NATIONAL BOARD FOR TECHNICAL EDUCATION

Innovation Development and Effectiveness in the Acquisition of Skills (IDEAS) Project

THE WORLD BANK

NATIONAL TECHNICAL CERTIFICATE (NTC)

AND

ADVANCED NATIONAL TECHNICAL CERTIFICATE (ANTC)

PROGRAMMES

CURRILCULUM AND MODULE SPECIFICATIONS

IN

BLOCKLAYING, BRICKLAYING AND CONCRETING PROGRAMME

JANUARY 2023

GENERAL INFORMATION

AIM:
To give training and impart the necessary skills leading to the production of craftsmen, technicians and other skilled personnel who will be enterprising and self –reliant.

ENTRY QUALIFICATIONS

CRAFT PROGRAMME
Candidates must not be less than 14 years of age and should have successfully completed three years of Junior Secondary education or its equivalent. Special consideration may be given to sponsored candidates with lower academic qualifications who hold trade test certificates and are capable of benefiting from the programme.

ADVANCED CRAFT PROGRAMME
Candidates should possess the National Technical Certificate or its equivalent and should have had a minimum of two years post qualification cognate industrial experience.

THE CURRICULUM
The Curriculum of each programme is broadly divided into three components:

(a) General Education, which accounts for 30% of the total hours required for the programme
(b) Trade Theory, Trade Practice and Related Studies which account for 65% and
(c) Supervised Industrial Training/Work Experience, which accounts for about 5% of the total hours required for the programme. This component of the course which may be taken in industry or in College production unit is compulsory for the full-time students.

Included in the curriculum is the teacher's activity and learning resources required for the guidance of the teacher.

UNIT COURSE/MODULE
A Course/Module is defined as a body of knowledge and skills capable of being utilized on its own or as a foundation or pre-requisite knowledge for more advanced work in the same or other fields of study. Each trade when successfully completed can be used for employment purposes.

BEHAVIOURAL OBJECTIVES

These are educational objectives which identify precisely the type of behavior a student should exhibit at the end of a course/module or programme. Two types of behavioral objectives have been used in the curriculum. They are:

(a) General Objectives
(b) Specific learning outcomes

General Objectives are concise but general statements of the behavior of the students on completion of a unit of work such as understanding the principles and application of:

(a) Orthographic projection in engineering/technical drawing
(b) Loci in Mathematics
(c) Basic concepts of politics and government in Political Science
(d) Demand and Supply in Economics

Specific Learning Outcomes are concise statements of the specific behavior expressed in units of discrete practical tasks and related knowledge the students should demonstrate as a result of the educational process to ascertain that the general objectives or course/programme have been achieved. They are more discrete and quantitative expressions of the scope of the tasks contained in a teaching unit.

GENERAL EDUCATION IN TECHNICAL COLLEGES

The General Education component of the curriculum aims at providing the trainee with complete secondary education in critical subjects like English Language, Economics, Physics, Chemistry, Biology, Entrepreneurial Studies and Mathematics to enhance the understanding of machines, tools and materials of their trades and their application and as a foundation for post-secondary technical education for the above average trainee. Hence, it is hoped that trainees who successfully complete their trade and general education may be able to compete with their secondary school counterparts for direct entry into the Polytechnics or Colleges of Education (Technical) for ND or NCE programmes respectively. The Social Studies component is designed to broaden the trainee's social skills and understanding of his environment.

For purpose of certification, only the first three courses in Mathematics will be required. The remaining modules are optional and are designed for the above average students.

NATIONAL CERTIFICATE

The NTC and ANTC programmes are run by Technical Colleges accredited by NBTE
NABTEB conducts the final National Examination and awards certificates.

Trainees who successfully complete all the courses/modules specified in the curriculum table and passed the national examinations in the trade will be awarded one of the following certificates

S/NO	LEVEL	CERTIFICATE
	Technical Programme	
1	Craft Level	National Technical Certificate
2	Advanced Craft Level	Advanced National Technical Certificate

GUIDANCE NOTES FOR TEACHERS TEACHING THE CURRICULUM

The number of hours stated in the curriculum table may be increased or decreased to suit individual institutions' timetable provided the entire course content is properly covered and the goals and objectives of each module are achieved at the end of the term.

The maximum duration of any module in the new scheme is 300 hours. This means that for a term of 15 weeks, the course should be offered for 20 hours a week. This can be scheduled in sessions of 4 hours in a day leaving the remaining hours for general education. However, (properly organised and if there are adequate resources), most of these courses can be offered in two sessions a day, one in the morning and the other one in the afternoon. In so doing, some of these programmes may be completed in lesser number of years than at present.

The sessions of 4 hours include the trade theory and practice. It is left to the teacher to decide when the class should be held in the workshop or in a lecture room.

INTEGRATIVE APPROACH IN THE TEACHING OF TRADE.

Theory, Trade Science and Trade Calculation

The traditional approach of teaching trade science and trade calculation as separate and distinct subjects in Technical College programmes is not relevant to the new programme as it will amount to a duplication of the teaching of mathematics and physical science subjects in the course. The basic concepts and principles in mathematics and physical science are the same as in the trade calculation and trade science. In the new scheme therefore, mathematics and physical science will be taught by qualified persons in these fields and the instructors will apply the principles and concepts in solving trade science and calculation problems in the trade theory classes. To this end, efforts have to be made to ensure that mathematics and science modules required to be able to solve technical problems were taken as pre-requisite to the trade module.

EVALUATION OF PROGRAMME/MODULE

For the programme to achieve its objectives, any course started at the beginning of a term must terminate at the end of the term.

Instructors should therefore device methods of accurately assessing the trainees to enable them give the student's final grades at the end of the term. A national examination will be taken by all students who have successfully completed their modules. The final award will be based on the aggregate of the scores attained in course work and the national examination.

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CURRICULUM TABLE COURSE HOURS/WEEK

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN BLOCKLAYING, BRICKLAYING AND CONCRETING

Module Code	MODULE	YEAR 1						YEAR 2						YEAR 3						TOTAL HOURS FOR EACH
		Term 1		Term 2		Term 3		Term 1		Term 2		Term3		Term 1		Term 2		Term 3		
		T	P	T	P	T	P	T	P	T	P	T	P	T	P	T	P	T	P	
CMA11	Mathematics	2	-	2	-	2	-	2	-	2	-	2	-	2	-	2	-	2	-	216
CPH 11	Physics	2	-	2	2	2	-	2	1	2	1	2	1	2	1	2	1	2	1	288
CCH 11	Chemistry	2	-	2	-	2	-	2	1	2	1	2	1	2	1	2	1	2	1	288
CEN 11	English Language	2	-	2	-	2	-	3	-	3	-	3	-	3	-	3	-	3	-	288
CEC 10	Economics	2	-	2	-	2	-	2	-	2	-	2	-	2	-	2	-	2	-	216
CTD 11	Technical Drawing	-	2	-	2	-	2	-	-	-	-	-	-	-	-	-	-	-	-	72
CTD 12	Descriptive Drawing	-	-	-	-	-	-	-	2	-	2	-	2	-	-	-	-	-	-	72
ICT 10	Introduction to Computer	-	-	-	-	-	-	1	2	-	-	-	-	-	-	-	-	-	-	36
ICT11	Comp Application I	-	-	-	-	-	-	-	-	1	2	-	-	2	-	-	-	-	-	36
ICT 12	Comp Application II	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	2	36
ICT 13	AutoCAD I	-	-	-	-	-	-	-	--	-	-	-	-	1	2	-	-	-	-	72
ICT 14	AutoCAD II	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	2	-	-	36
CBM 10	Entrepreneurship	-	-	-	-	-	-	-	-	-	-	-	-	2	-	2	-	2	-	36
CBC 1I	Introduction to Building Construction.	2	1	2	1	2	1	-	-	-	-	-	-	-	-	-	-	-	-	108
CTD 14	Building Drawing	-	-	-	-	-	-	2	-	2	-	1	-	-	-	-	-	-	-	60
CBC 12	Bricklaying	2	8	2	8	2	10	-	-	-	-	-	-	-	-	-	-	-	-	384
CBC 13	Blocklaying	-	-	-	-	-		2	10	2	10	2	8	-	-	-	-	-	-	408
CBC 14	Concreting	-	-	-	-	-	-	-	-	-	-	-	-	2	8	2	8	-	-	240
CBC 15	Wall, Flooring and Ceiling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	10	144
	Total	14	17	14	22	14	19	11	18	11	18	11	18	13	14	13	14	10	18	3,180

ADVANCED NATIONAL TECHNICAL CERTIFICATE PROGRAMME
IN BLOCKLAYING, BRICKLAYING AND CONCRETING

Module Code	MODULE	YEAR 1						TOTAL HOURS FOR EACH
		Term 1		Term 2		Term 3		
		T	P	T	P	T	P	
CMA 20	Mathematics	2	-	2	-	2	-	72
CEN20	English Language and Communication	2	-	2	-	2	-	72
CEC 20	Economics	2	-	2	-	2	-	72
ICT 20	AutoCAD I	-	2	-	-	-	-	24
ICT 21	AutoCAD II	-	-	-	2	-	-	24
CBM 20	Basic Construction. Management I	-	3	-	-	-	-	36
CBM 21	Basic Construction Management II	-	-	3	-	3	-	72
CBC20	Surveying in Building	1	3	-	-	-	-	48
CBC 21	Building Science, I	3	-	-	-	-	-	36
CBC 22	Building Science II	-	-	3	1	-	-	48
CTD 23	Building Drawing II	3	-	-	-	-	-	36
CBC 23	Advanced Bricklaying and Block laying	2	10	2	10	-	-	288
CBC 24	Advanced Concrete Work	2	6	-	-	-	-	96
CBC 25	Components and Finishes	-	-	-	-	2	6	96
	Total	14	24	14	13	8	6	1,020

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN BRICKLAYING, BLOCK LAYING AND CONCRETING		
MODULE: INTRODUCTION TO BUILDING CONSTRUCTION	**Course Code: CBC 11**	**Contact Hours: 3hrs Theory/week**

GOAL: This module is designed to introduce the trainee in the building trades to the basic construction principles, materials and methods so that he may be able to appreciate the roles of the various trades in the building industry

GENERAL OBJECTIVES:

On completion of this module, the trainee should be able to:

1 Understand the basic workshop safety, site safety principles and be able to apply them.
2 Know the use of common hand tools and building trades
3 Understand the use of materials and basic processes in carpentry and joinery
4 Understand the basic principles of site preparation
5 Understand setting out principles and be able to apply them to set out simple rectangular buildings on site.
6 Understand basic principles of choice and construction of foundations
7 Understand the principles of ground and upper floor construction in timber and concrete
8 Understand the principle of constructing load bearing walls
9 Know materials and methods used in fixing openings
10 Understand the function and principles of construction of roofs
11 Understand the basic principles of design and construction of stairs
12 Understand the application of common types of finishes in the building trade
13 Understand the basic principles of installation of various types of services in dwellings.

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN BRICKLAYING, BLOCKLAYING AND CONCRETING WORK						
Module: - INTRODUCTION TO BUILDING CONSTRUCTION	**Module Code: CBC II**		**Contact Hours: 2hrs. Theory, 1hr. Practical**			
Course Specification: Theoretical Content						
General Objective 1.0: Understand The Basic Principles of Health And Safety In The Workshop And Site, And Be Able To Apply Them.						
THEORETICAL CONTENTS			**PRACTICAL CONTENTS**			
WEEK	**Specific learning outcome**	**Teachers activities**	**Learning Resources**	**Specific learning outcome**	**Teachers activities**	**Evaluation**
1-2	1.1 State general rules on hygiene that must be followed. 1.2 State the importance of maintaining good personal health 1.3 State correct Personal Protective Equipment such as Head Protection, Foot Protection, face and eye Protection, Hand and Body protection and regulatory requirement 1.4 Enumerate various hazards in the workshop environment relating same to a construction site situation, and stating their causes and method of	• Explain the general rules on hygiene. • Discuss the importance of maintaining good personal health • Introduce PPE applicable to the trade • Use slide, videos, Simulation etc. to show and explain proper handling of constructio	• Projector, • Projector screen, • Slide, • video player and Television, • Video/films (related to the subject matter • diskettes etc. • Drilling, • grinding • cutting machine • circular saw, • molding machine etc. • Films, clips, videos films television monitor etc. • Chalkboard, copied notes etc. • Dummy, first Aid box well	1.1 Identify potential hazards in the building site 1.2 Describe the types of hazards in the work place that may occur and how to deal with them 1.3 Use PPE to carry out task 1.4 Identify hazard signs in building site 1.5 Apply/simulate appropriate First Aid Treatment on a victim in need of First Aid. e.g., burns, shocks, accident victims etc. 1.6 Identify hazards components of construction tools and equipment's e.g., drilling	1.9 Describe to the students' hazard or potential hazards in the building site 1.10 Guide the student on types of hazards in the work place that may occur and how to deal with them 1.11 Demonstrate how to use PPE 1.12 Describe hazard signs in building site • Demonstrate how to apply appropriate First Aid Treatment on a victim in need of First Aid. e.g., burns, shocks, accident victims etc. • Various movable hand tools and machines should be displayed to students and the methods of safe handling	• State and explain the general hazard rules that must be followed in workshop and site. • List correct Personal Protective Equipment • Enumerate various hazards in the workshop environment • Identify the content of first aid box • Enumerate dangerous gas and liquids in construction site

	prevention. 1.5 List dangerous gases and liquids in common use in the workshop or construction site e.g. paint frames, flammable liquids, acetylene etc. 1.6 state the type of hazards that can be dealt with personally and those to be reported to appropriate personnel. **1.7** State how to warn others about hazards and its importance.	n tools and equipment' s. • Discuss hazard and how to prevent accident both in the workshop and site.	equipped with drugs, bandage, cotton wool, iodine etc • Complete PPE Equipment • . Safety signs, hand gloves, boots protective clothing goggles etc. - Circular saws, and drilling machined etc. - First aid box, different drugs, bandage other first aid materials .	machines, grinding, machine and circular saw etc. **1.7** Undertake habitual maintenance of health, safety and general welfare of the individual. **1.8** Identify what safety is and how to prevent accidents, generally.	explained. • Show films and photo clips of the hazards that can be caused by poisonous and dangerous gases e.g., paint fumes, carbon mono oxide etc. • Use dummy to practice the application of First Aid on victims, this could be done in the classroom to reinforce the knowledge being imparted to students.	

General Objective 2.0: Know the use of common hand tools in building trades.						
WEEK	**Specific learning outcome**	**Teachers activities**	**Learning Resources**	**Students Learning Outcome**	**Teachers activities**	**Evaluation**
3	2.1 State the basic hand tools in plumbing work and state their functions. 2.2 Mention the basic hand tools in Brick/Block work and state their functions. 2.3 State the basic hand tools in carpentry and joinery and state their functions. 2.4 State the basic hand tools in Painting and state their	▪ Explain basic workshop hand tools related to a plumbing work e.g., wrench, yarn, dicing machine etc. ▪ Explain Brick/Block work tools, naming each tool and asking the students to identify same. ▪ Explain the use of basic carpentry hand tools e.g., hammer, pinches, drill etc. ▪ Explain the use of basic painting hand tools e.g.,	▪ Basic hand tools for: a. joiners and carpenters b. bloc/brick layers c. painters d. plumbers	2.1 Identify Equipment relevant to his/her trade. Such as; Vibrator, drills, electric drilling machine, skill hammer concrete drill, dumper, concrete mixing machine. 2.2 Recognize individual work and team work for lifting, loading and unloading materials and equipment 2.3 Identify relevant materials/tools for his own trade 2.4 Use appropriate materials/tools for a particular work.	▪ Show basic workshop hand tools related to plumbing work e.g. wrench, yarn, dicing machine etc. ▪ Guide student to carry out plumbing task using appropriate tools. ▪ Show the students practically how to handle Brick/Block work tools, naming each tool and asking the students to identify same. ▪ Guide students to carry out Block/Brick work using appropriate tools ▪ Demonstrate the use of basic carpentry hand tools to the students e.g., hammer, pinches, drill etc. ▪ Guide the students	▪ State the basic hand tools in plumbing work and state their functions. ▪ State the basic hand tools in carpentry and joinery and state their functions ▪ List the basic hand tools in Painting and state their functions ▪ Enumerate basic hand tools in brick/block work and state their functions.

	functions	hammer, pinches, drill etc.			to carry out Carpentry/joinery task ▪ Demonstrate the use of basic painting hand tools to the students ▪ Guide the students to carry out painting task	

General Objective 3.0: Understand the use of materials and basic processes in carpentry & joinery.						
WEEK	**Specific learning outcome**	**Teachers activities**	**Learning Resources**	**Specific learning outcome**	**Teachers activities**	**Evaluation**
3 – 5	3.1 List types of Nigerian Timbers and state their characteristics and uses. 3.2 Explain the process of felling of tree, conversion, seasoning and preservation 3.3 State types of manufactured boards and state their uses.	▪ Explain various types of Nigerian timbers, their characteristics and uses. • Discuss the process of felling of tree, conversion, seasoning and preservation ▪ Explain types of manufactured boards and where they are used	• Material (timber) • Wood Preservatives • Plywood • Particle Board • Portable Power saw • Portable Power jig-saw • Cutting tools • Drilling Machine • Srewing Machine (DC)	3.1 Identify types of Nigerian timbers and state their characteristics and uses. 3.2 Carry-out timber conversion and preservation. 3.3 Construct simple joints using a variety of materials and appropriate tools. 3.4 Identify types of Boards e.g., plywood, particle board and carry out simple work etc.	• Demonstrate using pieces, types of timbers by name, characteristics and uses. ▪ Discuss method of timber conversion and preservation ▪ Show types of manufactured boards and their uses ▪ Guide student to construct simple joints using variety of materials and appropriate tools ▪ Bring types of boards e.g., plywood, particle board etc. to the workshop for identification and state their uses.	• Identify types of Nigerian timbers and state their characteristics and uses. • List methods of timber conversion and preservation. • Construct simple joints using a variety of materials and appropriate tools. • Discuss the ocess of felling of tree, conversion, seasoning and preservation

General Objective 4.0: Understand the basic principles of site preparation and be able to make preparation for site						
	Specific learning outcome	**Teachers activities**	**Learning Resources**	**Specific learning outcome**	**Teachers activities**	**Evaluation**
6-7	4.1 Define vegetable soil. 4.2 State the reasons for removing vegetable soil or top soil before setting out. 4.3 State hand tools and mechanical plants used for excavation. 4.4 Explain the importance of site investigation prior to setting out. 4.5 Describe site preparation and procedures prior to setting out.	• Explain vegetable soil and mention reasons for removal of vegetable soil or top soil before setting out. • Introduce different types of hand tools to be used for removal of top soil. • Discuss importance of site investigation and preparation prior to setting out	• Vegetable soil ▪ Digger, Shovel, Excavator, Auger etc. ▪ Complete PPE Equipment	4.1 Identify vegetable soil. 4.2 Identify hand tools and mechanical plants used for excavation. 4.3 Carry out preparation and procedure for setting out 4.4 Select correct PPE for site work 4.5 Carry out visit to new construction site.	• Show vegetable soil. • Show student various hand tools used for earth excavation e.g auger, excavator, shovel, digger etc. • Demonstrate the procedure and preparation for setting out • Identify the correct PPE for site work. • Guide the students to visit new construction site.	• Define vegetable soil and mention reasons for removal of vegetable soil or top soil before setting out. • Describe site preparation and procedures prior to setting out. • Explain the importance of site investigation and preparation prior to setting out

