDefects			
		CostingSafety	,		

				Time to	
Code 9,1.0%	Sub Module Unit Glass	Types Manufacturing Process Properties and Use Glass as a Construction Material Fixing Glass Costing	Theory	Pract 4	91.6 91.6
9.1.08	Bituminous Products	Types Manufacturing Process Properties and Uses Tests	-5-3	2-3	
9.1.0∳⊖	Cementious Materials	Types Manufacturing Process Properties	2	3	9
	Tot	al	21	23	

9.1.01 INTRODUCTION TO MATERIALS

Theory

9.1.01T0 Specific Objectives

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

- a) describe the general properties of materials
- b) classify the common materials used in construction
- differentiate
 between mineral and
 organic materials

9.1.01C Competence
The trainee should have the ability to classify building materials

9.1.01T1 General properties of materials
9.1.01T1 Classification of

9.1.01T1 Construction materials

9.1.01T1 Difference between mineral and organic materials

Practice

9.1.01P0 Specific Objective
By the end of the submodule unit, the trainee should be able to classify the common materials used in construction

Content

9.1.01P1 Classification of construction materials

9.1.02 BUILDING STONES

Theory

9.1.02T0 Specific Objectives

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

- a) explain origin of stones used in construction
- b) explain the classification of stones
- c) describe the principal types of stones in each class and their uses
- d) describe the main production methods of stones
- e) describe various defects and procedure of repairing the defects
- f) outline the procedure of testing stone specimens

9.1.02C Competence The trainee should

The trainee should have the ability to:

 i) identify the principal types of rocks

	ii) identify defects in construction stones iii) carry out tests on stones in a	9.1.02P1 9.1.02P2	Content Selection of appropriate stones for various task Tests on construction stones
9.1.02T1	laboratory Content Origin of stones used in	9.1.03	TIMBER AND TIMBER PRODUCTS
X.1.0271	construction - geological formation		Theory
9.1.02T2	Classification of stones - geological - physical	9.1.03T0	Specific Objectives By the end of the sub- module unit, the trains
9.1.0273	- chemical - engineering Principal types of stones		should be able to: a) explain the mode of growth and cellular
6 J 00 T	- igneous rocks - sedimentary - metamorphic	COM	structure of a tree b) explain the various methods of
9.1.02T4	- sedimentary - metamorphic Quarrying - digging or excavation		conversion and seasoning of timbe c) identify and classic
122	 blasting drilling dressing to shape 		commercial timber d) explain timber
9.1.02T5 9.1.02T6	Defects and procedure of repairing the defects Test procedures for		defects and their effects on strength timber
	stone specimens		 e) describe the method of stress grading
9.1.02P0	Practice Specific Objectives		f) explain the preservation of timber
1	module unit, the trainee should be able to:	8	g) describe the manufacture of timber products
	stones for various	-	h) compare timber we other materials as
	b) carry our tests on construction stones	12.00	materials i) describe various
	94	1	carried on timber

	1 02	9.1.03P2	Tests
	Competence		Tests on timber
1.03C	The trainee should		- tensile
	have the ability to:		- compression
	a identify the various		- cleavage
	sizes of timber		- density
	ii) identify defects on		- moisture
	timber		content
		9.1.04	CLAY DD on
	Content	12.55	CLAY PRODUCTS
- 22	Mode of growth and		The
01.03Tl	cellular structure of a		Theory
	tree	9.1.0470	
5550455	Method of conversion	3.1.0110	Specific Objectives
9.1.03T2	and seasoning of timber		By the end of the sub-
	ldentification and		module unit, the
9.1.03T3	classification of timber		traince should be able
			to:
9.1.03T4	Defects and their effects		a) describe the various
	on strength of timber		types of clay
9.1.03T.5 ·	Stress grading methods	$\int_{C} C_{C}$	products and their
91.0316	Preservation of timber	Mer.	appropriate uses b) describe the
9.1.03T7	Manufacture of timber	easytuet.co	manufacturing
	products	-000	process of clay
9.1.0378	Comparison of timber		products
	with other materials		
9.1.03T9	Tests carried out on		c) explain the various glazes applied to
	timber		clay products
	Practice		at a managerises
			d) state the properties of clay products
9.1.03P0	Specific Objectives		· uting the
10.6781974	By the end of the sub-		e) outline the procedure of testing
	module unit, the trainee		clay products
	should be able to:		Clay pro-
			Compatance
	a) select timber for a	9.1.040	Competence The trainee should have
	given task		I HE II allies
	b) carry out tests on		the ability to:
	timber		i) mix required ingredients to
	207		produce a quality
91000	Content		
9.1.03P1	Selection of timber		ii) test clay products in a
BE LA	- hardwood	٠	ii) test clay pro-
	/softwood		laboratory
	- cross section	16	
	01033 3000	1000	