	General Objective 5.0: Understand setting out principles and apply them to set out simple rectangular building on site.					
WEEK	**Specific learning outcome**	➢ **Teachers activities**	**Learning Resources**	- **Specific learning outcome**	**Teachers activities**	**Evaluation**
8-12	5.1 Explain the principles of setting out of buildings. 5.2 Describe using sketch the method of pegging out the perimeter walls of a building. 5.3 Explain with sketches the use of timber profiles in setting out. 5.4 List the basic tools and equipment required for setting out on site. 5.5 Explain the setting out of simple rectangular building 5.6 Explain the	▪ Discuss the principles of setting out of buildings. ▪ Explain the basic equipment needed for setting out and use sketches where necessary. ▪ Discuss the process of storing resources (tools, equipment and materials) in setting out	▪ Board, sketches ▪ Pegs, profile, nails, line, T-square, Iron square, Measuring Tape etc. ▪ Setting out equipment: ➢ -Total station ➢ -Theodolite ➢ -Dumpy level etc.	5.1 Select the basic tools required for setting out. 5.2 Identify the basic tools in setting out. 5.3 Set out a simple rectangular building on site. 5.4 Store resources (tools, equipment and materials) appropriately. .	▪ Using appropriate drawings, show the methods of pegging out perimeter walls of a building ▪ Use sketches to show how timber is used as setting out profiles. ▪ Guide students to select basic tools required for setting out. ▪ Demonstrate how to set out a simple rectangular building with the student's participation ▪ Guide students to Store resources (tools, equipment and materials) appropriately.	▪ Sketch the method of pegging out the perimeter walls of a building. ▪ Enumerate types of setting out. ▪ List the basic tools and equipment required for setting out on site. ▪ Identify types of setting out. ▪ Describe how to store tools, material, and equipment on building site

	process of storing resources (tools, equipment and materials)in setting out					
13	**EXAMINATIONS: PRACTICAL 60% THEORY 40%**					

	General Objective 6.0: Understand basic principles of choice & construction of foundations.					
WEEK	**Specific learning outcome**	**Teachers activities**	**Learning Resources**	**Specific learning outcome**	**Teachers activities**	**Evaluation**
1-2	6.1 Explain the functions of foundation. 6.2 Enumerate the different types of foundations indicating their suitability. 6.3 State the equipment and methods used in excavating foundation trenches. 6.4 List the temporary supports to the sides of deep trenches in various soils. 6.5 List the equipment used in mixing concrete on site. 6.6 Explain batching of concrete by weight and by volume and	• Discuss in details the functions of foundation • Explain the different types of foundations indicating their suitability • Describe the equipment and methods used in excavating foundation trenches. • Explain temporary support to the side of deep trenches in various soils. • Describe equipment used in mixing concrete.	▪ Chalkboard etc. ▪ Films, clips, pictures, sketches etc. ▪ Concrete mixer, coarse aggregate, fine aggregate, cement, water etc. ▪ Digger, shovels profile, line etc.	• Describe using sketch the functions of foundation. • Describe the different types of foundations indicating their suitability. • Describe equipment and methods used in excavating foundation trenches. • Describe using sketch the reasons for temporary supports to the sides of deep trenches in various soils. • Carryout construction of strip foundation under the supervision	▪ Show using sketch types of foundation. ▪ Discuss using pictures/drawings different types of foundations and their suitability. ▪ Show video and pictures of excavating machines and methods used in excavating foundation. ▪ Discuss, using sketches the temporary support to sides of deep trenches in various soils. ▪ Describe construction of strip foundation	• List the functions of foundation. • List the different types of foundations. • State various methods of excavation of foundation • List equipment used in mixing concrete

	compare the two Methods					
3-4		• Discuss batching with regards to concrete work and the difference between batching by volume and by weight.		• Describe the equipment and methods used in mixing concrete on site. • Mix concrete using appropriate equipment	▪ Show the equipment and methods used in mixing concrete. ▪ Guide students to mix concrete using appropriate equipment.	

General Objective 7.0: Understand The Principles of Ground And Upper Floor Construction In Timber And Concrete.						
WEEK	**Specific learning outcome**	**Teachers activities**	**Learning Resources**	**Specific learning outcome**	**Teachers activities**	**Evaluation**
5-6	**7.1** State types of floors and their methods of construction. **7.2** State the functions of floors **7.3** State application of types of flooring (finishing).	▪ Explain the various types of floors available; ▪ Describe the functions and method of construction of each type of floors mentioned above. ▪ Explain application of various types of floorings.	• Concrete aggregates etc. • Tiles • Terrazzo • Epoxy • Marbles etc	7.1 Carry out casting of a concrete ground floor operations according to procedure using appropriate equipment/tools. 7.2 Identify basic tools, equipment and materials required for floor construction. 7.3 Carry out visits to a construction site.	• Demonstrate construction of floor using appropriate equipment/tools. • Describe basic tools, equipment and materials required for floor construction. • Visit construction site with student.	• State types of floors and their methods of construction. • State the functions of floors.

General Objective 8.0: Understand The Principle of Constructing Load Bearing Walls.						
WEEK	**Specific learning outcome**	**Teachers activities**	**Learning Resources**	**Specific learning outcome**	**Teachers activities**	**Evaluation**
7-8	8.1 List the principal functions of external and internal walls. 8.2 Describe various types of wall units in common use. 8.3 List typical mixes for mortar used for bonding wall units in 8.2 above. 8.4 State the procedures and precautions involved in mixing of concrete and mortar on site. 8.5 List the various DPC materials. 8.6 State the functions of	▪ Explain the principal functions of external and internal walls in a building. ▪ Discuss various types of wall unit commonly used ▪ Explain typical mixes for mortar that are used for bonding wall units. ▪ Explain the procedures and precautions that are involved in mixing concrete and mortar on site. ▪ Discuss various DPC materials ▪ Explain DPC and the difference between DPC and	• Block, Cement, aggregate, mortar, D.P.M etc. • Polystyrene, plastic sheet, rubber, bituminous felt etc.	8.1 Carry out erection of simple straight walls using appropriate tools. 8.2 Carryout mixing of concrete and mortar. 8.3 Carryout placement of DPC	• Guide student to erect simple straight walls using appropriate tools. • Show how to carryout mixing of concrete and mortar. • Demonstrate how to place DPC	• List the principal functions of external and internal walls. • State the procedures and precautions involved in mixing of concrete and mortar on site. • List the various DPC materials. • State the functions for DPC in walls. • Explain method of placing and position of DPC in walls.

	DPC in walls. 8.7 Explain method of placing and position of DPC in walls.	DPM.				

General Objective 9.0: Know Materials And Methods Used In Fixing Openings.						
WEEK	**Specific learning outcome**	**Teachers activities**	**Learning Resources**	**Specific learning outcome**	**Teachers activities**	**Evaluation**
9-10	9.1 List Materials suitable for window and door construction. 9.2 State the functions of openings in dwellings e.g., light, ventilation, privacy, inclusion of external weather. 9.3 Describe types of ironmongery and state their uses.	9.1 Explain the wooden shutter windows and doors, steel windows and doors, cyclical Hope type Windows and doors, Aluminum projected windows and sliding windows, Aluminum projected doors and sliding doors etc. 9.2 Discuss the need of openings in dwellings e.g. light, ventilation, privacy, inclusion of external weather. 9.3 Explain types of ironmongery and their uses.	▪ Pictures/Posters ▪ Charts ▪ Door/window (Aluminum, steel and wooden) Schedules (Manufacturer ’s/designer)	9.1 Describe with sketches various types of timber, metal and aluminum doors and windows including their mode of operation. 9.2 Describe using sketch types of doors and windows used in simple dwellings and the need for the provision of weathering structures (e.g sill). 9.3 Identify types of iron monger	• Describe with sketches types of timber, metal and aluminum doors and windows including their mode of operation. • Show using sketch types of doors and windows used in simple dwellings and the need for the provision of weathering structures (e.g sill). • Show types of iron monger.	• List Materials suitable for window and door construction. • State the functions of openings in dwellings e.g., light, ventilation, privacy, inclusion of external weather. • Explain types of ironmongery and state their uses.

General Objective 10.0: Understand The Function And Principles of Construction of Basic Roof Types.						
WEEK	**Specific learning outcome**	**Teachers activities**	**Learning Resources**	**Specific learning outcome**	**Teachers activities**	**Evaluation**
10-12	10.1 Identify types of roofing's system 10.2 State the materials required in basic roof types 10.3 Explain the maximum allowable span of the various materials in 10.2 10.4 Name various roof coverings suitable for tropical use and identify the areas suitable for their use in Nigeria.	• Discuss types of roofing system • Explain materials required for basic for basic roof types • Explain the maximum allowable span of the various materials in 10.2 • Explain various roof coverings suitable for tropical use and identify the areas suitable for their use in Nigeria.	• Pictures, Charts, Drawings, film clips • Roofing materials (Aluminum, Alloy zinc. Zinc etc.)	10.1 Identify with sketches, basic roof types. 10.2 Identify materials required for basic roof types 10.3 Describe the maximum allowable span for various types of roofing materials 10.4 Identify different types of roof covering	• Discuss with sketches, basic roof types. • Describe materials required for basic roof types • Show using sketch the maximum allowable span for various types of roofing materials • Describe different types of roof covering	• Sketch types of roofing's system. • Name various roof coverings suitable for tropical use and identify the areas suitable for their use in Nigeria.
13	**EXAMINATIONS: PRACTICAL 60%**		**THEORY 40%**			

General Objective 11.0: Understand The Basic Principles of Design And Construction of Stairs Case						
WEEK	**Specific learning outcome**	**Teachers activities**	**Learning Resources**	**Specific learning outcome**	**Teachers activities**	**Evaluation**
	11.1 Explain the materials used in construction of stair case 11.2 List types of stair case 11.3 Explain the basic components of a stair case (tread, riser, waits, nosing etc) 11.4 Explain the basic principles of construction of a straight flight; timber/concrete /steel stair.	• Explain the difference between timber, concrete and steel stair cases. • Describe the materials used in construction of stair case • Discuss types of stair case • State the basic components of a stair case (tread, riser, waits, nosing etc) ▪ basic principles of construction of a straight flight timber/concrete/steel stair.	▪ Materials, tools and equipment ➢ Timber ➢ Concrete ➢ Steel etc	11.1 Describe with the aid of sketches, the different types of stairs e.g. straight flight, dog-leg open well, spiral etc. 11.2 Describe with the aid of sketches the design standards for the construction of stairs e.g. riser, tread relationship, minimum headroom, standard sizes of structural members etc.	• Show with the aid of sketches, the different types of stairs e.g. straight flight, dog-leg open well, spiral etc. • Show with the aid of sketches the design standards for the construction of stairs e.g. riser, tread relationship, minimum headroom, standard sizes of structural members etc.	• List types of stair case. • List and explain the basic components of a stair case. • Identify types of stair case

General Objective 12.0: Understand The Application of Common Types of Finishes in Building						
WEEK	**Specific learning outcome**	**Teachers activities**	**Learning Resources**	**Specific learning outcome**	**Teachers activities**	**Evaluation**
	12.1 List external and internal wall finishes e.g. paint, wall paper, premix finishes, etc. . 12.2 Explain the method of applications of the items in 12.1, 12.3 Explain the types of ceiling and their functions 12.4 List types of finishes for joinery works and explain their application e.g. vanish, polish, paint etc.	▪ Describe external and internal wall finishes e.g., paint, wall paper, premix finishes, etc. . ▪ Discuss the method of applications of the items in 12.1, ▪ Describe the types of ceiling and their functions ▪ State various types of finishes for joinery works and explain their application e.g. vanish, polish, paint etc.	▪ Paints ▪ Wall paper ▪ POP ceiling etc ▪ Vanish ▪ Polish etc	12.1 Identify external and internal wall finishes eg. paint, wall papers etc 12.2 Describe methods of application of wall finishing 12.3 Carry out the finishing assignment using two different brand names to test their quality and efficiency 12.4 Identify types of ceilings	▪ Describe external and internal wall finishes eg. paint, wall papers etc ▪ Demonstrate methods of application of wall finishing ▪ Guide the students to carry out finishing on building. ▪ Demonstrate types of ceilings**.**	• List external and internal wall finishes. • List the types of ceiling and their functions.

General Objective 13.0: Understand The Basic Principles of Installation of Various Types of Services In Dwelling.						
WEEK	**Specific learning outcome**	**Teachers activities**	**Learning Resources**	**Specific learning outcome**	**Teachers activities**	**Evaluation**
8-10	13.1 Explain the basic principles of a good drainage system. 13.2 Explain the sanitary wares; fittings e.g. sinks, bath, W.C. shower, wash hand basin, Urinals, etc. use in buildings 13.3 Explain the functions of good insulation and lighting in dwellings. 13.4 State the different modes of supply and installation systems of electricity in	▪ State principles and operation of good drainage system ▪ State the sanitary wares; fittings e.g. sinks, bath, W.C. shower, wash hand basin, Urinals, etc. use in buildings ▪ State the functions of good insulation and lighting in dwellings. ▪ Discuss the different modes of supply and installation systems of electricity in dwellings e.g. single phase, 3-phase supply (conduit or surface wiring system)	▪ PPE Equipment ▪ Sanitary fittings ▪ Electrical fittings ▪ Plumbing fittings etc ▪ Video clips	13.1 Describe with sketches the installation standards relating to cold and; hot water supply. 13.2 Describe with sketches construction standards relating to the construction of domestic drainage system, e.g. Inspection chamber/cesspool, septic tank, soak away. 13.3 Interpret electrical circuit symbols and drawings .	13.1Show with sketches the installation standards relating to cold and; hot water supply. 13.2 Show with sketches construction standards relating to the construction of domestic drainage system, e.g. Inspection chamber/cesspool, septic tank, soak away. 13.3Guide the students to interpret electrical circuit symbols and drawings	• Explain the basic principles of a good drainage system. • Identify electrical symbols on electrical drawing • State the types of sanitary wares in a building • List function of insulation and lighting in a building

	dwellings e.g. simgle phase, 3- phase supply (conduit or surface wiring system)					
11-12	13.5 Explain various electrical fixtures and fittings stating their functions. 13.6 List the precautions to be taken to ensure safe electrical installation in dwellings. . .	▪ Describe various electrical fixtures, their functions and operating principles detailed to the student. ▪ Discuss the precautions to be taken to ensure safe electrical installation in dwellings.	• Electrical drawing of a typical building.	13.4 Identify key electrical symbols	▪ Use a detailed Electrical drawing to guide the student to identify key symbols.	• Enumerate the caution to be taken to ensure safe electrical installation in dwellings
13	**EXAMINATIONS: PRACTICAL 60%**		**THEORY 40%**			

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN BRICKLAYING, BLOCK LAYING AND CONCRETING		
MODULE: BUILDING DRAWING I	**Course Code: CTD 14**	**Contact Hours: 5hrs/wk**

GOAL: This module is intended to introduce the trainee to the basic principles of residential building design and to enable him make and interpret building drawings.

GENERAL OBJECTIVES:

On completion of this module, the trainee should be able to:

1. Interpret and apply symbols, and conventions and other standard practices in building drawing
2. Identify various architectural droughting materials and equipment and use them effectively in making building drawings
3. Demonstrate knowledge of the basic principles of design of dwellings in warm climate
4. Prepare preliminary sketch design of a modern 3-bedroom bungalow
5. Draw the site and floors plans, elevations and sections of the proposed 3-bedroom bungalow
6. Prepare essential detail drawings of components
7. Draw detail plan of the electrical services
8. Demonstrate knowledge of the principles of preparing schedules
9. Reproduce drawing

PROGRAMME: National Technical Certificate in Bricklaying, Blocklaying and Concrete Work.						
Module: **BUILDING DRAWING I**		**Module Code: CTD – 14**			**Contact Hours: 5hrs/week**	
Course Specification: Theoretical/Practical Content						
General Objectives 1.0: Interpret and apply symbols and conventions and other standard practices in building drawing						
WEEK	**Specific learning outcome**	**Teachers activities**	Learning Resources	**Specific learning outcome**	**Teachers activities**	**Evaluation**
1 – 2	1.1 List essential information required in the title block. 1.2 Indicate 1.1 above in standard layout as recommended in B.S. 1192 or similar Nigerian standard. 1.3 State factors which govern choice of scale e.g a. Need for lucid working information: b. Need to achieve economy of effort and time in drawing preparation; c. Nature of	▪ Explain various scales selection in common use and factors that influence the scale. ▪ Explain the importance of accurate dimensioning in proportioning in drawings ▪ Explain different format of title block ▪ Explain the basic essential information required in a standard title block ▪ Explain the basic range of scales used	▪ Chalk Board ▪ Charts of graphical symbols ▪ A building drawing with various graphical symbols. ▪ Drawing instruments ▪ Materials ▪ Lesson note Standard drawing sheets of various sizes	1.1 Draw commonly used graphical symbols and representation in building drawing. NOTE: Symbols and representation should be as contained in B.S. 1192 or similar Nigerian Standard. 1.2 Produce various lettering styles. 1.3 Apply appropriate lettering styles in producing building drawings.	▪ Demonstrate the symbols in tabular form on the chalk board and explain their application. ▪ Display various lettering styles and explain their uses. ▪ Guide students to apply appropriate lettering styles in producing building drawings. ▪ Use sketches to describe dimensioning methods commonly use in building	• Produce a standard title block indicating all the basic essential element • Identify types of lettering from a given drawing. • Interpret symbols in a given drawing. • Identify basic types of scales in drawings

	drawing. 1.4 State range of standard scales for the following: a. Site plans b. Floor plans c. Elevations **d.** Component' details 1.5 Explain the importance of dimensioning and proportioning in building design.	in drawing		 1.4 Use sketches to describe dimensioning methods commonly use in building drawing	drawing	

General Objective 2.0: Identify various architectural draughting materials and equipment and use them effectively in making building drawing.						
WEEK	**Specific learning outcome**	**Teachers activities**	Learning Resources	**Specific learning outcome**	**Teachers activities**	**Evaluation**
2 - 5	2.1 Explain the various metric scales on architect's triangular or flat scales. 2.2 Explain the various metric scales in the making of building drawings. 2.3 Explain the character and state the use of:- i. Cartridge drawing paper ii. Natural tracing paper iii. Tracing film (acetate paper). 2.4 Explain the working principles of a typical plan printing machine or device.	• Discuss the various metric scales on architect's triangular or flat scales. • Describe the various metric scales in the making of building drawings. • Describe the character and state the use of:- -Cartridge drawing paper -Natural tracing paper -Tracing film (acetate paper). • Discuss the working principles of a typical plan printing machine or device. • Explain the basic drawing soft wares • Introduce Artificial Intelligence and 3D printing	▪ Picture of plan printing machine. ▪ Drawing instrument eg. Drawing pen, lettering template, scales, T-square, drawing board, instrument set etc. ▪	2.1 Recognize various standard sizes of drawing papers and boards. 2.2 Describe how to use of standard sizes of drawing papers and board 2.3 Select appropriate instruments and use them effectively in the production of building drawings NOTE: Essential instruments to be used should include: scales, drawing pens, lettering templates, adjustable set-square, instrument set, irregular	▪ Demonstrate various standard sizes of drawing papers and boards. ▪ Demonstrate how to use standard sizes of drawing papers and board ▪ Guide students to select appropriate instruments and use them effectively in the production of building drawings NOTE: Essential instruments to be used should include: scales, drawing pens, lettering templates, adjustable set-square, instrument set,	• List materials and equipment required for producing building drawings. • Use appropriate instrument to draw a building plan to specification

				(French) curves, T-square/parallel ruling straight edge/draughting machine.	irregular (French) curves, T-square/parallel ruling straight edge/draughting machine.	

General Objective 3.0: Demonstrate knowledge of the basic principles of design of dwellings in warm climate.						
WEEK	**Specific learning outcome**	**Teachers activities**	Learning Resources	**Specific learning outcome**	**Teachers activities**	**Evaluation**
	3.1 List basic parts of a typical modern residential bungalow. 3.2 Explain the concepts of form, function and aesthetic and orientation as applied in building design. 3.3 Explain functions of the various building components. 3.4 Explain the functional relationship of 3.2 above 3.5 State the design required with regards to warm climate condition. 3.6 List the essential services necessary	• List basic parts of a typical modern residential bungalow. • Enumerate the concepts of form, function and aesthetic and orientation as applied in building design. • State the functions of the various building components. • State the functional relationship of 3.2 above • Describe the design required with regards to warm climate	• Drawing book • Drawing board • Chalk Board • Posters • Charts • A typical building drawings • Town Planning Laws. • Picture /Posters of a well-planned modern city.	3.1 Identify the basic parts of a typical modern residential bungalow 3.2 Produce a building plan indicating the basic parts 3.3 Produce a building plan demonstrating a good functional relationship of basic parts. 3.4 Identify; - design -plan and -as built plan	▪ Guide student to identify the basic parts of a typical modern residential bungalow. ▪ Guide students to produce a building plan indicating the basic parts ▪ Demonstrate the good functional relationship of basic parts in a building plan. ▪ Guide student to identify; -design -plan and -as built plan	• State the basic principles of design of modern residential bungalow. • Describe the basic building components of residential bungalow. • Describe the form, function, and orientation as applied in building design • Differentiate site plan and floor plan. • Describe the importance of openings in buildings.

	in a building. **NOTE**: Basic parts should include: dining room, bed room, kitchen, garage (internal and annexed), bath/toilet, store, etc.	condition. • State the essential services necessary in a building. • Describe the elevation and section of a building.				• Draw the plan elevation and section of a given drawing using appropriate scale to • List some Local Authority Law as it affect residential building
	4 State how site characteristics may influence the design of a residential building. • List the characteristics of good floor plan, e.g. adequate and properly located openings, good functional relationship, etc. • State the factors which influence the	• Explain how site characteristics may influence the design of a residential building • Discuss the characteristics of good floor plan, e.g. adequate and properly located openings, good functional relationship, etc		.		

	design of residential buildings in Nigeria, e.g. site, town planning authority regulations, materials and labour availability, client taste/culture, financial ability. • Distinguish between design and plan and as-built plan • State the essential elements of good site plan.	• Enumerate the factors which influence the design of residential buildings in Nigeria, e.g. site, town planning authority regulations, materials and labour availability, client taste/culture, financial ability • Discuss between design and plan and as-built plan • Describe the essential elements of good site plan. .				

General Objective 4.0: Prepare preliminary sketch design of a modern 3 bedrooms bungalow.						
WEEK	**Specific learning outcome**	**Teachers activities**	**Learning Resources**	**Specific learning outcome**	**Teachers activities**	**Evaluation**
1 – 9	4.1 List characteristics of surveyors plan. 4.2 Explain the characteristics of a given building plan 4.3 Explain the space arrangement for a three bedroom bungalow 4.4 List the choice of materials for a propose three bedroom bungalow	• Explain surveyors plan and the contents of the plan ▪ Describe the characteristics of a given building plan. ▪ Discuss the space arrangement for a three bedroom bungalow ▪ Discuss the choice of materials for a propose three bedroom bungalow	▪ A well-equipped drawing studio ▪ A typical detail building drawing	4.1 Determine the characteristics of a given Surveyor's plan, e.g. solar orientation, plot size, access road, etc. 4.2 Prepare preliminary sketch design of a modern 3-bedroom bungalow suitable for the plot in 4.1 above. 4.3 Discuss presentation plan 4.4 Draw elevations e.g. approach, rear and rear side elevation 4.5 Justify the space arrangement and choice of	• Determine the characteristics of e given Surveyor's plan, e.g. solar orientation, plot size, access road, etc. • Guide students to Prepare preliminary sketch design of a modern 3-bedroom bungalow suitable for the plot in 4.1 above. • Demonstrate presentation plan • Guide students to draw elevations e.g. approach, rear and rear side elevation. ▪ Demonstrate how to Justify the space arrangement and	• Explain the details that should be available in surveyors plan • State the importance of space arrangement in a building • Draw the plan, elevations and sections of a 3-bedroom bungalow.

				materials of the proposed bungalow.	choice of materials of the proposed bungalow.	

General Objective 5.0: Draw the site and floor plans, elevations and sections of a proposed 3-bedroom bungalow.						
WEEK	**Specific learning outcome**	**Teachers activities**	**Learning Resources**	**Specific learning outcome**	**Teachers activities**	**Evaluation**
10 - 11	**5.1** List the different types of building eg. Bungalow, story building, duplex, detached, semi-detached etc 5.2 Explain the plan, elevations and sections of a 3-bedroom bungalow.. 5.3 List the importance of proper detailing in building plan.	▪ Explain different types of building eg. Bungalow, story building, duplex, detached, semi-detached etc ▪ Describe the differences in building plan. ▪ State the importance of proper detailing in building plan	• Finished drawing plan.	5.1 Prepare presentation floor plan and working drawings to suitable scales of a proposed bungalow. 5.2 Draw the elevation to suitable scale. NOTE: Elevations may include front, rear, left and right sides. 5.3 Determine and draw details of essential sections. 5.4 Draw the foundation plan. 5.5 Draw the site plan. NOTE: Site plan should conform with local authority planning regulations and in particular indicate drainage plan. (septic tanks, soak away, inspection, chambers,	• Distinguish between a bungalow and a storey building, duplex, etc. • Explain the importance of proper detailing in building drawing • Guide students to draw the foundation plan. • Guide students to draw the site plan • . NOTE: Site plan should conform with local authority planning regulations and in particular indicate drainage plan. (septic tanks, soak away, inspection, chambers, pipelines), boundary wall or line, access road.	• Explain what is building plan. • State what a building plan should contain. • Draw as indicated on the drawing, the sections and elevations.

				pipelines), boundary wall or line, access road.		
13	**Examinations. Practical 100%**					

	General Objective 6.0: PREPARE ESSENTIAL DETAIL DRAWINGS OF BUILDING COMPONENTS.					
WEEK	**Specific learning outcome**	**Teachers activities**	**Learning Resources**	**Specific learning outcome**	**Teachers activities**	**Evaluation**
1-4	6.1 List various component of a building eg. floors, beams, linters, columns, openings etc 6.2 State the advantages of producing plumbing plan (septic tank, soak-away, kitchen etc) of a proposed three bedroom bungalow. 6.3 Explain the advantages of producing interior elevation and sections of the various building components.	• Explain various component of a building eg. floors, beams, linters, columns, openings etc • Discuss the advantages of producing plumbing plan (septic tank, soak-away, kitchen etc) of apropose three bedroom bungalow. • State the advantages of producing interior, elevation and sections of the various	• A well-equipped drawing studio.	6.1 Draw to suitable scales essential details of building components . NOTE: Details may include: Floor, beams, lintels, hoods, railings, screen walls fire place, boundary wall and gate, plumbing. 6.2 Prepare working drawing of the septic tank and soak-away suitable for the bungalow. 6.3 Draw the interior elevations and sections of the kitchen and launderette.	• Guide the Students to produce a given drawing to specification from preparation to completion of detail drawing. NOTE: Details may include: Floor, beams, lintels, hoods, railings, screen walls fire place, boundary wall and gate, plumbing. 6.4 Guide students to prepare working drawing of the septic tank and soak-away suitable for the bungalow. 6.5 Demonstrate how to draw the interior elevations and sections of the kitchen and launderette.	• Describe the procedures of preparing building drawing • State what information building drawing should contain. • Prepare a building drawing of 3-bedroom bungalow (showing the external works which includes safety tank, soak-away and inspection chamber)

		building components.		NOTE: Drawings should show details of cabinets; and work-top.	NOTE: Drawings should show details of cabinets; and work-top.	

General Objective 7.0: Draw detailed plan of the electrical services.						
WEEK	**Specific learning outcome**	**Teachers activities**	**Learning Resources**	**Specific learning outcome**	**Teachers activities**	**Evaluation**
5-7	**7.1** List common electrical fixtures in a building **7.2** Recognize various electrical symbols in a typical building plan **7.3** Explain how to determine the appropriate positions of electrical fittings in building plan	• Explain common electrical fixtures in a building plan. • Discuss various electrical symbols in a typical building plan • Describe how to determine the appropriate positions of electrical fittings in a building plan	• Drawing showing the floor plan.	**7.1** Use the presentation floor plan as an aid in determining the types and location of electrical services. **7.2** Draw the electrical service plan for the bungalow.	• Guide the students to use the presentation floor plan and determine location of electrical services. • Guide students to draw the electrical service plan for the bungalow.	• Enumerate electrical symbols and interpret them • Show using sketches, different types of electrical symbols of a building plan

General Objectives: 8.0 Principles of preparing Schedules						
WEEK	**Specific learning outcome**	**Teachers activities**	**Learning Resources**	**Specific learning outcome**	**Teachers activities**	**Evaluation**
8-10	8.1 State the meaning of "scheduling" as used in building drawing. 8.2 State the uses of schedules and typical subjects for schedules. 8.3. Explain the two categories of information in schedule, e.g. i. a specification of materials, component of activity. ii. the location of theses specifications.	• Explain scheduling and describe its use for the following: doors, windows, electrical plumbing, painting etc. • State the two categories of information in schedule, e.g. - specification of materials, component of activity. - the location of theses specifications.	• Chalk Board • Drawing of a given bungalow. Digital Board and White Board • Flip chart Board	**8.1** Demonstrate principles and methods of preparing schedules. **8.2** Prepare the following schedules for the bungalow: door, windows, electrical installation, plumbing, painting, reinforcement (where necessary)	• Show principles and methods of preparing schedules to students**.** • Guide students to prepare schedules for a given building and give assignments projects	• Explain what is building schedule. • State the use of building schedule. • -Prepare a schedule of doors and windows of a 3-bedroom bungalow.
11 - 12	9.1 List different methods of reproducing drawing 9.2 Explain the advantages of reproducing drawings 9.3 Differentiate between pencil/ink	• Describe different methods of reproducing drawing • State the advantages of reproducing drawings	• Drawing studio • Dark Room • Printing Equipment • Posters	9.1 Trace and ink effectively the design and working drawings above 9.2 Print out inked or pencil drawing using plan printing	• Organise a printing Exercise. • Produce copies of drawing. • Guide the students to perform the exercise • Guide student to reproduce 3-bedroom bungalow plan	• Reproduce a typical building drawing of 3-bedroom bungalow • Explain why drawings are reproduced.

	drawing from printed copy	• Discuss how to differentiate between pencil/ink drawing from printed copy		machine or a manual printing device. 9.3 Assess the quality of drawings from printed copies.		• Use Pencil to draw a 3-bedroom bungalow .
13	EXAMINATIONS: 100%					

	PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN BRICKLAYING, BLOCK LAYINGING AND CONCRETING		
	MODULE: BRICKLAYING	**Course Code: CBC 12**	**Contact Hours: 5hrs/wk**
	GOAL: This module is designed to provide the trainee with the essential knowledge and skill that will enable him perform competently all aspects of brick-work in the construction industry. **GENERAL OBJECTIVES:** On completion of this module, the trainee should be able to: 1. Understand basic workshop and site safety principles and their applications 2. Understand the use of various tools and equipment in the bricklaying trade 3. Understand the basic principles of manufacture, properties and application of various types of bricks 4. Understand the use of material and basic processes in carpentry and joinery 5. Understand the main physical properties and application of various types of cements 6. Understand the main physical properties and application of various types of aggregates and mortars 7. Understand the principles and methods of preparing mortars for building works. 8. Understand the basic principles of and be able to carry out simple leveling project construction 9. Understand the principles and methods of preparing sites and setting out building 10. Understand and be able to apply basic principles and practice relating to substructure construction 11. Understand the principles of construction and be able to construct concrete ground floor 12. Understand the basic principles of construction and be able to construct plan and simple decorative brick walls 13. Know materials and methods used in fixing openings 14. Understand the function and principles of construction of basic roof types 15. Understand the basic principles of design and construction of stairs 16. Understand the principles of construction , erection and dismantling of scaffolds in accordance with construction (working places) regulations. 17. Know materials and methods used in walling. 18. Understand the principles of construction of simple drainage system. 19. Understand the basic principles of Kerbs and surface drainage channels to specification.		

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN BRICKLAYING, BLOCKLAYING & CONCRETE WORK.						
MODULE: BRICKLAYING		**Module Code: CBC 12**		**Contact Hours: 2hrs Theory, 8hrs Practice**		
General Objective 1.0: Understand Basic Workshop And Site Safety Principles And Their Application.						
Week	**Specific Learning Objective:**	• **Teachers Activities**	• **Resources**	**Specific Learning Objective:**	**Teachers Activities**	**Evaluation**
1	**1.1** Define and enumerate various hazards in the workshop environment relating same to a construction site situation, and stating their causes and methods of prevention. **1.2** Name some dangerous gases and liquids in common use in the workshop or construction site e.g. paint fumes, flammable liquids, acetylene etc. **1.3** Define and cite relevant clauses in the factory act	• Use slides, video films, computer simulation etc. to show and explain proper handling method of construction tools and equipment's how to practically prevent accidents both in the workshop and on site when using them • Show films and photo clips of some hazards that can be caused by poisonous and dangerous gases	• Slide, video player and television, video films (related to the subject matter) diskettes etc. • Drilling, circular saws, molding machine etc. • First, aid box well equipped with drugs, banding cotton wool, iodine etc. • Safety signs, hand, gloves, boots, protective clothing, goggles etc. • Circular saw, grinding, machine,	1.1 Identify dangerous components in construction tools and equipment's e.g. drilling machines, grinding machine, and circular saw, etc. 1.2 Apply appropriate first Aid treatment on a victim involved in burns, shocks accident victims etc. 1.3 Carry out habitual maintenance of health, safety and general	• Show specified hand tools and machines to students and explain methods of safe handling of such equipment. • Demonstrate the use of safety equipment to apply first aid on victims, this could be done in the classroom to reinforce the know ledge being imparted to the student	• Define and enumerate various hazards in the workshop environment relating same to a construction site. • List some dangerous gases and liquids in common use in the workshop or construction site.

	on Health, safety and Welfare Regulations for workers on a construction site.	e.g. paint fumes, carbon monoxide etc. • Write on the chalkboard for the students to copy the relevant clauses. Give examples for students to learn at home.	and drilling machines etc.	welfare of the individual. 1.4 Identify what safety is and how to prevent accidents, generally		

General Objective 2.0: Understand The Use Of Various Tools And Equipment In The Bricklaying Trade.						
Week	**Specific Learning Objective:**	• **Teachers Activities**	• **Resources**	**Specific Learning Objective:**	**Teachers Activities**	**Evaluation**
	2.1 List common hand tools and equipment in bricklaying 2.2 Explain the use of various bricklaying tools and equipment appropriately 2.3 State the importance of care/ maintenance of bricklaying tools. .	• Explain common hand tools and equipment in bricklaying • State the use of various bricklaying tools and equipment appropriately • Discuss the importance of care/ maintenance of bricklaying tools. • Discuss the operational procedure of carrying out the maintenance of specified block laying equipment.	• Tools and equipment (some). • Chart/posters. • Real object tools. • Charts/Poster. • Overhead projector. • Tools and equipment • Manufacturers manual	2.1 Identify the common tools and their uses. 2.2 Identify the equipment available in Bricklaying viz pan mixer, mortar mixer, concrete mixer of various types of dumpers. 2.3 Sketch/draw and label some of the tools/equipment used in the bricklaying shop 2.4 Identify each of these tools displayed. 2.5 Demonstrate the handling of the common bricklaying tools.	• Demonstrate common tools in brick laying and state their use and name each tool. • Show equipment available in Bricklaying. • Guide student to sketch/draw and label some of the tools/equipment used in the bricklaying workshop. • Guide students to identify each of these tools displayed. • Demonstrate the handling of the common bricklaying tools • Show how to correctly handle specific bricklaying	• List common hand tools and equipment in bricklaying • Explain the importance of care/ maintenance of bricklaying tools

				2.6 Carry out check for efficiency. 2.7 Correctly handle some specified bricklaying equipment and tools. 2.8 Carry out periodic maintenance of equipment e.g. concrete mixer.	tools • Demonstrate how to carry out periodic maintenance of equipment	

General Objective 3.0: Understand The Basic Principles Of Manufacture, Properties And Application Of Various Types Of Bricks.						
	Specific Learning Objective:	**Teachers Activities**	**Resources**	**Specific Learning Objective:**	**Teachers Activities**	**Evaluation**
	3.1 List the composition of clays. **3.2** List the physical properties of clays. **3.3** State the advantage of machine molded bricks over hand molded bricks 3.1 State the process of manufacturing of sand Crete brick taking into account curing techniques 3.2 List defects in manufactured bricks 3.3 State the causes of defect and	• Explain the composition of clays and their physical properties • Explain the advantages of machine molded bricks over hand molded bricks • Explain the process of manufacturing of bricks taking into account curing techniques. • Explain some defects that may show and gives reason for the occurrence • Explain their use causes and state necessary	• Lesson plan. • Sandscreete bricks. • Clay bricks. • Engineering bricks. • Mud bricks • Hand mold. • Machine mold • Typical training work shop • Material laboratory • Clay • Head pan • Spade • Moulds (manual / /	3.6 Describe with sketches and state uses of various sizes of bricks: • burnt clay bricks • mud bricks • engineering bricks • refractory bricks • decorative bricks • concrete bricks • sand lime bricks 3.7 Identify different types of bricks 3.8 Use diagram to outline the process of production of standard bricks with emphasis on the amount of	• Show with sketches and state uses of various sizes of bricks . ➢ burnt clay bricks ➢ mud bricks ➢ engineering bricks ➢ refractory bricks ➢ decorative bricks ➢ concrete bricks ➢ sand lime bricks • Display the different types of bricks and identifies the materials used in their production. • With live diagram the teacher outline the process of production of standard bricks emphasing on the amount of water required in the mix	• List the composition of clays • List the physical properties of clays • State the advantages of machine molded bricks over hand molded bricks • List defects in manufactured bricks • State the causes of defect and state necessary precautions against their occurrence • -Estimate the required quantity of

	state necessary precautions against their occurrence. 3.4 Estimate the required quantity of materials required for molding or specified number of sandscrete bricks 3.5 List the factors which can affects the compressive strength of bricks	precautions against their occurrence • Discuss the required quantity of materials required for molding of specified number of sands Crete bricks. • Explain the factors which can affects the compressive strength of bricks	/machine)	water required in the mix and the danger of having excess or less water in the mix 3.4 Select tools and materials for brick production 3.5 Carry out production of specific number of bricks given the materials. 3.6 Clean and store equipment/tools according to rules and procedures	and the danger of having excess or less water in the mix • Show how to select correct tools and materials for the production of bricks • Guides the students in the production of specific number of bricks. • Describe how to clean and store equipment/tools according to rules and procedures	materials required for molding or specified number of sands Crete bricks.

General Objective 4.0: Understand The Use Of Material And Basic Processes In Carpentry And Joinery						
Week	**Specific Learning Objective:**	**Teachers Activities**	**Resources**	**Specific Learning Objective:**	**Teachers Activities**	**Evaluation**
5	4.1 Explain various types of Nigerian timbers and state their characteristics and uses. 4.2 Describe methods of felling of tree, conversion, seasoning and preservation. 4.3 Identify various types of manufactured boards and state their uses. 4.4 Select bonding materials in relation to Manufacture boards. 4.5 Describe the use of various wood finishes such as thinner, lacquer,	• Explain various types of timbers (pieces) to class and identify same to students by name and characteristics. • Explain the process of felling of tree, conversion and preservation.. • Select bonding materials in relation to Manufacture boards. • Explain the use of various wood finishes such as thinner, lacquer, paraffin, polishes, paints etc.	▪ Pieces of various types of timbers available in Nigeria. ▪ Wood preservatives, wood etc. ▪ Pieces of plywood, particle board, etc. ▪ Variety of materials required for construction. ▪ Cutting tools ▪ Fastening tools	4.1 Describe the basic process of carcass construction 4.2 Select manufactured boards for specific task in carpentry and joinery. **4.3** Apply bonding materials in accordance with given instructions. 4.4 Apply fastening materials for the construction of bookshelf. 4.5	• Bring pieces of various types of boards e.g. plywood, particle board etc. to the class for identification and state their uses. • Guide to select Manufactured boards for specific task in carpentry and joinery. • Demonstrate how to apply bonding materials in accordance with given instructions. • Show how to apply fastening materials for the construction of bookshelf.	• List available types of Timber • List methods of tree felling, r conversion, seasoning and • preservation. • -Produce a simple book-shelve using manufactured board.

	paraffin, polishes, paints etc.				• Explain the use of various wood finishes such as thinner, lacquer, paraffin, polishes, paints etc.	