			Content	
	Content	9.1.04P1	Selection of approprie	
9.1.0471	Types of clay products	= -27V VD83X38VE0	clay products	
200000000000000000000000000000000000000	- bricks	9.1.04P2	Laboratory tests of the	
	 blocks roofing tiles 		products	
	- flooring tiles		- water absorption	
	- wall tiles		- san content	
	- pipes and fittings		- compressive	
9.1.04T2	Manufacturing process		strength	
3.1.041=	- raw materials		- chemical	
	- ratios		resistance	
	- process		Venm. T.	3
9.1.04T3	Glazes	9.1.05	METALS	
	 salt glazing 		TTO S	
	 opaque glazing 		Theory	
	- porcelain	0.1.0570	0 10 011	
0 1 0 1 7 1	enamelling	9.1.05T0	Specific Objectives	
9.1.04T4	Properties of clay	^	By the end of the sub	
	products	coll.	module unit, the train	ı
	 tests procedures water absorption 		should be able to:	ľ
	- salt content		a) define the tems	
	- compressive		used in metals	ı
	strength		b) identify the	ı
	- chemical		common iron ord	ı
	resistance		 c) describe the 	ı
			extraction process	
	Practice	=	of ferrous and no	ı
0			ferrous metals	ı
9.1.04P0	Specific Objectives		d) explain propertie	١
	By the end of the cub		and uses of the	ı
	module unit the		various groups of	١
	trainee should be able		non ferrous men	1
	10,		e) explain the form	1
	a) select appropriate		processes of me	4
	products for a		f) describe the heal	ı
	PLACII ISCP		treatment given	10
	o) carry out labour			1
	CHAIL CHAIL		steel	
	products for a		g) explain the	
	task a given	8	protection of	
			A roll	

11.05

9,1

protection of ferrous and non ferrous metals

	h) describe metal alloys used in construction		- fire resistance Practice
	 i) describe the process of steel production from scrap metal outline laboratory tests on metals 	9.1.05P0	Specific Objectives By the end of the submodule unit, the trainee should be able to: a) select metallic
9.1.05C	Competence The trainee should have the ability to: i) form metal into various shapes		b) carry out laboratory tests on metals used for construction
	ii) harden steel by heat	Conte	ent
	treatment	9.1.05P1	Selection of metallic
	iii) analyse the		materials
	chemical	9.1.05P2	Laboratory tests on
	composition of steel	ې خ	metals
	processed from	, el.	- compressive/tensil
	scrap metal	itale	e strength
		25	- fire resistance
	Content		
9.1.05T1	Definition of terms	9.1.06	PLASTICS AND
9.1.05T1	Common iron ores		RUBBER
9.1.05T3	Extraction processes of ferrous and non ferrous		Theory
	metals		
9.1.05T4	Properties and uses on	9.1.06T0	Specific Objectives
•	non-ferrous metals		By the end of the sub-
9.1.05T5	Forming (shaping)-of		module unit, the trainee
0.1.0	metals		should be able to:
9.1.05T6	Heat treatment to steel		 a) explain the methods
9.1.05T7	Protection of ferrous		of manufacturing
0.1:0	and non-ferrous metals		plastics
9.1.05T8	Metal alloys		b) outline reasons for
9.1.05T9	Process of steel		using plastics in
	production from scrap		construction works
0.1.0.	metals		c) explain properties
9.1.05T10	Laboratory tests on		and uses of rubber
	metals		d) outline fire and
	 compressive/tensile 		safety precautions
	strength		

	when using plastics and rubber		a) explain propertion paints and varnish b) outline the
9.1.06C	TA 2015 STATE OF THE STATE OF T		b) outline the process
2.1.000	Competence		preparation before
	The trainee should have		painting and
	the ability to select and		varnishing
	use plastics and rubber		c) outline the process
	as construction		of applying paint
	materials		and varnishes
	Content		d) outline safety
0.1.0671	Methods of		precautions to be
9.1.06T1	manufacturing of		observed while
	plastics		working with page
9.1.06T2	Reasons of using		and varnishes
9.1.0012	plastics in construction		e) outline the proceds
9.1.06T3	Properties and uses of		of material
3.1.0013	rubber		estimation for a jo
9.1.06T4	Fire and safety		f) explain procedure
2	precautions	st.com	of remedying defer
	Parametrical Control of the Control		on paints and
200	Practice	80.	varnishes
	5		varinshes
9.1.06P0	Specific Objective	9.1.07C	Competence
	By the end of the sub-	3.1.076	The trainee should
	module unit, the trainee		have the ability to:
	should be able to select		15/1
	plastic and rubber		i) prepare surface
	materials for		before painting at
	construction work		varnishing
	Content		ii) select and apply
9.1.06P1	Selection of plastic and		paints and vamish
200000000000000000000000000000000000000	rubber materials		to different surface
	Juous materials		HART.Y
9.1.07	PAINTS AND	925 A - 15 - 50 PHILLIPS	Content
		9.1.07T1	Properties of paints #
	VARNISHES		varnishes
	Theory	9.1.07T2	Surface preparation
9.1.07T0	Service Co.	9.1.07T3	Procedures of applying
2.1.0/10	Specific Objectives		
	By the end of the sub-	9.1.07T4	paints and vamishes
	module unit, the trainee	24,0714	Safety precautions at
	should be able to:		working with paints?
			varnishes

9.1.07T5 9.1.07T6 9.1.07P0	Material estimation for a job Remedy of defects on paints and varnishes Practice Specific Objectives By the end of the submodule unit, the trainee should be able to: a) select paints and varnishes for various jobs b) prepare surfaces before painting and		 a) explain the manufacturing processes of glass b) explain properties and uses of various types of glass. c) outline advantages of glass as a construction materials d) state materials used for fixing glass e) outline the procedure of fixing glass
	varnishing a surface c) apply paints and	9.1.08C	Competence The trainee should have the ability to measure, cut and fix glass
	d) determine the cost of painting and varnishing a surface	9.1.08T1	Content Manufacturing
	Content		processes of glass
9.1.07P1	Selection of paints and	9.1.08T2	Properties and uses of glass
9.1.07P2 9.1.07P3	Varnishes Surface preparation Apply paints and	9.1.08T3	Advantages of glass as a construction material
	varnishes to surfaces - coats - tools/equipment	9.1.08T4	Fixing materials: - rubber - putty - beads
9.1.07P4	Determination of cost of painting and varnishing a surface	9.1.08T5	Procedure of fixing glass
9.1.08	GLASS		Practice
010-	Theory	9.1.08P0	Specific Objectives By the end of the sub- module unit, the
^{9.1} .08T0	Specific Objectives By the end of the sub- module unit, the trainee should be able to:		trainee should be able to:

Content

			Alexandra III
	a) select materials for		Bituminous malena
	a) select material	9.1.0971	
	0132108	010914	
	b) fix glass panes b) fix glass panes	9.1.09T3	(1) 1) (1) (1) (1) (1) (1) (1) (1) (1) (
	b) fix glass panes c) determine the cost of	9.1.	Dioce
	glazing	9.1.09T4	Properties of bitumber
	Content	*OTS	Procedure of tests
	Selection of glazing	9.1.09T5	bitumen
9.1.08Pl	Selection		Diffullien
	materials Fixing glass panes Fixing glass panes		TELLE I
9.1.08P2	Fixing glass panes Costing of glazing tasks		Practice
9.1.08P3	Costing of Base		
1887/000	BITUMINOUS	9.1.09P0	Specific Objectives
9.1.09	BITUMING	9.1.071	By the end of the
350000	PRODUCT		module unit, theta
			should be able to:
	Theory		
	44.1		 a) select approprize
9.1.09T0	Specific Objectives	_	bituminous
3	By the end of the sub-	st.com	materials for as
	module unit, the trainee	X.	b) carry out labora
	should be able to:	3	tests on bitumin
	a) describe types of		
	bituminous materials		materials
	b) explain the process		
	of manufacturing		Content
	bituminous products	9.1.09P1	Selection of bituminous
	c) outline the use of	21419243	materials
	bituminous products	0.1.0000	
	in construction	9.1.09P2	Laboratory tests
			 viscosity
	d) explain properties of		 stability
	various bituminous		- strength
	products	9.1.10	CEMENTITIOUS
	e) outline the procedure	88/485625/4//	
	of carrying out tests on bitumen		MATERIALS
01000			Theory
9.1.09C	Competence		1
	The trainee change	9.1.10T0	C C . C
	the ability to apply		Specific Objectives
			By the end of the sib
	construction of		module unit, the traff
	construction effectively		should be able to:
			a) describe various
			describe vario
			types of cementill
	18	100	materials
	4.		D-2000007-2007-0000

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	9.7	PY No.	.16
		3 S	8
	b) explain the manufacturer of		c) use cementitious
	cementitious		materials as bonding
	materials	ECKED	maccials as bonding
	c) explain the		d) assemble
	properties and uses		construction
	d) outline the procedure	P	components using
	of preparing	C	cementitious
	cementitious		materials
	materials		
		9.1.10P1	Content
•0C	Competence	J.1.10F1	Selection of
_{9.1} .03C	The trainee should have	9.1.10P2	cementitious materials
	the ability to select,	5.1.1012	Preparation of
	prepare and use	9.1.10P3	Cementitious materials
	cementitious materials	>.1.101 J	Use of cementitious
	to bond various		materials as bonding agents
	construction materials	9.1.10P4	Assembly of
		ζ	construction
	Content	col,	components using
9.1 .10 T1	Types of cementitious	, cit.	cementitious materials
	materials	The	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
9.1.10T2	Manufacture of	95)	Suggested
	cementitious plaster		Teaching/Learning
9.1 .10T 3	Properties and uses of		Methods
	mortar		- Discussion
9.1 .10 T4	Procedure of preparing		- Demonstration
	cementious materials for	•	 Write notes
	use		 Bond various
			components
	Practice		
911000			Suggested
2.1.T050	Specific Objectives		Teaching/Learning
	By the end of the sub-	,	Resources
	module unit, the trainee		 Text books
	should be able to:		- Manuals
	a) select appropriate		 Journals
	cementitious		- Tools
	materials for a given		 Materials
	task		
	b) prepare cementitious		Suggested Assessment
	materials		Methods
			- Observation