General Objective 5. 0: Understand The Main Physical Properties And Application Of Various Types Of Cements.						
Week	**Specific Learning Objective:**	**Teachers Activities**	**Resources**	**Specific Learning Objective:**	**Teachers Activities**	**Evaluation**
	5.1 List the different types of cements available and give example of were they are use ie. ordinary Portland cement, low heat Portland cement, sulphate resisting cement high alumina cement, super-sulp hate cement etc. 5.2 Outline the process of manufacture of ordinary Portland cement. 5.3 Describe the general effects of variation in the properties of ordinary Portland cement, e.g. variation in fineness, soundness and setting time.	• tabulate the types of cement eg Portland cement modified Portland cement and non-Portland cement their properties and area of used. • Outline by line diagrams the stages of production of ordinary Portland cement. • Explain the following terms a. hydration b. Setting and c. Hardening • Discuss tests and procedures of testing i.e. fineness test, soundness, setting time etc. • Discuss handling procedure of both large/small quantity of cement.	Sample of the following types of cements: • Ordinary Portland • Low heat Portland • Sulphate resisting • Portland pozzolana • Supersulphated cement • High almina cement a. balance b. apparatus ievicat c. le chatelier briquette mould.	5.1 Identify the various types of cements and their uses. 5.2 Carry out tests following the procedures of testing and test; fineness test, soundness, setting time etc. **5.3** Identify the equipment/apparatus for carrying out tests ie vicat apparatus etc. 5.4 Carry out the test following: fineness, soundness, setting time.	• Guide the various types of cements and their uses. • Guide students the procedure of carrying out test of; fineness test, soundness, setting time etc. • Display the equipment/apparatus for carrying out tests ie vicat apparatus etc. • Guide to demonstrate the following test: fineness, soundness, setting time.	• List the different types of cements available and give example of where-they are use ie. ordinary Portland. • Define Hydration, setting and hardening of cement. • Define setting and hardening of cement. • List the advantages of handling cement in silos and in bags. • Carryout different types of test for cement

	5.4 State the meaning of the following: - Hydration, setting and hardening of cement. 5.5 Distinguish between setting and hardening of cement. 5.6 Explain the relative advantages of handling cement in silos and in bags. 5.7 List the procedure of carrying out the following test fineness, soundness, setting time. 5.8 Mention the suitability of cement on site by at least three methods.	• Explain the physical tests on cement.				

General Objective: 6.0 Understand The Main Physical Properties And Application of Various Types of Aggregates						
Week	**Specific Learning Objective:**	**Teachers Activities**	**Resources**	**Specific Learning Objective:**	**Teachers Activities**	**Evaluation**
	6.1 Define aggregates and 6.2 Distinguish between fine and coarse aggregates. 6.3 Classify various aggregates by their sources and uses ie natural, artificial, light weight (refractory) etc. 6.4 Distinguish between the range of particles size of coarse and fine aggregate and explain the general effects of particles. 6.5 Describe different ways of collecting aggregate for test	• Show sample of fine / coarse aggregate ie sand/gravel or granite ▪ Define aggregate and their use in Construction ▪ List and classify aggregate by their nature or use • List the sieve sizes for grading of both fine and coarse aggregates • Describe the process of carrying out test on aggregates from sampling to sieving.	• Sample of the aggregates • Quartering gauge • Riffle box • Balance • A table of a complete job • The graphs sheet. • Photograph of an aggregate stock pile.	6.1 Identify aggregates and distinguish between fine and coarse aggregates 6.2 Identify the physical and natural properties of aggregates 6.3 Carry out sieve test 6.4 Carry out testing of properties of aggregate 6.5 Demonstrate proper aggregate storage on site	• Guide to Identify aggregates and distinguish between fine and coarse aggregates • Guide to identify the physical and natural properties of aggregates • Guide carry out sieve test. • Guide carry out testing of properties of aggregate • Guide demonstrate proper aggregate storage on site	• Define aggregates • Distinguish between fine and coarse aggregates

	6.6 State the purpose of sieve test and plot the sieve analysis and interpret. - graded, gap graded 6.7 Determine the fineness modulus. 6.8 State tests on aggregate and determine the purpose of silt, bulking colour metric etc. 6.9 Describe physical tests on aggregates. 6.10 Describe various ways of storing , aggregates on the site i.e. aggregates stock pilling, storage bins.	• Modulate and interpret result. • Describe various ways of storing aggregates on the site. • Determine the finesse modulus. • State tests on aggregate and determine the purpose of silt, bulking colour metric etc. • Describe physical tests on aggregates. • Describe various ways of storing , aggregates on the site i.e. aggregates stock pilling, storage bins.				

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General Objective: 7.0 Understand The Principles And Methods Of Preparing Mortar For Building Works.						
Week	**Specific Learning Objective:**	**Teachers Activities**	**Resources**	**Specific Learning Objective**	**Teachers Activities**	**Evaluation**
	7.1 Define mortar. 7.2 List the qualities of a good mortar as used in construction industry 7.3 Specify the type and mix ratio for a particular purpose. 7.4 Define workability. 7.5 Determine factors affecting workability. 7.6 Identify the advantages of mechanical mixing over manual mixing. 7.7 Determine factors affecting mixing/mix. 7.8 Determine the use of admixture in mortar.	• Define mortar and identify the four types of mortar and uses. a. Lime- mortar. b. Cement mortar c. Cement lime mortar or gauge mortar d. Refectory mortar e. Mortar. • Explain the two methods of mixing and factors affecting the choice. • Define workability, water: cement ratio, aggregate: cement ratio. • Specify by tabulating mix ratio/type of mortar for various jobs.	-Sample of line light weight aggregate. -sand binding agent -concrete platform -shovel -deadpan -pan mixer -cement -water -mixer -Weighting Balance -Gauge box -Sample of light weight aggregate	7.1 Mix a workable mortar for one of the following purposes. a. Moulding bricks b. Bedding and jointing of bricks c. Plastering and rendering **NOTE:** Mix by hand or machine process. 7.2 Take a specified water, cement ratio, and aggregate: cement ratio, measure materials for mortar by volume.	• Describe a mix ratio and asked student to measure out by volume the sand and cement content. • Describe various ways of achieving a workable mortar. • Demonstrate the application of mortar for various uses in construction	• Define mortar • list the qualities of a good mortar as used in construction industry. • Define workability. • List factors affecting workability. • List advantage of mechanical mixing over manual mixing. • What is the use of admixture in mortar.
13	**EXAMINATION: Practical 60%, Theory 40%**					

General Objective 8.0: Understand The Basic Principles Of Levelling in Building Construction and be able to carry out Levelling.						
	Specific Learning Objective:	• **Teachers Activities**	• **Resources**	**Specific Learning Objective:**	**Teachers Activities**	**Evaluation**
2	8.1 Define levelling. 8.2 Identify various tools and equipment used in transferring levels i.e. a. Plumb level and pegs b. water level c. bunny rods and pegs d. levelling instrument. 8.3 Describe the process of levelling i.e. rise and fall method and instrument height.	• Define levelling. • List various equipment used in levelling. • Describe each method of levelling and their accuracy. • Explain the two methods. a. rise and fall , and b. instrument height. • Compute reduced level from the given data and ask students to do same.	▪ Spirit/Plumb level ▪ Transparent tiny rubble tube ▪ Pegs ▪ Boring rods ▪ Dumpy level ▪ Tilting level ▪ Staff ▪ Measuring Tape (digital and analog) • Theodolite • Total station	8.1 Identify appropriate levelling tools 8.2 Assemble the appropriate tools for levelling. 8.3 Carry out levelling task using appropriate tools and following the correct procedure	• Show appropriate levelling tools • Describe how to assemble the appropriate tools for levelling. • Guide student to carry out task of levelling using appropriate tools and following the correct procedure	• Define leveling. • List tools and equipment used in transferring levels.

General Objective: 9.0 Understand The Principles And Methods Of Preparing Sites And Setting Out Buildings						
Week	**Specific learning outcome**	**Teachers activities**	**Learning Resources**	**Specific learning outcome**	**Teachers activities**	**Evaluation**
3-4	9.1 Outline the basic considerations in the preparation of site for the construction of buildings e.g. a. access roads b. electricity supply c. storage facilities d. temporary structure e. hoarding etc. 9.2 State the problems that may be encountered during the construction work in the following situations: a. water logged site b. pit/alluvial soil	• Describe what is meant by preliminary site work thereby identify the temporary services and importance • Discuss the method of clearing and the reason for removal of vegetable/top soil. • Define giving examples the different types of soil: a. rocky b. firm c. made up soil • Explain the problems that may be encountered during the	• Chart/picture of various earth moving equipment. • Builders square • Tape • Pegs • Trammel • Line • Profiles	9.1 Determine the importance of removal of top soil/vegetable soil 9.2 Describe site lay out arrangement and factors to consider when setting it out 9.3 Identify basic tools used in setting out and excavation. 9.4 Carryout setting out while observing safe work practice	• Show the methods and procedures in setting out of the building structure. • Demonstrate setting out while observing safe work practice • Show students the tools and materials used in simple setting out exercise • Show site lay out arrangement and factors to consider when setting it out.	• What are the problems that may be encountered during the construction work in the following situations: a. water logged site. b. pit/alluvial soil c. congested one plot side d. site requiring demolition of existing structures • Differentiate between site layout and setting out.

	c. congested one plot side d. site requiring demolition of existing structures 9.3 Describe techniques involve in measurement for setting out. 9.4 Differentiate between site layout and setting out. 9.5 State the importance of building line. 9.6 Describe the process of setting out of regular and irregular shapes. 9.7 Identify the line and peg method of setting out.	construction work in the following situations: a. water logged site b. pit/alluvial soil c. congested one plot side d. site requiring demolition of existing structures • Explain the purpose of establishing datum level on site • Discuss between layout and setting out. • Determine the importance of building line.				

3	9.8 Describe at least two ways to check accuracy of a given set out. 9.9 Explain the purpose of establishing datum level on site.					

General Objective 10.0: Understand And Be Able To Apply Basic Principles And Practice Relating To Substructure Construction.						
Week	**Specific Learning Objective**	**Teachers Activities**	**Resources**	**Specific Learning Objective**	**Teachers Activities**	**Evaluation**
5-6	10.1 Distinguish between site preparation and soil investigation. 10.2 Describe various ways of site drainage 10.3 Define the bearing capacity of a soil 10.4 Identify methods of preventing collapse of trench. 10.5 Define the angle of repose. 10.6 State necessary precautions for safe	• Samples of soils displayed and their properties identified. • . • Identify various ways of site drainage. • Sump hole. • Laying of perforated pipes. • Dewatering etc. • The teacher draws the timbering suitable for a loose shallow trench and gives assignment. • Teacher names types of timber used in timbering trenches • Explain safe working condition in excavated trenches. • Materials used for concrete for foundation. • Describe reasons	• Real object i.e. sample of soils. • Charts. • Pictures. • Chalkboard. • Complete drawing instrument. • T. Square. • Pair of compass. • Lesson notes • Materials used for concrete for foundation.	10.1Identify the properties of different types of soil. 10.2 Select the necessary tools for manual excavation. 10.3 Describe mechanism by drawing various earth moving equipment. 10.4 Identify with sketches the timbering system for the following situations. ➢ Shallow trench in moderately firm soil ➢ ➢ Shallow trench in loose soil ➢ ➢ Shallow trench in water logged area	• Show students the properties of different types of soil. • Describe the necessary tools for manual excavation. • Display charts, posters and pictures illustrating the mechanism of the earth moving equipments • Demonstrate with sketches the timbering system for the following situations. a. Shallow trench in moderately firm soil b. Shallow trench in loose soil	• Distinguish between site preparation and soil investigation. • Define the bearing capacity of a soil. • Define the angle of repose. • State necessary precautions for safe working conditions. • List types of foundations • List functions of foundations

	working conditions. 10.7 State the reasons for the following craft practice. a. Ramming of trench base before casting concrete foundation. b. Casting concrete foundation c. Antiterm its application d. Ramming in layers very deep refill 10.8 Describe the functions of foundations. 10.9 List types of foundations	for a-d in 10.12. • Explain how to estimate quantity of soil to be carted way or back fill putting allowing for bulking. • Explain the types and functions of foundation		10.5 Sketch different types of foundations and identify their uses. 10.6 Estimate quantity of soil to be carted way or back fill putting allowing for bulking. 10.7 Solve some problems involving bearing capacity.	c. Shallow trench in water logged area • Demonstrate how to sketch different types of foundations. • Sketch different types of foundations and identify their uses. • Show how to estimate quantity of soil to be carted way or back fill putting allowing for bulking. • Show how to solve some problems involving bearing capacity	.

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General Objective 11.0: Understand The Principles Of Construction and be able to lay Concrete Ground Floors						
Week	**Specific Learning Objective**	**Teachers Activities**	**Resources**	**Specific Learning Objective**	**Teachers Activities**	**Evaluation**
	11.1 Identify the functions of solid ground and suspended floors. 11.2 State the functions of damp proof course. 11.3 List common damp proof materials. 11.4 Give reason for the following . a. Minimum thickness of oversite concrete b. Correct placement of positioning of DPC c. Correct mix for over site concrete. 11.5State the functions of hardcore.	• The teacher lists the functions. • Emphasise on the sizes of components and the point of placement and give reasons. • List some damp proof materials. • Organise a visit to a standard construction site Introduce the students provide necessary safety wears and ask students to questions and jot observations.	• Chalkboard • Lesson notes • Sketches • Drawing • Real object egg. Hardcore damp proof materials. • A typical project site where casting of oversight concrete is in progress.	11.6Sketch the cross section of: a. Solid ground floor b. Suspended floors German floor 11.7Specify the quality and type of local material suitable for hardcore. 11.8Show the placement of main and distribution bars in suspended floor.	• Guide students to sketch the types of floors on the chalkboard. a. solid b. suspended • Specify the quality and type of local material suitable for hardcore. • Show the placement of main and distribution bars in suspended floor.	• What is the functions of solid ground and suspended floors. • State the functions of damp proof course. • - State the functions of hardcore

General Objective 12.0: Understand The Basic Principles Of Construction of Simple Decorative Brick Walls						
Week	**Specific Learning Objective**	**Teachers Activities**	**Resources**	**Specific Learning Objective**	**Teachers Activities**	**Evaluation**
	12.1 State the functions of a brick wall 12.2 Identify the common bond in brick wall construction 12.3 Describe the following types of walls – load bearing, partition walls, parapet, party etc. . 12.4 Differentiate between precast and cast in situ.	• Explain the function of brick wall. • List the different types of walls and give brief definition and uses. • Explain the difference between precast and cast in situ. • Give assignment to draw – three centrearch.	• Lesson plan • Chalk board • Charts • Drawing/sketche	12.1 Sketch different provision for future continuation of job. 12.2Describe with sketches /drawing the following methods of bridging openings. 12.3Sketch the following features in wall construction; -Sill Canopy copping -attached piers detached piers. 12.4 Interpret brickwork construction form a working drawing	• Sketch – Tooting raking back on the black board and explain their uses • Guide students to sketch the following features in wall construction. -Sill -Canopy. -copping. -attached piers. -detached piers. • Show Students using Drawing how to interpret brickwork construction from a working drawing • Demonstrate using sketch a	• State the functions of a brick wall - Define following types of walls - load bearing - partition walls - parapet - party • Differentiate between precast and cast in situ.

				12.5 Sketch a typical mould and form work for each 12.6 Draw to scale showing construction lines and parts of a semi-circle arch	typical mold and form work for each • Show student how to draw to scale to show construction lines and parts of a semi-circle arch	

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General Objective 13.0: Know Materials and Methods Used In Fixing Openings.						
Week	**Specific Learning Objective**	**Teachers Activities**	**Resources**	**Specific Learning Objective**	**Teachers Activities**	**Evaluation**
	13.1 Identify Nigerian timbers and timber products suitable for window and door construction. 13.2 List the method of conversion and seasoning timber for carpentry and joinery work. 13.3 State the functions of openings in dwellings e.g. light Ventilation, privacy, exclusion of external weather. 13.4 Describe various types of doors and windows iron ironmongery	• Explain Nigerian timbers and timber products suitable for window and door construction • Describe the method of conversion and seasoning timber for carpentry and joinery work. • Describe the difference between wooden shutter windows and doors, steel windows and doors, crittal-Hope type Windows and doors. • Aluminum projected windows and sliding doors etc. • Explain how to estimate the quantity of material allowing for damages using a working drawing.	• Sample of Nigerian Timber • Door schedules • Window schedules • 3D model	13.1 Describer with sketches various types of timber and metal doors and windows including their mode of operation 13.2 Explain the need for the provision of weathering Structures (e.g sill) at openings and describe with sketches structures used in simple dwellings. 13.3 Sketch a threshold 13.5 Sketch fixing of door/window frames as the construction	• Show with sketches various types of timber and metal doors and windows including their mode of operation • Describe the need for the provision of weathering Structures (e.g sill) at openings and describe with sketches structures used in simple dwellings. • Show how to sketch a threshold • Use sketch to show fixing of door/window frames as the	• List the method of conversion and seasoning timber for carpentry and joinery work • State the functions of openings in dwellings. -

	and state their uses 13.5 Estimate the quantity of material allowing for damages using a working drawing 13.6 Define a threshold 13.7 State method of constructing threshold 13.8 List advantages and disadvantages 13.9 Explain the difference between pointing and jointing.	• Explain and explain a threshold • Describe method of construction. • State advantages and disadvantages.		continues 13.6 Sketch fixing of door/window frames at the completion of construction. 13.7 Sketch different types used in wall construction.	construction continues • Demonstrate using sketch fixing of door/window frames at the completion of construction . • Sketch different types used in wall construction	• Define a threshold • List advantages and disadvantages of threshold
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General Objective: 14.0 Understand The Function And Principles Of Construction Of Basic Roof Types						
Week	**Specific Learning Objective**	**Teachers Activities**	**Resources**	**Specific Learning Objective**	**Teachers Activities**	**Evaluation**
	14.1 List basic roof types e.g. flat roof, pitch roof, concrete flat roofs etc. 14.2 List the different parts roof. 14.3 Describe the materials, maximum allowable span and Application of the various roof types in use 14.4 Name various roof covering suitable for tropical use.	• Explain basic roof types e.g. flat roof, pitch roof, concrete flat roofs etc. • State the different parts roof. • Describe the materials, maximum allowable span and Application of the various roof types in use • Define various roof covering suitable for tropical use.	• Pictorial representation of the various roof types to the student while describing each.	13.1Describe with sketches, basic roof types and Profiles e.g. beam and slabs as in concrete flat roofs Lattice and similar guiders, trusses (Howe truss, double , for truss, truss rafter, standard fink French Truss, North light truss, couple, umbrella, bow string, etc), portal frames, shall roofs, folded plates etc. 12.7 Describe the representation of the various roof types.	• Show pictorial representation of the various roof types to the student while describing each.	• List basic roof types • List the different parts roof a roof.

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	General Objective: 15.0 Understand The Basic Principles of Design and Construction of Stairs.					
Week	**Specific Learning Objective**	**Teachers Activities**	**Resources**	**Specific Learning Objective**	**Teachers Activities**	**Evaluation**
	15.1Explain and define the basic principles of construction of a straight flight timber/concrete/steel spiral stair 15.2 Explain the materials used in construction of stair case 15.3List types of stair case 15.4 Explain the basic components of a stair case (tread, riser, waits, nosing etc) 15.5 Explain the basic principles of construction of a straight flight timber/concrete/steel stairs.	• Explain the difference between timber, concrete and steel stair cases. • State the Describe the materials used in construction of stair case • Discuss types of stair case • State the basic components of a stair case (tread, riser, waits, nosing etc) • basic principles of construction of a straight flight timber/concrete/steel stairs.	• Pictures • Charts • Films • Timber • Stairs	.1 Describe with the aid of sketches, the different types of stairs e.g. straight flight, dog-leg, open well, spiral etc .2 Explain with sketches the design standards for the Construction of stairs e.g. • tread relationship • minimum headroom • standard sizes of structural members etc.	• Show with the aid of sketches, the different types of stairs e.g. straight flight, dog-leg, open well, spiral etc • Show with the aid of sketches the design standards for the Construction of stairs e.g. ➢ riser-tread relationship, ➢ minimum headroom, ➢ standard sizes of structural members etc.	• List types of stair case • List the basic components of a stair case

General Objective: 16.0 Understand The Principles of Construction, Erection and Dismantling of Scaffolds In Accordance With Construction (Working Places) Regulations						
Week	**Specific Learning Objective**	**Teachers Activities**	**Resources**	**Specific Learning Objective**	**Teachers Activities**	**Evaluation**
	16.1 Define the following scaffolds. a. Defendant/putlog scaffold b. Independent/transom scaffold c. Trestle scaffold 16.2 State situation where each is most suitably used. 16.3 List the members. 16.4 State safety precautions peculiar to scaffolding and cranes. 16.5 Enumerate the relative advantage of timber and tubular scaffold.	• Explain the following scaffolds. a. Defendant/putlog scaffold b. Independent/transom scaffold c. Trestle scaffold • Explain situation where each is most suitably used. • Identify the members. • Explain safety precautions peculiar to scaffolding and cranes. • Explain the relative advantage of timber and tubular scaffold.	• Lesson plan • Real objects – gin wheel and chain • Pictures / posters of cranes • Couplers • Other components. • Scaffold tubes • Couplers • Spanners • Wrench etc.	16.1 Describe with sketches the following scaffolds. a. Defendant/putlog scaffold b. Independent/transom c. Trestle scaffold 16.2 State situation where each is most suitably used. 16.3 Identify the members 16.4 Sketch a gin wheel as it is attached to scaffold. 16.5 Show the sketch supports with bridle at window	• Using sketch show the types of scaffolds and identify part. • Show how to sketch a gin wheel as it is attached to scaffold. • Show the sketch supports with bridle at window opening • Demonstrate safety precautions peculiar to scaffolding and cranes. • Show tools necessary to erect i.e. spanner wrench etc. scaffold.	• Define the following scaffolds ➢ Defendant/putlog scaffold ➢ Independent/transom ➢ Trestle scaffold • State safety precautions peculiar to scaffolding and cranes. • What is advantage of timber and tubular scaffold. • State the components of scaffold and its uses

	16.6 Describe various hoisting equipment for hoisting material on site. • gin wheel • scaffold crane • stationery crane • mobile cranes 16.7 State the components of scaffold and its uses.	• Describe various hoisting equipment for hoisting material on site. ➢ gin wheel ➢ scaffold crane ➢ stationery crane ➢ mobile cranes • Explain components of scaffold and name		opening. 16.6 Practice safety precautions peculiar to scaffolding and cranes. 16.7 Erect a put log scaffold. 16.8 Erect transom scaffold. 16.9 Erect timber/bamboo scaffold. 16.10 Dismantle the putlog scaffold. 16.11 Dismantle transom scaffold. 16.12 Dismantle timber/bamboo scaffold.	• Demonstrate in steps the process of erection. • Placing the sole and base plate at the base of the standards. • Demonstrate how a gin wheel is attached to the scaffold.	

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General Objective17.0: Know Materials and Methods Used In Walling.						
Week	**Specific Learning Objective**	**Teachers Activities**	**Resources**	**Specific Learning Objective**	**Teachers Activities**	**Evaluation**
	17.1 State types of stone in Nigeria suitable for walling i.e. granite marble etc. 17.2 Describe the process involve in preparation of 17.1 above for plastering. 17.3 Identify various bonding patterns available for walling. 17.4 Specify mortar mix for stone setting in walling.	• Explain different types of stones. • In tabular form state the process involved in preparation of stone from rock. • State each bonding pattern available. • Explain mix proportion of mortar for setting of stone wall.	• real objects • stone samples • pictures showing • plastering site • crushing drawing showing different bonds.	17.1 Sketch each bonding pattern available. 17.2 Identify by name various types of stone in Nigeria suitable for walling i.e. granite marble etc.	• Demonstrate how to sketch each bonding pattern available • Show using pictures by name various types of stone in Nigeria suitable for walling i.e. granite marble etc.	• List types of stone in Nigeria suitable for walling.

General Objective 18.0: UNDERSTAND THE PRINCIPLES OF CONSTRUCTION OF SIMPLE DRAINAGE SYSTEM						
Week	**Specific Learning Objective**	**Teachers Activities**	**Resources**	**Specific Learning Objective**	**Teachers Activities**	**Evaluation**
	18.1Distinguish between a sewer and a drain. 18.2Explain the basic principles of a good drainage system 18.3State the use and the standard sizes of. a. plastic drain pipes b. asbestos drain pipes c. galvanized steel pipes d. W. C suite e. bidet f. urinal g. sink.	• Describe pieces of drain pipes a. Plastic b. asbestos • Show the students pieces of drain pipes a. Plastic b. asbestos • Show the students the different pipe fitting as listed in 19.6 • Carry the students to where construction is going and show them how drains are tested	• air bag and stopper • gauge • hand pump • smoke chamber • touch • chart • picture air bag and stopper • gauge • hand pump • smoke chamber • chart • picture • Water • Smoke • Ball • Torch • Air. • site plan • mechanical drawing • Accessories a. bath b. wash hand basin c. W.C. suite d. Bidet	18.1Sketch Sewer combine system (2) separate system. 18.2Describe with detail sketches the structural detail of. a. Septic tank b. Soak away c. Inspection chamber/manhole d. Cesspool e. Intercepting chamber 18.3Describe with sketches the use of pipe fitting e.g. a. connecting sockets. b. junction-square oblique c. Saddle junctions d. Bends e. Channels	• Guide student how to sketch Sewer combine system and a separate system. • Show with detail sketches the structural detail of. a. Septic tank b. Soak away c. Inspection chamber/manhole d. Cesspool • Intercepting chamber • Show the students pieces of drain pipes a. Plastic b. asbestos • Describe with sketches the use of pipe fitting e.g. a. connecting sockets. b. junction-square oblique	• Distinguish between a sewer and a drain. • What is the basic principles of a good drainage system.

			e. Urinal f. sink	f. Gullies g. Drain chutes h. Interceptors 18.4 Describe with sketches the use of pipe fitting e.g. . a. connecting sockets b. taper pipe c. junction-square square d. saddle junctions e. bends f. channels g. gullies interceptors 18.5 Describe with sketches methods of determining fall of underground drain. 18.6 Describe the following methods of testing drains. a. water b. smoke c. ball d. torch e. air	c. Saddle junctions d. Bends e. Channels f. Gullies g. Drain chutes h. Interceptors • Show with sketches the use of pipe fitting e.g. . a. connecting sockets b. taper pipe c. junction-square square d. saddle junctions e. bends f. channels g. gullies interceptors • Demonstrate with sketches methods of determining fall of underground drain. • Describe the following methods of	

				18.7 Interpret from working drawing construction of details of simple drainage systems. involving trench excavation, preparation of 19 base, laying of pipes, gullies. 18.8 Install (1) bath (2) wash/hand basin	testing drains. a. water b. smoke c. ball d. torch **e.** air • Display a typical mechanical drawing • pick detail from the drawing and explain fixing of fittings. • Using a typical standard site plan locate. a. soak away b. septic tank c. cesspool as the case may be • Demonstrate the installation of; (1) bath (2)Wash/hand basin	

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General Objective 19.0: Understand The Basic Principles of Laying Kerbs and Surface Drainage						
Week	**Specific Learning Objective**	**Teachers Activities**	**Resources**	**Specific Learning Objective**	**Teachers Activities**	**Evaluation**
	19.1 Explain the functions of kerbs. 19.2 List the types of bricks and jointing mortar suitable for construction of channels/gutters. 19.3 Give reasons for channeling of drainage and state the factors which determine the better angles	• Describe Kerbs and state their functions. • Specify the materials used in production ie cement, sand and granite. • State reasons for channeling of drainage and state the factors which determine the better angles	• Charts • Pictures.	19.1 Sketch and describe different forms of kerbs and state materials for production . 19.2 Describe with sketches a methods of laying precast concrete kerbs. State standard sizes of kerbs. .3 Carry out visit to a road construction project	• Mount the pictures of a run way showing the arrangement of kerbs and channels. • Show using sketch, different forms of kerbs and state materials for production. • Describe with sketches a methods of laying precast concrete kerbs. State standard sizes of kerbs. • Pay visit to a road construction project	• What is the functions of kerbs? • List the types of bricks and jointing mortar suitable for construction of channels/gutters
	EXAMINATIONS: Practical 60%, Theory 40%					

PRORAMME: NATIONAL TECHNICAL CERTIFICATE IN BRICKLAYING AND BLOCKLAYING.						
Module: BLOCKLAYING		**Module Code: CBC 12**		**Contact Hours: 8hrs**		
Course Specification: PRACTICLAL CONTENT						
General Objective:						
WEEK	**Specific Learning Objective:**	**Teachers Activities**	**Resources**	**Specific Learning Objective**	**Teachers Activities**	**Evaluation**
1			Manson's and bricklayer tools	1. Select tools for specific craft operations e.g. a. Cutting b. Laying	• Show each of the tools for specific craft operation.	
2-4			• Shovel • Clay Mixer •	**2** Mix properly with hand or machine, mortar suitable for molding of bricks	• Demonstrate to mix with hands and machine	
			• Compressive strength machine Bricks	3 Perform test to determine the compressive strength of brick	• Conduct test to determine the compressive strength	
5-6				4 Carry out visual inspection to determine a sound cement.	▪ Show how to carry out visual inspection to determine sound cement	
			• Aggregates measuring vessels, • Weighing machine • Colour charts	5. Carry out the following tests on aggregates a. silt test b. bulking test c. moisture content test	• Demonstrate how to perform the different type of tests on aggregate	

				d. colour metric physical test		
7			Visual	6.Test the quality and suitability of aggregates on site using specified site methods	▪ Show how to carry physical test on the site.	
			Clay, Shovel Water	7. Prepare banding mortar to specification for specified jobs to industry standard.	• Show how to prepare mortar for bonding to specification	
8			Water, Bricks, Stop Watch	8. Carry out test to determine porosity of a given brick	• Conduct test to determine porosity of bricks	
			Water, Bricks, Stop Watch.	9. Carry out test to determine permeability of a given brick	• Demonstrate test to determine permeability of a given brick	
9-10			Clay, Mold, Shovel, Water, etc.	10. Mold clay/sand Crete bricks to specification	• Guide student to mold clay and sand Crete bricks to specification.	
			Bucket, Rubber Horse	11. Apply the correct curing method after production	• Describe how to cure the brick using the correct method.	
11-12			Line, Tape Set Square Pegs	12. Set out simple rectangular buildings	• Show how to set out rectangular	

			Profiles.	on plain and on sloppy sites.	building on plain and slopping sites.	
13	**EXAMINATIONS: Theory = 40% Practical = 60%**					
1-3			Tape, Measuring Tape, Chain, Staff, Tilting Level Dumpy Level, Rod, Pegs.	13. Carry out simple leveling exercise by rise and fall and by instrument height method	Demonstrate simple leveling exercise using rise and fall and instrument height method	
			Data	14. Compute reduced level from given data.	Guide to compute level from a given data	
4-6			builders square, tape, line, pegs, profile	15. Set out a right angle on site by the following methods a. builder square **b.** tape and 3:4:5 method.	▪ Guide to set out a right angle using builder square, tape and 3:4:5 method.	
			• Trammel, Tape, Plan, Peg line etc. Nails, trammel.	16. Set out on site circular foundations using at least two methods e.g. a. trammel or tape for curves of small radii b. offset method	• Guide to set out circular foundation using trammel or tape for curves of small radii and offset methods	
7-12			Trammel Tape Pegs, Line, Plan Nails, Hammer etc.	17. Set out an elliptical foundation on site using one of the following	• Guide to set out elliptical foundation using the trammel and	

				methods. a. the trammel method peg and line method	peg and line method	
13	**EXAMINATION: Theory - 40%, Practical - 60%**					
1-3			Trowel, Spirit Level, Profiles Pegs, Nails Rammer, Hardcore dumpy level aggregates water, Mixing manually or mechanically concrete compactor surface vibrator buckets, host etc.	18 .Select appropriate tools and equipment for ground floor construction transfer/spread level with pegs to ensure a flat surface. Specify the appropriate concrete mix Spread, tamp and range green concrete to the required thickness Ram concrete appropriately 19.Carry out construction of continuous concrete ground floor. Cure concrete by damping.	• Guide students to select appropriate tools and equipment for ground floor construction. • Show how to set up and level to specify floor level profile or edge boards around external walls. • Show how to mark on edge board positions of internal walls.	
					• Demonstrate how to consolidate floor base by ramming • Demonstrate hoe to establish hardcore datum	

					pegs at suitable intervals over entire floor area. • Show how to fill, ram and level hardcore bed to specify level. • Show how to establish floor level datum pegs at suitable intervals over entire floor area	
1-3					• Show how to mix concrete to specification • Demonstrate how to lay concrete to level around datum pegs. • Demonstrate how to lay concrete on intermediate spaces to floor level and compact using tamper or surface vibrator • Show how to cure floor by	

					damping.	
4-5			Bricks, Trowel, Spirit level jointing board mortar.	20.Construct solid walls of thickness ½B-1½B involving ends, junction and quoins in English and Flemish bonds	▪ Student construct solid walls to the thickness of ½B-1½B involving ends, junctions and quoins in English bond and Flemish bond.	
			Bricks, trowel, spirit level jointing board mortar.	21.Construct cavity walls involving stopped ends, junctions and quoins in English and Flemish bonds	• Guide student to construct cavity walls, involving stopped ends, junctions, and quoins in English bond and Flemish bond.	
6			Bricks, trowel, spirit level jointing board mortar	22 Construct the following brick wall features. a. detached pier b. attacked pier c. buttress capping d. Square jambs(in IB-1½B solid wall)	▪ Guide student construct the following brick wall a. with detached pier b. attached pier c. buttress capping d. Square	

				e. Square and rebated jambs in cavity walls	jambs e. Rebated jambs • Show how to squared and rebated jambs in cavity walls.	
			Bricks, trowel, spirit level jointing board mortar	23. Construct door and window openings in solid IB-1½B and cavity walls applying appropriate damp exclusion and weathering methods at the opening.	• Guide students how to construct window openings in solid IB-1½B applying damp exclusion and weathering methods.	
				24. Construct decorative brick-work such as block work bonded quoins, diaper bond basket weave and herring bone bond.	• Show common bricks decorative – bricks, trowel spirit level, mortar.	
7			• Timber scaffold tabular scaffold. Coupler, Putlog Transom.	25. Erect for use and dismantle timber and tabular scaffolds in accordance with construction regulations	• Guide student to erect timber and tabular scaffold and be able to dismantle it.	
			Bricks, trowel, spirit level joint board hawk, mortar etc.	26 Set out and construct to specification fire place and chimney	• Guide students to set out and construct fire	

				stack for any class of fuel.	place and chimney stack to specification	
8-9			Set square measuring tape, pegs, nails, digger shovel.	27.Set out and construct to specification septic tank, soak-away and inspection chamber	• Guide student to set out and construct septic tank, soak-away and inspection chamber to specification	
10-12			Mortar, bricklayer tools.	28.Construct to specification roadside channels/gutters in given situations	• Guide students to construct to specification roadside channels/gutters.	
13	**EXAMINATIONS: Practical 60%, Theory 40%**					

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PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN BRICKLAYING, BLOCK LAYING AND CONCRETING		
Module: BLOCKLAYING	**Course Code: CBC 13**	**Contact Hours: 5hrs/week**

GOAL: This module is designed to provide the trainee with the essential knowledge and skill that will enable him perform proficiently in all aspects of block layer's work in the construction industry.

GENERAL OBJECTIVES:

On completion of this module, the trainee should be able to:

1. Understand basic workshop and site safety principles and methods of applications
2. Know the use of various tools and equipment in the block laying trade
3. Know the method of manufacture, properties and application of different types of cement
4. Understand the basic principles and methods of manufacture, properties and application of various blocks
5. Understand the main physical properties and application of various types of aggregates and mortars.
6. Understand the main physical properties and various types of mortar.
7. Understand the basic principles of leveling and be able to carry out simple leveling projects
8. Understand the principles and methods of preparing sites and setting out building
9. Understand the principles of construction of foundations
10. Understand the basic principles of construction of concrete ground floors
11. Understand the principles of construction block work to specification
12. Understand the principles of fixing openings
13. Understand the principles of design and construction of stairs
14. Understand the basic principles of constructing different types of roofs
15. Understand the principles of construction and dismantling of scaffold in accordance to with construction regulation
16. Understand the basic principles of construction and be able to construct coarse and un-coarse rubble walls
17. Understand the principles of construction of simple drainage system

PRORAMME: NATIONAL TECHNICAL CERTIFICATE IN BRICKLAYING, BLOCKLAYING CONCRETE WORK.						
Module: BLOCKLAYING		**Module Code: CBC 13**		**Contact Hours:**		
General Objective 1.0: Understand Basic Workshop And Site Safety Principles And Methods Of Application.						
Week	**Specific Learning Objective:**	**Teachers Activities**	**Resources**	**Specific Learning Objective:**	**Teachers Activities**	**Evaluation**
1	1.1 List types of hazards in the workshop environment relating same to a construction site situation, and stating their causes and methods of prevention. 1.2 State dangerous components in construction, Tools and equipment e.g. drilling machines, Grinding, cutting and circular saw etc.	• Explain as regards to construction, tools and equipment's proper handling and how to prevent accidents both in the workshop and on site. • Discuss hazards that can be caused by poisonous and dangerous gases e.g paint frames, co-carbon monoxide etc.	• Slide, video player and television video, films (related to the subject matter) diskettes etc. • Drilling, grinding cutting machines circular few, • Molding machine etc. • Chisel • Hammer	1.1 Identify various hazards in the workshop environment relating same to a construction site situation, and stating their causes and methods of prevention. 1.2 Identify dangerous components in construction Tools and equipment e.g. drilling machines, Grinding, cutting and circular saw etc. 1.3 Identify dangerous gases and	• Use slide, video films, computer simulation etc. to show and explain construction tools and equipment proper handling and also how to practically prevent accidents both in the workshop and on site. • Show various movable hand tools and machines should be practically displayed and showed to students and the methods of safe handling	• List types of hazards in the workshop environment relating same to a construction site situation. • List dangerous gases and liquids common use in the workshop or construction site. • State the safety precautions in workshop and site.

	1.3 List dangerous gases and liquids common use in the workshop or construction site e.g. paint frames, flammable liquids, acetylene etc.			liquids in common use in the workshop or construction site e.g. paint frames, flammable liquids, acetylene etc.	explained. • Show films and photo clips of the hazards that can be caused by poisonous and dangerous gases e.g paint frames, co-carbon monoxide etc.	

General Objective: 2.0 KNOW THE USE OF VARIOUS TOOLS AND EQUIPMENT IN BLOCKLAYING TRADE.					
Specific Learning Objective:	**Teachers Activities**	**Resources**	**Specific Learning Objective:**	**Teachers Activities**	**Evaluation**
2.1 List common hand tools and equipment/machine use in block laying 2.2 State the use of tools and equipment use in block laying 2.3 State the importance of care and maintenance of block laying tools.	▪ Distinguish by defining and tabulating tools and equipment. ▪ State the use of tools and equipment use in block laying ▪ Explain the importance of care and maintenance of block laying tools. .	• Real objects e.g. laying and pointing trowel, wooden float, spirit level etc. • Chart. • Real object tools. • Charts/Poster. • Projector/Video	2.1 Identify the equipment available in Blocklaying, viz pan mixer, mortar mixer, concrete mixer of various type, damper. 2.2 Sketch/draw with label each of the tools/equipment. 2.3. Select tools for specific craft operation e.g cutting, laying. 2.4 Identify the common tools and their uses. 2.5 Practice correctly how to handle each tool in 2.2 above 2.6 Carry out periodic maintenance of equipment eg concrete mixer. 2.7 Carry out check for efficiency.	▪ Display charts to show equipment in Blocklaying. ▪ Discuss the list of operational procedure of a periodic check/maintenance of the equipment. ▪ Display and name each tool and their uses. ▪ Guide students to identify as each is displayed. • Demonstrate the handling of the common block laying tools. • Present the equipment and demonstrate how to start and stop each identifying the	• List and state the use of tools and equipment in block laying. • List the use of tools and equipment use in block laying. • List care and maintenance of block laying tools. • Explain how to maintain a particular tools • State how to check tools efficiency

				safety precautions involved. • Demonstrate how to carry out check for efficiency. • Organize a maintenance exercise of any of the equipment	

General Objective: 3.0 Know The Method Of Manufacture, Properties And Application Of Different Types Of Cements						
Week	**Specific Learning Objective:**	**Teachers Activities**	**Resources**	**Specific Learning Objective:**	**Teachers Activities**	**Evaluation**
	3.1 List the different types of cement available and give example of where they are use i.e. ordinary. Portland cement, modified Portland cement, non-Portland cement. 3.2 Outline the process of manufacture of ordinary Portland cement. 3.3 Describe the general effects of variation in the properties of ordinary Portland cement e.g. variation in fineness, soundness and setting time. 3.4 State the meaning of the following: ▪ Hydration, setting and	• Explain the types of cement eg Portland cement modified Portland cement and non-Portland cement their properties and area of used. • Discuss the stages of production of ordinary Portland cement. • Explain the following terms a. hydration b. Setting and • Hardening • Discuss handling procedure both large/small quantity. • Explain the physical tests on cement. • Discuss the equipment/apparatus for carrying out tests ievicat apparatus etc.	• Sample of raw material eg line or chalk and clay a. chart of stages of production of cement, b. sample of O.P.C.. c. poster of typical storage of cement in bags and silo. • Sample of the following types of cements:- ▪ Ordinary Portland ▪ Rapid hardening Portland ▪ Low heat Portland soleplate resisting Portland ▪ Portland blast furnace ▪ White Portland Portland pozzolana Super sulphate cement High Alumna • specimen/sample • balance	3.1 Carry out tests using the procedures of testing ie fineness test, sound ness, setting time. 3.2 Identify using line diagrams the stages of production of ordinary Portland cement. 3.3 Display the equipment/apparatus for carrying out tests ievicat apparatus etc. 3.4 Demonstrate the experiment. 3.5 Carry out the tests. 3.6 Prepare a wooden plate form.	• Guide students the tests and procedures of testing ie fineness test, sound ness, setting time. • Show using line diagrams the stages of production of ordinary Portland cement. • Display the equipment/apparatus for carrying out tests ievicat apparatus etc. • Demonstrate the experiment. • Groups the students and task them to carry out the tests.	• List the different types of cements. • What are the advantages of handling cement in silos and in bags. • Discuss the result of the group test

	hardening of cement ascertain the suitability of cement. 3.5 Explain the relative advantages of handling cement in silos and in bags. 3.6 Identify by visual inspection a sound cement. 3.7 List the procedure of carrying out the following test and equipment. - fineness, soundness, setting time.		• apparatus ievicat • le chatelier • briquette mold.			

General Objective 4.0: Understand The Basic Principles and Methods of Manufacture, Properties and Application of Various Blocks.						
Week	**Specific Learning Objective:**	**Teachers Activities**	**Resources**	**Specific Learning Objective:**	**Teachers Activities**	**Evaluation**
5-6	4.1 List the different types of blocks – sandcrete, clay/mud, glass, facing 4.2 Outline the process of production of sandcrete blocks. 4.3 Identify reason for the control of quantity and quality of mixing water. 4.4 List defects in manufactured blocks and state their causes 4.5 List types of blocks in terms of sizes 4.6 State the merits and demerits of mechanically vibrated and manually vibrated blocks 4.6 Describe in the process of manufacturing blocks. 4.7 Define Porosity/permeability of a given block	• Explain different types of blocks. • Identify materials used in production of each. • Distinguish between hollow and solid. • Explain types of blocks in terms of sizes (100, 150 & 225mm) • Explain the method of producing and curing blocks and the materials required. • Explain Porosity permeability	• Sandcrete blocks (solid and hollow • Clay or re mod blocks. • Glass blocks • Hand mould • Typical training workshop • Material laboratory • Cement • Sand • Head pan • Spade • Manual Molding machines • Water	4.1 Identify different type of block 4.2 Use line diagram to explain process of production of sandcrete block emphasizing on the amount of water added during the mixing 4.6 Produce specific numbeof blocks, given the material. 4.3Mix properly with hand or machine mortar used for molding block. 4.4 Mold specified number of blocks using a	• Show different blocks. • Explain with line diagram the process of production of sandcret block emphasizing on the amount of water added during the mixing added during the mixing of mortar. • Guide the student in production of specific number of blocks, given the material. • Guide to apply the correct curing method after production.	• **S**tate reason for the control of quantity of mixing water. • List defects in manufactured blocks and state their causes • Show and name molding resources • Define Porosity/permeability of a given block

		of a given block • Determine the quantity of sand by ratio knowing the amount number of bags of cement to be used. • Explain some defects that may show and give reason for them		a).manual molding b).machine mold. 4.5 Conduct tests to determine the compressive strength. 4.6 Apply the correct curing method after production.		

General Objective 5.0: UNDERSTAND THE MAIN PHYSICAL PROPERTIES AND APPLICATION OF VARIOUS TYPES OF AGGREGATES.						
Week	**Specific Learning Objective:**	**Teachers Activities**	**Resources**	**Specific Learning Objective:**	**Teachers Activities**	**Evaluation**
	5.1 Define aggregates and distinguish between fine and course aggregates. 5.2 Explain various aggregates by their sources and used i.e. natural, artificial, light weight (refectory) etc. 5.3 Distinguish between the range of particles size of coarse and tine aggregate 5.4 Describe different ways of collecting aggregate for test 5.5 State the effect of sieve test and plot the sieve analysis	▪ Describe aggregate i.e. sand/gravel or granite, the ▪ aggregate is defined and their use in ▪ construction or mortar. ▪ List and classify aggregate by theirnature or use. ▪ List the sieve sizes for grading of both Fine and coarse aggregates. ▪ Describe the process of carrying out grading of aggregates from sampling of aggregates to fineness.	▪ Sample of aggregates. ▪ Quartering gauge ▪ Riffle box ▪ Balance ▪ A table of a complete job ▪ The graphs sheet. ▪ Photograph of an aggregate stock pile.	5.1 Identify sample of fine/coarse. 5.2 Carry out tests on aggregate and determine the purpose of silt, bulking colour matric etc. 5.3Determinephysical tests on aggregates. 5.4 Describe various ways of storing, aggregates on the site i.e. aggregates stock piling, storage bins.	• Identify sample of fine/coarse. • Demonstrate tests on aggregate and determine the purpose of silt, bulking colour matric etc. • Describe physical tests on aggregates. • Show various ways of storing, aggregates on the site i.e. aggregates stock pilling, storage bins.	• Define aggregates and distinguish between fine and course aggregates

	and interpret.	▪ Describe various ways of storing aggregates on the site.				

General Objective: 6.0 UNDERSTAND THE MAIN PHYSICAL PROPERTIES AND VARIOUS TYPES OF MORTAR.						
Week	**Specific Learning Objective:**	**Teachers Activities**	**Resources**	**Specific Learning Objective:**	**Teachers Activities**	**Evaluation**
9-12	6.1 Define mortar and list the qualities of a good mortar as used in construction industry. 6.2 Explain workability. 6.3 Determine factors affecting workability. 6.4 Identify the advantages of mechanical mixing over manual mixing. 6.5 Explain factors affecting mixing. 6.6 Determine the use of admixture in mortar.	• State mortar and identify the four types of mortar and uses. a. Line mortar. b. Cement mortar c. Cement line mortar or ganged d. Mortar. e. Refractory mortar • Explain the two methods of mixing and factors affecting the choice. • State workability, water, cement ratio, aggregate cement ratio. • Specify by tabulating mix ratio/type of mortar for various jobs. • Describe various ways of achieving a workable mortar.	• Sample of line light weight aggregate. a. Sand b. binding agent c. concrete platform d. shovel e. deadpa f. pan mixer g. water h. cement i. mixer	6.1 Specify the type and mix ratio for a particular purpose 6.2 Describe a mix ratio and asked students to measure out by volume the sand and cement content. 6.3 Describe various ways of achieving a workable mortar. 6.4 Demonstrate the application of mortar for various uses in construction	▪ Specify the type and mix ratio for a particular purpose ▪ Describe a mix ratio and asked students to measure out by volume the sand and cement content. ▪ Describe various ways of achieving a workable mortar. ▪ Demonstrate the application of mortar for various uses in construction	▪ Define mortar and list the qualities of a good mortar as used in construction industry. ▪ State factors affecting mixing (mortar/concrete)

		• Given a mix ratio student are asked to measure out by volume the sand and cement content. • Mix by turning until a uniform colour is achieved. • Add water to achieve required workability.				
EXAMINATIONS: 60% Practical : 30% Theory						

General Objective: 7.0 Understand The Basic Principles of Levelling and Be Able To Carry Out Simple Levelling Projects						
Week	**Specific Learning Objective:**	**Teachers Activities**	**Resources**	**Specific Learning Objective:**	**Teachers Activities**	**Evaluation**
	7.1Explain leveling. 7.2 Describe the process of leveling i.e. rise and fall method and instrument height. 7.3 Compute reduced level from given data.	• Explain levelling. • List various equipment used in levelling. • Describe each method and their accuracy. • Explain the two methods. 1. rise and fall , and 2. instrument height. • Compute reduced level from the given date	▪ Spirit/Plumb level ▪ Transparent tiny rubble tube ▪ Pegs ▪ Boring rods ▪ Dumpy level ▪ Tilting level ▪ Staff ▪ Measuring ▪ Tape (manual and digital ▪ Water level ▪ Theodolite Same as above	7.1 Book readings and recording correctly. List different tools and equipment used in transferring levels. i.e. a. Plumb level and pegs b. water level c. bunny rods and pegs d. leveling instrument. 7.2 Carry out the two leveling processes. 7.3 Run the level, book and compute.in group	• Show how to book readings correctly ▪ Demonstrate with the students the two-leveling process. • Given a particular area group the students and ask them to run the level, book and compute. • Given a particular area group the students in fire and ask them to run the level, book and compute.	• Define leveling. • Compute reduced level from given data.

General Objective: 8.0 UNDERSTAND THE PRINCIPLES AND METHODS OF PREPARING SITES AND SETTING OUT BUILDING.						
Week	**Specific Learning Objective:**	**Teachers Activities**	**Resources**	**Specific Learning Objective:**	**Teachers Activities**	**Evaluation**
	8.1 Outline the basic considerations in the preparation of the following in site. a. access roads b. temporary structure c. hoarding etc. 8.2 Explain the importance of removal of top soil/vegetable soil. 8.3 Explain different types of soil; 8.4 Explain the purpose of establishing datum level on site. 8.5 Differentiate between layout and setting out. 8.6 Explain the importance of building line. 8.7 Explain at least two	• Explain what is meant by preliminary site work thereby identify the temporary services and importance. • Discuss the method of clearing and the reason for removal of vegetable/top soil. • Explain, giving example different types of soil. a. Rock b. Firm c. Made up soil etc • Describe datum peg and its establishment.	• Chart/picture of various earth moving equipment. • Soil sample • Typical set of building drawing • Measuring tape • Builders squares Theodolite • Sets of drawing • School field or plain ground • Buildings square • Tape etc. • Sprit level (plumb)	8.1 Identify using simple drawing various tools and materials used in simple setting out exercise 8.2 Carry out setting out using the following methods. a. builders/iron b. square c. method 8.4 Set out a simple rectangular building on a plain site using a builder square iron square. 8.5 Show the line and peg method of setting out.	• The student are groups to carry out this exercise given different simple drawing • Demonstrate how to carry out setting using various methods • Show how to set out a simple rectangular building on a plain site using a builder square iron square.	• Show and name the given survey/leveling materials • Explain the importance of removal of top soil • List the different types of soil. • Differentiate layout and setting out • List ways of checking accuracy of setting out

	ways to check accuracy of setting out. 8.8 Explain the process of construction of trained for setting out of irregular shapes. 8.9 Explain line and peg method of setting out..	• Distinguish between layout and setting out. • Explain the establishment of building list, then the other sides of French. Introductions • Explain at least two ways to heck accuracy of setting out. • Describe the process of setting out of irregular shapes.				

General Objective 9.0: UNDERSTAND THE PRINCIPLES OF CONSTRUCTION OF FOUNDATIONS						
Week	**Specific Learning Objective:**	**Teachers Activities**	**Resources**	**Specific Learning Objective:**	**Teachers Activities**	**Evaluation**
	9.1 List properties of different types of soil . 9.2 Distinguish between site and soil investigation. 9.3 List the materials used in production of foundation concrete (cement, sand and granite). 9.4 State safety precautions in construction of foundation 9.5 Define the bearing capacity of a soil 9.6 Solve some problems involving bearing capacity 9.7 Identify methods of preventing collapse of trench 9.8 Define the angle of repose. 9.9 State the reasons for the following practices.	• State properties of different types of soil. • identify on the chalkboard. equipments. • Explain the difference between site and soil investigatio n • List the materials used production of cement sand granite. • Explain safety precaution in construction of foundation. • Give	• Real object i.e sample of soils. • Charts. • Pictures. • Chalkboard. • Complete drawing instrument • T. Square. • Pair of compass. • Lesson notes	9.1 Select the necessary tools for manual excavation. 9.2 Identify mechanism by drawing various earth moving equipment. 9.3 Describe various way of site drainage. • Identify with sketches the timbering system for the following situations. a. Shallow trench in moderately firm soil. b. Shallow trench in loose soil. c. Shallow trench in water logged area. 9.4 Describe the functions of foundation. a. List types of foundation. b. Sketch different types of	• Demonstrate selection of the necessary tools for manual excavation. • Use drawing to describe mechanism of various earth moving equipment. • Display charts, posters and pictures illustrating the mechanism of earth moving equipment. • Identify various ways of site drainage. - Sump hole. -Laying of perforated pipes. -Dewatering etc. • Using instrument to draw the timbering suitable	• Explain bearing capacity of soil • State properties of soil • Distinguish site and soil investigatio n

	a. ramming of trench base before casting concrete foundation. b. Casting concrete foundation c. Ant termite application d. Ramming in layers for very deep refill	reasons for these craft operation, These include ; -formation of a solid and a flat base . -Avoiding loose soil		foundations. c. Identify their uses.	for a loose shallow trench and give assignment. • Mount the picture of a runway showing the arrangement of kerbs, precast paves and channels. • Work example using a working drawing.	

General Objective 10.0: UNDERSTAND THE BASIC PRINCIPLES OF CONSTRUCTION OF CONCRETE GROUND FLOORS						
Week	**Specific Learning Objective:**	**Teachers Activities**	**Resources**	**Specific Learning Objective:**	**Teachers Activities**	**Evaluation**
	10.1 State the functions of ground floors, solid and suspended. 10.2 State the functions of damp proof course. 10.6 List common damp proof materials. 10.7 Give reason for the following . a. minimum thickness of over-site concrete b. placement correct positioning of DPC c. concrete mix for over site concrete. 10.1 State the functions of hardcore in foundation concrete	• Lists the functions of ground floors, solid and suspended • Explain the functions of damp proof course. • Describe some damp proof materials • Explain reason for the following: a. minimum thickness of over-site concrete b. placement correct positioning of DPC c. concrete mix for over site concrete. • Describe the functions of	• Chalkboard • Lesson notes • Sketches • Drawing • Real object eg. Hardcore damp proof materials. • A typical project site where casting of over-site concrete is in progress.	10.1 Sketch sections across. a. Solid ground floor b. Suspended floors c. German floors 10.2 Identify by labeling the members with sizes. 10.3 Describe the placement of main and distribution bars in suspended floor. 10.3Carry out a visit to a standard construction site 10.5 Use necessary safety wears in the site and ask questions and jot answers..	• Sketch the types of floors on the chalkboard. a. solid b. suspended • Emphasize on the sizes of components and the point of placement and give reasons. • Show the placement of main and distribution bars in suspended floor. • Organise a visit to a standard construction site • Introduce the students and provide necessary safety wears and ask students to questions and jot observations.	• What are the benefit of PPE • List common damp proof materials • Enumerate the common types of damp proof materials

	10.2 List the types of local materials suitable for hardcore.	hardcore. • Specify the quality and type of local material suitable.				

General Objective 11.0: UNDERSTAND THE BASIC PRINCIPLES OF CONSTRUCTING BLOCK WORK TO SPECIFICATION						
Week	**Specific Learning Objective:**	**Teachers Activities**	**Resources**	**Specific Learning Objective:**	**Teachers Activities**	**Evaluation**
	11.1 State the functions of a block wall. 11.2 List the common bond in block wall construction . 11.3 Explain the following types of walls; load bearing, partition walls, parapet, party walls etc. 11.9 Define a threshold 11.10 Describe method of constructing threshold.	▪ List and explain the function of brick wall. ▪ List the different types of walls and give brief definition and uses ▪ Explain Threshold and method of construction ▪ Explain Advantage and disadvantages ▪ Work some examples and give assignment. ▪ Write some example and give assignment. .	• Lesson plan • Chalk board • Charts • Drawing/sketches. Same - Handout/drawing - Common bricklaying tools Line mortar.	11.1 Sketch different provision for future continuation of job. 11.2 Interpret block work construction form a working drawing. 11.3 Describe with sketches /drawing the following methods of bridging openings. a. precast lintel b. cast insitu lintel c. soldier bricks with reinforcement rod/angle iron d. Arches – Semi-circle e. segmental; f. camber g. three cantre 11.4 Sketch the	• Show how to sketch – Toothing raking back on the black board and explain their uses. • Explain or differentiate between precast and cast in situ.. • Show how to sketch a typical mould and form work for each. • Draw to scale showing construction lines and parts of a semi circle arch. • Give assignment to draw – three centrearch. • Use working drawing to show how to estimate the quantity of materials allowing for damages. • Show the sketch	• Use sketches to describe different types of walls • State advantages and disadvantages of threshold • Estimate quantity of materials required from a working drawing

	11.11 State advantages and disadvantages. threshold			following features in wall construction. a. Sill b. Canopy, c. copping, **d.** attached piers **e.** detached piers 11.4 Estimate the quantity of material allowing for damages using a working drawing. 11.5 Sketch a threshold. 11.6 Sketch fixing of door/window frames as the construction continues. 11.7 Sketch fixing of door/window frames at the completion of construction. 11.8 Distinguish between pointing and jointing sketch different types used in wall construction. 11.9 Sketch the two	of; sill, canopy, copping, pier and state their uses. • Describe using sketch, fixing of door/window frames at the completion of construction. • Describe jointing and pointing, sketch different types used in wall construction. • Show with sketch the two methods of fixing, giving the importance of stile in wooden and metal frames. • With a prepared drawing/handout, set out walls with attached pier and demonstrate the construction process for course 12.7. • This is repeated in the following cases at separate practical session. - Curved wall on plan	

				methods of fixing, giving the importance of stile in wooden and metal frames. 11.10 Set out and construct to specification attached and detached piers . 11.11 Interpret given working drawing, set out and construct brick walls circular complain. 11.12 Set out and construct to specification brick. 11.13 Thresholds. 11.14 Select tools for pointing/jointing exercise. 11.15 Set out and construct to specification brick. • Thresholds. 11.16 Mix a workable mortar using line/admixture	- Threshold Jointing and pointing • Set out and construct to specification brick. • Thresholds. • Select tools for pointing/jointing exercise. • Show how to mix a workable mortar using line/admixture	

General Objective 12.0: Understand The Principles of Fixing Openings						
Week	**Specific Learning Objective:**	**Teachers Activities**	**Resources**	**Specific Learning Objective:**	**Teachers Activities**	**Evaluation**
	12.1 List Nigerian timbers and timber products suitable for window and door construction. 12.2 Explain the methods of conversion and seasoning timber for carpentry and joinery work. 12.3 State the functions of openings in dwillings e.g. light ventilation, privacy, exclusion of external weather. 12.5 List various types of doors, windows, ironmongery and state their	▪ Describe Nigerian timbers and timber products suitable for window and door construction. ▪ Discuss the method of converting and seasoning timber for carpentry and joinery work. ▪ Explain the functions of openings in drillings e.g. light ventilation, privacy, exclusion of external weather. ▪ Describe various types of door and window ironmongery and state their uses. ▪ Explain the difference between wooden shutter windows	▪ Different types of doors and windows aluminum doors and windows Picture, charts	12.1 Describer with sketches various types of timber and metal doors and windows including their node of operation. 12.2 Describe the need for the provision of weathering in structures (e.g. sill) at openings and describe with sketches structures used in simple dwellings.	• Demonstrate with sketches various types of timber and metal doors and windows including their node of operation. • Explain the need for the provision of weathering in structures (e.g. sill) at openings and describe with sketches structures used in simple dwellings.	• List various types of doors and windows and state their uses • Explain the method of conversion and seasoning of timber • List types of timbers obtain in Nigeria suitable for doors and window construction

	uses.	and doors, steel windows and doors, crittal-Hope type Windows and doors, Aluminum projected windows and sliding doors etc.				
	EXAMINATIONS: Practical = 60%; Theory = 40%					

General Objective 13.0: Understand The Principles of Design and Construction of Stairs.						
Week	**Specific Learning Objective:**	**Teachers Activities**	**Resources**	**Specific Learning Objective:**	**Teachers Activities**	**Evaluation**
	13.1 List the types of stairs 13.2 Define the basic principles of construction of a straight flight timber/concrete/steel stairs. 13.3 List the different parts of stairs 13.4 Mention the difference between timber, concrete and steel staircases	• State the basic principles of construction of a straight flight timber/concrete/steel stairs. • Differentiate between timber, concrete and steel stair cases to the student.	• Pictures, Real Objects films, Timber Stairs	13.1 Describe with the aid of sketches, the different types of stairs e.g. straight flight, dog-open well, spiral etc. 13.2 Describe with sketches the design standards for the construction of stairs e.g. riser tread relationship, minimum headroom standard sizes of structural members etc	• Explain with the aid of sketches, the different types of stairs e.g. straight flight, dog-open well, spiral etc. • Explain with sketches the design standards for the construction of stairs e.g. riser tread relationship, minimum headroom standard sizes of structural members etc	• List the types of stairs • Differentiate dogleg and open-well stair case • Identify the differences between timber, concrete and steel stair cases

General Objective 14.0: UNDERSTAND THE BASIC PRINCIPLES OF CONSTRUCTING DIFFERENT TYPES OF ROOFS						
Week	**Specific Learning Objective:**	**Teachers Activities**	**Resources**	**Specific Learning Objective:**	**Teachers Activities**	**Evaluation**
3-4	14.1 List basic roof types e.g. flat roof, pitch roof, concrete flat roofs etc. 14.2 List the different parts roof. 14.3 Describe the materials, maximum allowable span and Application of the various roof types in use . 14.4 Name various roof covering suitable for tropical use.	• Explain basic roof types e.g. flat roof, pitch roof, concrete flat roofs etc. • State the different parts roof. • Describe the materials, maximum allowable span and Application of the various roof types in use • Define various roof covering suitable for tropical use.	• Pictorial representation of the various roof types to the student while describing each.	14.1Describe with sketches, basic roof types and Profiles e.g. beam and slabs as in concrete flat roofs Lattice and similar guiders, trusses (Howe truss, double , for truss, truss rafter, standard fink French Truss, North light truss, couple, umbrella, bow string, etc), portal frames, shall roofs, folded plates etc. 14.2Describe the representation of the various roof types.	• Show with sketches, basic roof types and Profiles e.g. beam and slabs as in concrete flat roofs Lattice and similar guiders, trusses (Howe truss, double , for truss, truss rafter, standard fink French Truss, North light truss, couple, umbrella, bow string, etc), portal frames, shall roofs, folded plates etc • Show pictorial representation of the various roof types to the student while describing each.	• List the basic roof types • List the different parts of a roof • Use sketch to show different types of roof

General Objective: 15.0 Understand The Principles of Construction and Dismantling of Scaffold In Accordance With Construction Regulation						
Week	**Specific Learning Objective:**	**Teachers Activities**	**Resources**	**Specific Learning Objective:**	**Teachers Activities**	**Evaluation**
5-6	15.1Define the following scaffolds. • bracket scaffold • putlog • independent • trestle 15.2State situation where each in (15.1) is most suitably used. 15.3Identify the members in (15.1). 15.4State safety precautions peculiar to scaffolding and cranes. 15.5Explain the relative advantage of timber and tubular scaffold.	▪ Describe external and internal wall finishes e.g. paint, wall paper, premix finishes, etc. ▪ Discuss the method of applications of the items in 12.1, ▪ Describe the types of ceiling and their functions ▪ State various types of finishes for joinery works and explain their application e.g. vanish, polish, paint etc. ▪ Explain	• Lesson plan • Real objects – gin wheel and chain • Pictures, posters of cranes • Couplers • Other componen ts. • Scaffold tubes • Couplers • Spanners • Wrench etc.	15.1 Describe with sketches the following scaffolds. • bracket scaffold • putlog • independent • trestle 15.2 State situation where each is most suitably used. 15.3 Identify the members in (15.1 above) 15.4 Sketch a gin wheel as it is attached to scaffold. 15.5 Show the sketch supports with bridle at window opening. 15.6 Practice safety precautions	▪ Define the following scaffolds. • bracket scaffold • putlog • independent • trestle ▪ State situation where each is most suitably used. ▪ Identify the members. ▪ State safety precautions peculiar to scaffolding and cranes. ▪ Explain the relative advantage of timber and tubular scaffold. ▪ Describe various hoisting equipment for hoisting material on site. • gin wheel	• State the safety precaution in using scaffold • Sketch an independent scaffold • State the relative advantages of using steel scaffold over timber scaffold.

	15.6 Describe various hoisting equipment for hoisting material on site. • gin wheel • scaffold crane • stationery crane • mobile cranes 15.7 State the components of scaffold and its uses.	components of scaffold and name.		peculiar to scaffolding and cranes. 15.7 Erect a put log scaffold. 15.8 Erect transom scaffold. 15.9 Erect timber/bamboo scaffold. 15.10 Dismantle the putlog scaffold. 15.11 Dismantle transom scaffold. 15.12 Dismantle timber/bamboo scaffold.	• scaffold crane • stationery crane • mobile cranes ▪ State the components of scaffold and its uses.	

General Objective: 16.0 Understand The Principles of Construction and Be Able To Construct Coarsed And Uncoarsed Rubble Walls.						
Week	**Specific Learning Objective:**	**Teachers Activities**	**Resources**	**Specific Learning Objective:**	**Teachers Activities**	**Evaluation**
8-9	16.1 List types of stone in Nigeria suitable for walling i.e granite, marble etc. 16.2 Describe the process involve in preparation of plastering. 16.3 List various bonding patterns available.	• Describe the different types of stones. • In tabular form state the process involved in preparation of stone from rock. • Identify mix proportion of mortar for setting of stone wall.	• real objects • stone samples • pictures	16.1 Sketch each bonding pattern available. 16.2 Specify mortar mix for stone setting	▪ Describe using sketch each bonding pattern available.	• Describe types of stones available in Nigeria for walling • State the process involve in preparation of plastering

General Objective 17.0: UNDERSTAND THE PRINCIPLES OF CONSTRUCTION OF SIMPLE DRAINAGE SYSTEM.						
Week	**Specific Learning Objective:**	**Teachers Activities**	**Resources**	**Specific Learning Objective:**	**Teachers Activities**	**Evaluation**
10-11	17.1 Explain the functions of kerbs. 17.2 List the types of bricks and jointing mortar suitable for construction of channels/gutters. 17.3 Give reasons for channeling of drainage and state the factors which determine the better angles	• Describe Kerbs and state their functions. • Specify the materials used in production ie cement, sand and granite. • State reasons for channeling of drainage and state the factors which determine the better angles	• Charts • Pictures.	17.1 Sketch and describe different forms of kerbs and state materials for production. 17.2 Describe with sketches a methods of laying precast concrete kerbs. State standard sizes of kerbs. 17.3 Carry out visit to a road construction project	• Show how to sketch: (1)combine system (2) separate system. • Describe with detail sketches the structural detail of. a. Septic tank b. Soak-away c. Inspection chamber/manhole d. Cesspool e. Intercepting chamber • Display a typical mechanical drawing • pick detail from the drawing and explain fixing of fittings. • Using a typical standard site plan locate. - soak-away - septic tank - cesspool as the case may be	• Explain the functions of kerbs • List materials use for construction of channel gutters • State the procedures in laying of kerbs
	EXAMINATIONS. 60% Practical ; 30% Theory					

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN BRICKLAYING, BLOCK LAYING AND CONCRETING		
MODULE: CONCRETING	**Course Code: CBC 14**	**Contact Hours: 12hrs/wk**

GOAL: This module is designed to provide the trainee with the basic knowledge of the properties and application of concrete as well as the skill in the production of sound concrete structures.

GENERAL OBJECTIVES:

On completion of this module, the trainee should be able to:

1. Understand the functions and methods of maintaining of common concreting tools and equipment
2. Understand the properties of aggregates in relation to their use in concrete production
3. Know the properties and application of different types of cement
4. Understand the use and application of stones in construction
5. Understand how to relate the properties of concrete to its application as a construction material
6. Understand the use and application of earth soil and laterite in construction
7. Understand the principles and methods of proportioning, mixing and testing concrete and be able to carry out the operations.
8. Know the principles and methods of handling, transporting, placing and curing concrete.
9. Understand the principles and methods of constructing joints in concrete structures
10. Understand the use of form-work in construction and its application in construction.
11. Understand the basic principles and methods of reinforcing simple concrete structures.
12. Understand the basic principles and conventional methods of structural detailing.
13. Understand how to produce sound reinforced and mass concrete structures to specification.
14. Understand the basic principles of production and use of pre-stressed concrete in the construction industry

Week	Specific Learning Objective:	Teachers's Activities	Learning Resources	Specific Learning Outcomes	Teachers' Activities	Evaluation
	1.1 List some concreting common hand tools eg club hammer, tapping rod, wheel barrow, head pan, mixing board, spirit level tamper. 1.2 Explain the functions of the tools and equipment in 1.1 1.3 State reasons for routine care and maintenance of the tools and equipment.	• Discuss some concreting common hand tools eg club hammer, tapping rod, wheel barrow, head pan, mixing board, spirit level tamper. • State the functions of the tools and equipment in 1.1 • Discuss reasons for routine care and maintenance of the tools and equipment.	• Wheel barrow, sprit its level, head pan, club hammer etc.	1.1 Identify with sketches the concreting common hand tools and equipment eg club hammer, tapping rod, wheel barrow, head pan, mixing board, spirit level tamper. 1.2 Carry out a task using the tools listed above appropriately. 1.3 Carry out routine care and maintenance of the tools and equipment.	• Demonstrate with examples common hand tools and equipment eg club hammer, tapping rod, wheel barrow, head pan, mixing board, spirit level tamper. • Guides the students on how to use the tools listed above in 1.1. • Demonstrates how these tools and equipment (in 1.1) are cared for and maintained	• Identify concreting tools • State reasons for caring tools • Carryout maintenance of tools and equipment

General Objective 2.0: Understand The Properties of Aggregates in Relation To Their Use In Concrete Production						
Week	**Specific Learning Objective:**	**Teachers's Activities**	**Learning Resources**	**Specific Learning Outcomes**	**Teachers' Activities**	**Evaluation**
	2.1 Classify aggregates as natural and artificial, and give examples under each class 2.2 Explain the uses of aggregate 2.3 Distinguish between the range of particles size of coarse and fineaggregates. 2.4 State the factors to be considered in specification of maximum particle size for given jobs. 2.5 State the purpose of sieve test. 2.6 Explain the purpose of the following tests and describe methods of carrying them out:	• Lists the natural and artificial aggregates to students e.g. natural – sand, gravel, crushed stone, etc. Artificial – foamed slag, clinker breeze, slag, saw-dust. • State examples of factors to include (i) dimension of concrete member to be cast. (ii) cover for reinforcement (iii) Ease of handling wet concrete (workability). • Discuss the purpose of sieve test. • Identify between the range of particles size of coarse and fine aggregates and	• Sketches, sand gravel crushed stone saw-dust etc. • Sieve • Coarse aggregate • Fine aggregate etc.	2.1 Identify natural and artificial aggregates e.g. natural sand gravel, crushed stone, Artificial foamed slag, clinker breeze, slag, saw-dust etc. 2.2 Carry out sieve test. 2.3 Identify the range of particles size of coarse and fine aggregates **2.4** Carry out following tests and describe methods of carrying them out: a. Silt b. Bulking c. moisture content d. colour metric	• Guide the students how to identify natural and artificial aggregates to students e.g. natural – sand gravel, crushed stone, etc. • Guide the students on how to carry out sieve test. • Guide the students on how to identify the range of particles size of coarse and fine aggregates and factors to be considered in specification of maximum particle size for given jobs. • Demonstrate the following tests and describe methods of	• Identify types of aggregate and state their uses • Explain concreting process • State the precaution necessary in carrying out test -sieve analysis -silt • Bulking -moisture content -physical test • Explain the purpose of carrying out the following test: -sieve analysis -silt • Bulking -moisture content -physical test • Explain the various method of measuring the quantity and

	1. silt 2. bulking 3.mixture 4.content 5.colour metric 6.physical tests. 2.7Explain specific quantities of aggregates (fine and coarse) for concrete work and state reasons for the specification 2.8 State the reasons for specification of quantity of aggregate 2.9 List the three methods of measuring the quantity and suitability of aggregates on sites. 2.10 Explain the three methods of measuring the quantity and suitability of	state the factors to be considered in specification of maximum particle size for given jobs. • Discuss the purpose of the following tests and describe methods of carrying them out: a. silt b. bulking c. moisture content d. colour metric e. physical tests. • Discuss the specified quantities of aggregates (fine and coarse) for concrete work and state reasons for the specification		e.physical tests. 2.5 Specify the quantities of aggregates (fine and coarse) for concrete work and state reasons for the specification. 2.6 Carry out sieve test procedures as it involves aggregate sampling, , sieving and record results. 2.7 Carry out tests in the laboratory of the following:. Silt them out test, colour-metric test and physical test. 2.8 Use the test in 2.7 to determine the quantities of	carrying them out: a. silt b. bulking c. mixture content d. colour metric e. physical tests. • Guide the students to Specify the quantities of aggregates (fine and coarse) for concrete work and state reasons for • Guide to carry out sieve test procedures as it involves aggregate sampling, , sieving recording of results • Guide to carry out the tests with the students in the school	sustainability of aggregate

	aggregates on sites. 2.11 Explain methods of storing and protecting aggregates on sites e.g. Stock piling, use of storage bins, rock ladder etc.	• Discuss the three methods of measuring the quantity and suitability of aggregates on sites. • Discuss methods of storing and protecting aggregates on sites e.g. Stock piling, use of storage bins, rock ladder etc.		given samples of aggregates.	laboratory e.g. Silt them out, test colour-metric test, physical test. • Demonstrate how to use the test in 2.4 to determine the quantities of given samples of aggregates.	

General Objective: 3.0 At The End of The Module Students Will Understand Basic Principles of Manufactures, Properties And Application of Different Types of Cements.						
Week	**Specific Learning Objective:**	**Teachers's Activities**	**Learning Resources**	**Specific Learning Outcomes**	**Teachers' Activities**	**Evaluation**
	3.1 List the properties and uses of the following types of cements: Ordinary Portland, Rapid hardening Portland, Sulphate resisting Portland, Portland-blast furnace, white Portland, Portland Pozzolana, super sulphated cement and High alumina. 3.2 Describe the process of manufacture of ordinary Portland cement. 3.3 Explain the importance of the following properties of ordinary	• Discuss the properties and uses of the following types of cements: Ordinary Portland, Rapid hardening Portland, Sulphateresiting Portland, Portland-blast furnace, white Portland, Portland Pozzolana, super sulphated cement and High alumina. • Discuss the process of manufacture of ordinary Portland cement. • Discuss	Charts	3.1 Carry out simple tests to determine fineness, Soundness and setting time of ordinary Portland cement. 3.2 Show a line diagram of the production process of ordinary Portland cement. **3.3** Demonstrate how to handle cement in silos and in bags and state storage precautions. **3.4** demonstrate three methods of assessing the quantity and suitability of ordinary Portland cement on site.	• Guides to Carry out simple tests to determine fineness, Soundness and setting time of ordinary Portland cement. • Demonstrates a line diagram of the production process of ordinary Portland cement. • Guide how to handle cement in silos and in bags and state storage precautions. • Guide to demonstrate three methods of assessing the quantity and suitability of ordinary Portland cement on site.	• List the properties of cement • Determine the fairness, soundness and setting time of cement • Identify various types of Portland cement. • Explain the various methods of storing cement. • Explain the processes of manufacturing cement. • Distinguish between setting and hardening of cement • Explain health hazards associated to handling of Portland cement

	Portland cement (I)fineness (ii)Soundness (iii)Setting time. 3.4 Define hydration 3.5 Distinguish between setting and hardening of cement. 3.6 Explain the relative advantage of handling cement in silos and in bags and state storage precautions. 3.7 List health hazards related to cement handling and state the precaution measures against them. 3.8 Describe three methods of assessing the quantity and suitability of ordinary Portland cement on site.	hydration and distinguish between setting and hardening of cement. • Enumerate the relative advantage of handling cement in silos and in bags and state storage precautions. • Discuss health hazards related to cement handling and state the precaution measures against them. • Explain three methods of assessing the quantity and suitability of ordinary Portland cement on site.				

General Objective: 4.0 Understand The Use And Applications of Stones In Construction Works						
Week	**Specific Learning Objective:**	**Teachers's Activities**	**Learning Resources**	**Specific Learning Outcomes**	**Teachers' Activities**	**Evaluation**
	4.1 Describe the types of stones used in construction works such as, lime stone, sand stone granite, slates etc. 4.2 State the uses of each of the stones. 4.3 Describe the composition of the stones. 4.4 Explain the methods of production of stones. 4.5 Describe the characteristics of stones such as specific weights,	• Discuss the various types of stones used in construction works such as, lime stone, sand stone granite, slates etc. • Enumerate the uses of each of the stones. • Discuss the composition of the stones. • Discuss the methods of production of these stones. • Discuss the characteristics of stones such as specific weights, compressive strength, water absorption, effect on fire, moisture expansion, effect of	• Charts, various types of stones. • videos	4.1 Describe to the students how to make models of walls, cladding, plinths, steps, floor stairs, coping etc with stones. 4.2 Carry out tests to determine the characteristics of stones such as specific weights, compressive strength, water absorption, effect on fire, moisture expansion, effect of chemicals, resistance to salts, thermal expansion, conductivity, durability.	• Demonstrate to the students how to make models of walls, cladding, plinths, steps, floor stairs, coping etc with stones. • Guide students on how to carry out tests to determine the characteristics of stones such as specific weights, compressive strength, water absorption, effect on fire, moisture expansion, effect of chemicals, resistance to salts, thermal expansion, conductivity, durability.	• Identify different types of cement • Explain the uses of stones in construction • Explain the various methods of stone production • Enumerate the characteristic of stone in construction

	compressive strength, water absorption, effect on fire, moisture expansion, effect of chemicals, resistance to salts, thermal expansion, conductivity, durability	chemicals, resistance to salts, thermal expansion, conductivity, durability				

General Objective 5.0: Understand The Properties of Concrete In Relation To Its Application as Construction Material.						
Week	**Specific Learning Objective:**	**Teachers's Activities**	**Learning Resources**	**Specific Learning Outcomes**	**Teachers' Activities**	**Evaluation**
	5.1 Explain concrete and the functions of each ingredient in concrete. 5.2 Outline the properties that make concrete an important construction material egmould ability, strength, durability, fire resistance etc. 5.3 Explain the use of mass/dense and light-weight concrete in construction. 5.4 Describe concrete in terms of the following properties – Drying Shrinkage, fire	• Discuss concrete and state the functions of each ingredient in concrete. • State the properties that make concrete an important construction material e.g. mold ability, strength, durability, fire resistance etc. • Discuss the use of mass/dense and light-weight concrete in construction. • Discuss concrete in terms of the following properties – Drying Shrinkage, fire resistance, thermal movement	a. Charts concrete. b. Chart c. Cement d. Sand e. Water	5.1 Demonstrate how to mix fine and coarse aggregates with cement and add water to the correct ratio to form the concrete. 5.2 Examine the mix ratio and tell the texture, colour and record observations. **5.3** Carry out assessment of concrete in terms of the following properties – Drying Shrinkage, fire resistance, thermal movement compressive and tensile strength, sound transmission permeability, creep Durability, Density.	• Guide students on how to mix fine and coarse aggregates with cement and add water to the correct ratio to form the concrete. • Demonstrate how to examine the mix ratio and tell the texture, colour and how to record observation • Guide students on how to assess concrete in terms of the following properties – Drying Shrinkage, fire resistance, thermal movement compressive and tensile strength, sound transmission permeability, creep Durability, Density.	• Explain concreting process • Explain the properties of concrete • Describe the assessment of concrete: - Shrinkage - Fire resistance - Thermal movement - Tensile strength etc • Describe the properties of concrete

	resistance, thermal movement compressive and tensile strength, sound transmission permeability, creep Durability, Density.	compressive and tensile strength, sound transmission permeability, creep Durability, Density.				

General Objective 6.0 : Understand The Use And Application of Earth, Soil And Laterite In Construction Works						
Week	**Specific Learning Objective:**	**Teachers's Activities**	**Learning Resources**	**Specific Learning Outcomes**	**Teachers' Activities**	**Evaluation**
	6.1 Describe earth, soil and laterite. 6.2 Explain the difference between earth, soil and laterite. 6.3 State the various applications of soils, earth and laterite. 6.4 Enumerate the characteristics of earth soil and laterite. 6.5 Explain the problems of earth soil and laterite. 6.6 State the remedies of the problems explained above in 6.5	• Discuss earth, soil and laterite. • Distinguish between earth, soil and laterite. • Discuss the various applications of soils, earth and laterite. • Enumerate the characteristics of earth soil and laterite. • Discuss the problems of earth soil and laterite. • Discuss the remedies of the problems explained above.	• Samples of earth, soil and laterite.	5.4 Collect samples by standard methods. 5.5 Carry out tests on earth, soil and laterite by the following tests methods (a) Touch, washing, visual, water retention, dry strength, wet-sieving grain size etc. 5.6 Record result of test above in 6.2	• Collect samples by standard methods. • Demonstrate how to carry out the various tests on earth, soil and laterite by the following tests methods (a) Touch, washing, visual, water retention, dry strength, wet-sieving grain size etc. • Guide students on how to record result of test above in 6.3	• Explain the characteristic of soil, earth and laterite • Identify problems associated to earth, soil and laterite • How would you remedy the problems identified above?

General Objective: 7.0 Understand The Principles And Methods of Proportioning, Mixing and Testing Concrete and Be Able to Carry Out The Operation.						
Week	**Specific Learning Objective:**	**Teachers's Activities**	**Learning Resources**	**Specific Learning Outcomes**	**Teachers' Activities**	**Evaluation**
	7.1 State the difference between designed mix and prescribed mix and state factors to be considered in determining mix ratio e.g. Strength of finished concrete, types of concrete, structure to be cast etc. 7.2 Define water/cement ratio and aggregate: cement ratio and explain their relationship with the quality of mix and hardened concrete.	• Distinguish between designed mix and prescribed mix and state factors to be considered in determining mix ratio e.g. Strength of finished concrete, types of concrete, structure to be cast etc. • Define water/ cement ratio and aggregate: cement ratio and explain their relationship with the quality of mix and hardened concrete. • Specify (a) the quality of water for mixing concrete	▪ Pre-cast – Slabs batch mixer charts batch mixer charts. Charts batch mixer. Concrete mixer ▪ Sketches and charts of raft, pad, strip foundations. ▪ Lintel, bean & Column. ▪ Floor slab, walls etc. ▪ Charts cube mould ▪ Head pan ▪ Wheel barrow ▪ Slum test apparatus ▪ Stationary mixer	7.1 Carry out the mixing ratios for a common range of jobs like strip foundation. 7.2 Operate a given light duty batch mixer e.g. $3\frac{1}{2}$T mixer. 7.3 Maintain a given light duty batch mixer e.g. $3\frac{1}{2}$T mixer. 7.4 Give the students assignment to calculate the quantity of ingredients required in any given batch with prescribed mix. 7.5 Carry out slump test in the workshop. 7.6 Carry out mixing operations. 7.7 Carry out slump test to determine the workability of a given mix. 7.8 Carry out compacting factor test	• Show to students the mixing ratios for a common range of jobs like strip foundation. • Guide students to operate a given light duty batch mixer e.g. $3\frac{1}{2}$T mixer. • Show students how to maintain a given light duty batch mixer e.g. $3\frac{1}{2}$T mixer. • Show how to calculate the quantity of ingredients required in any given batch with prescribed mix. • Demonstrate how to carry out slump test in the workshop.	▪ What is cement/water ratio? ▪ State the application of the various mix design ▪ Explain the quality of water used in concrete ▪ Calculate the quantity of concrete ingredients in a given mix ▪ What is batching? ▪ Describe methods of batching Concrete

	7.3 Explain (a) the quality of water for mixing concrete (b) mixing ratios for a common range of jobs e.g. Strip foundation, basement floor, floor slab, lintel, concrete-roof and roof gutter, road kerbs, etc.. 7.4 Define batching 7.5 Describe two methods of batching i.e. by volume and by weight-taking into account necessary precautions to ensure quality. 7.6 Distinguish between the following mixers in terms of their main features, working principles and uses (a) Continuous mixer (b) batch	(b) mixing ratios for a common range of jobs e.g. Strip foundation, basement floor, floor slab, lintel, concrete-roof and roof gutter, road kerbs, etc.. • Discuss batching and describe two methods of batching i.e. by volume and by weight-taking into account necessary precautions to ensure quality. • Guide to distinguish between the following mixers in terms of their main features, working principles and uses (a) Continuous mixer (b) batch mixer (tilting and non-			• Organise and execute mixing operations. • Show how to carry out slump test to determine the workability of a given mix. • Demonstrate how to carry out compacting factor test	▪ Identify various equipment used in mixing concrete ▪ What is workability? ▪ Explain the factors that determine workability of concrete. ▪ State the specific the slump range for common concrete structures.

	mixer (tilting and non-tilting). 7.7 Explain the use of the following mixers in (i) Central batch – mixing plant (ii) transit mixer, truck mixer (iii) stationary mixer. E.g. Paddle mixer). 7.8 Define workability and factors which determine workability. 7.9 Explain the reduction in bulk of the aggregates during mixing and state the appropriate shrinkage value. 7.10 Explain how to determine workability of a given mix sample by slump test or compacting factor test	tilting). • Discuss the use of the following mixers in (i) Central batch – mixing plant (ii) transit mixer, truck mixer (iii) stationary mixer. E.g. Paddle mixer). • Discuss workability and state factors which determine workability. • State the reduction in bulk of the aggregates during mixing and state the appropriate shrinkage value. • Describe how to determine workability of a given mix sample by slump test or compacting factor test				

	7.11 State the specific the slump range for common concrete structures.	• State the specific the slump range for common concrete structures.				

General Objective 8.0: Understand The Principles And Method of Handling, Transportation, Placing and Curing of Concrete						
Week	**Specific Learning Objective:**	**Teachers's Activities**	**Learning Resources**	**Specific Learning Outcomes**	**Teachers' Activities**	**Evaluation**
	8.1 Explain the use of the following equipment in wet concrete transporting and placing operations – head pan, steel concrete barrow, power barrow, tower crane skip, mobile truck mixer conveyor belt, pipe line. 8.2 Explain the precautions (operational and safety) to be taken when using the equipment in 8.1. 8.3 Explain the use of pumped and ready-mixed concrete taking into account their relative advantages and precautions to be taken during	• State the use of the following equipment in wet concrete transporting and placing operations – head pan, steel concrete barrow, power barrow, tower crane skip, mobile truck mixer conveyor belt, pipe line. • State the precautions (operational and safety) to be taken when using the equipment in 8.1. • Describe the use of pumped and ready-mixed concrete taking into account their relative advantages and precautions to be taken during application.	▪ Head pan steel concrete barrow charts. ▪ Rammer/tamper ▪ Sketches and charts of raft, pad, strip foundations. ▪ Lintel, bean & Column. ▪ Floor slab, walls etc. Cube mould. ▪ Sketches and charts of raft, pad, strip foundations. ▪ Lintel, bean & Column. ▪ Floor slab, walls etc. ▪ Charts cube mould	8.1 Use the equipment in wet concrete transporting and placing operations. 8.2 Carry out the students the use of pumped and ready-mixed concrete. 8.3 Demonstrates the use of common tools for compacting wet concrete. **8.4** Visit a constructional site is advised. 8.5 Demonstrates testing of cube with the students. 8.6 Demonstrates vibrating wet concrete test. 8.7 Demonstrates compacting wet concrete test. 8.8 Demonstrates safety and operational precautions in the use of mechanical vibrators.	• Demonstrates to the students how to use the equipment in wet concrete transporting and placing operations. • Show to students how to carry out work with the use of pumped and ready-mixed concrete. • Demonstrates to the students the use of common tools for compacting wet concrete. • Guide students to visit a constructional site. • Teacher guides them to demonstrate testing of cube with the students. • Teacher guides them demonstrates vibrating test • Guide students to demonstrate compacting wet concrete.	▪ Identify equipment used in concreting ▪ Explain the necessary precautions necessary to be observed in concreting process ▪ What are the factors of operational precautions in placing wet concrete? ▪ What are the tools used in compacting wet concrete? ▪ Explain the method of concreting under hot weather

	application. 8.4 List factors to be considered in the choice of methods of transporting wet concrete to placing point e.g. Quantity to be handled, distance to placing point, site conditions etc. 8.5 State the safety and operational precautions to be observed when placing wet concrete by the methods in 8.1 above. 8.6 State reasons for vibrating or compacting wet concrete. 8.7 State common tools for compacting wet concrete and describe with sketches their main features and methods of	• State factors to be considered in the choice of methods of transporting wet concrete to placing point e.g. Quantity to be handled, distance to placing point, site conditions etc • The teacher outlines the safety and operational precautions to be observed when placing wet concrete by the methods in 8.1 above. • The teacher state reasons for vibrating or compacting wet concrete. 8.7 The teacher shows how to identify common tools for compacting wet concrete	▪ vibrator		• Guide the students to demonstrate safety and operational precautions in the use of mechanical vibrators.	

	use (compacting tools may include poker vibrators, clamp on vibrators, rammer/tamper. 8.8 Outline safety and operational precautions in the use of mechanical vibrators. 8.10 Describe the methods of concreting under the following conditions – (a) very hot and dry weather (Severe harmattan) (b) wet weather (c) under weather . 8.11 State reasons for curing concrete and describe common curing methods eg. Pending, sprinkling, wet covering, use of water-proof	and describe with sketches their main features and methods of use (compacting tools may include poker vibrators, clamp on vibrators, rammer/tamper . 8.8 Outlines safety and operational precautions in the use of mechanical vibrators. 8.9 The teacher shows how to identify appropriate compacting tools for the following concrete structures – (i) raft foundation (ii) pad foundation – (combined and Isolated) (iii) strip foundation (mass and reinforced) (iv) Lintel and bean (v) Column (vi) floor slabs (vii) walls				

	paper, curing. Compounds, plastic sheets, steam curing.	(including parapet walls)(vii) concrete pavement (viii) concrete ground floor.				
	8.12 Identify situations where the curing methods in 8.11 above are most suitable. 8.13 Describe the making and testing of cube taking into account precautions to be taken against variation of result. 8.14 Determine by the cube test the compressive strength of given mix sample.	• Discuss the methods of concreting under the following conditions – (a) very hot and dry weather (Severe harmattan) (b) wet weather (c)under weather. • State reasons for curing concrete and describe common curing methods eg. Pending, sprinkling, wet covering, use of water-proof paper, curing. Compounds, plastic sheets, steam curing. • Identify situations where the curing methods in 8.11	▪ Charts ▪ Cube mould ▪ Cube test apparatus	demonstrate how to carry out curing methods eg. Pending, sprinkling, wet covering, use of water-proof paper, curing. Compounds, plastic sheets, steam curing. • Identify appropriate compacting tools for the following concrete structures (i) raft foundation (ii) pad foundation (combined and Isolated) (iii) strip foundation (mass and reinforced) (iv)Lintel and bean (v) Column (vi) floor slabs (vii) walls (including parapet walls) (vii) concrete pavement (viii) concrete ground floor.	Guide how to demonstrate how to carry out curing methods eg. Pending, sprinkling, wet covering, use of water-proof paper, curing. Compounds, plastic sheets, steam curing.	▪ What are the reasons for curing concrete? ▪ What is cube test?

		above are most suitable. • Describe the making and testing of cube taking into account precautions to be taken against variation of result. • Determine by the cube test the compressive strength of given mix sample.				
	EXAMINATIONS: Theory 40%, Practical 60%					

General Objective 9.0 Understand The Principles And Methods of Constructing Joints In Concrete Structure.						
Week	**Specific Learning Objective:**	**Teachers's Activities**	**Learning Resources**	**Specific Learning Outcomes**	**Teachers' Activities**	**Evaluation**
	9.1 Explain with sketches, the purpose of the following joints in concrete structures – (a) Joints in water tanks and reservoirs (b) Construction joints (c) sliding and slip joints. 9.2 List common jointing materials and state their specific applications Example of materials may include (a) bitumen (b) asphalt (c) corking compound (d) soft board (e) mastic etc 9.3 Describe the method of making construction	• Determine using sketches, the purpose of the following joints in concrete structures – (a) Joints in water tanks and reservoirs (b) Construction joints (c) sliding and slip joints. • Enumerate common jointing materials and state their specific applications Example of materials may include (a) bitumen (b) asphalt (c) corking compound (d) soft board	▪ Sketches on joints in water – tanks and reservoirs etc. ▪ Sketches showing expansion and contraction joints in floors, columns concrete roofs and strip and pad foundation ▪ Water ber	9.1 Sketches expansion joints and contraction joints in floors, columns, concrete floors, strip and pad foundations. 9.2 Construct expansion, contraction, compression and construction joints in concrete structures in the workshop. 9.3 Determine construction joint location using shear stress distribution in structures.	• Guide students to sketch expansion and contraction joints in floors, columns, concrete floors, strip and pad foundations. • Demonstrate how to construct expansion, contraction, compression and construction joints in concrete structures in the workshop. • Guide students how to apply the knowledge of shear stress distribution in structures to determine construction joint location in structures.	• Explain the purpose of joint seal

	joints in structures such as floors, beams, column, concrete roofs and parapets, taking into consideration, construction precautions. 9.4 Explain with sketches methods of constructing expansion/contraction joint in structures such as floors, columns, concrete roofs, foundation (strip and pad).	(e) mastic etc • Discuss the method of making construction joints in structures such as floors, beams, column, concrete roofs and parapets, taking into consideration, construction precautions. • Describe using sketches methods of constructing expansion/contraction joint in structures such as floors, columns, concrete roofs, foundation (strip and pad).				

General Objective 10.0: Understand The Use of Formwork in Construction						
Week	**Specific Learning Objective:**	**Teachers's Activities**	**Learning Resources**	**Specific Learning Outcomes**	**Teachers' Activities**	**Evaluation**
	10.1 State the functions of formwork. 10.2 List the basic requirements in formwork construction eg adequate support, rigidity, use of appropriate materials, ease of stripping, leak-proof, repetitive use, minimum cost 10.3 Explain the relative advantages of steel and timber forms. 10.4 Explain with sketches the construction of forms for the following structures (a) Column, (b) beam and	• Discuss the functions of formwork. • Outline the basic requirements in formwork construction eg adequate support, rigidity, use of appropriate materials, ease of stripping, leak-proof, repetitive use, minimum cost • Discuss the relative advantages of steel and timber forms. • Discuss with sketches the construction of forms for the following structures	• Grease • Timber • Steel • Bamboo etc	10.1 Design and construct formwork. 10.2 Apply soft soap solution and grease to form work 10.3 Strike out formwork from the structures	• Guide students how to design and construct formwork. • Demonstrates in the workshop how soft soap solution and grease are applied to formwork. • Guide students on how to strike out formwork from the structures	• Explain types of formworks • What are basic requirement of a good formwork? • What are precautions in striking formworks?

	slab (c) lintel (d) concrete arch (circular, semi-circular equilateral, gothic arch) straight flight, dogleg stairs, open – well stairs window hood, concrete fascia parapet wall, road side channel or gutter. 10.5 List the procedures and precautions to be taken in striking formwork from the structures in 10.4 above and in subsequent storage and preservation. 10.6State the functions of mould oil and form liners and specify their qualities.	(a) Column, (b) beam and slab (c) lintel (d) concrete arch (circular, semi-circular equilateral, gothic arch) straight flight, dogleg stairs, open – well stairs window hood, concrete fascia parapet wall, road side channel or gutter. • Outline the procedures and precautions to be taken in striking formwork from the structures in 10.4 above and in subsequent storage and preservation.				

	10.7 Name the types of mould oil in common use and state the necessary precaution in their use, e.g. soft soap solution, grease etc.	• Discuss the functions of mould oil and form liners and specify their qualities. • Enumerate the types of mold oil in common use and state the necessary precaution in their use, e.g. soft soap solution, grease etc.				

General Objective: 11.0 Understand The Basic Principles and Methods of Constructing Concrete Structures.						
Week	**Specific Learning Objective:**	**Teachers's Activities**	**Learning Resources**	**Specific Learning Outcomes**	**Teachers' Activities**	**Evaluation**
	11.1 Define the term reinforce concrete 11.2 Explain the need for reinforcing concrete. 11.3 Explain the functions of reinforcement in concreting 11.4 Explain the effect of loading on reinforced concrete	• Discuss the term reinforce concrete. • Discuss the need for reinforcing concrete. • Explain the functions of reinforcement in concreting • Explain the effect of loading on reinforced concrete	• Sketches, • Iron bar • Charts	11.1 Sketches and illustrate the following stress effects in concrete structures – bending, buckling, stretching, and twisting, shearing. 11.2 Sketches to illustrate the normal stress effects in the following concrete structures – (a) foundations, retaining walls, columns, beams, slab (simple supported continuous and cantilevered) 11.3 Sketches to show typical methods of reinforcing the following concrete structures, beams (free support beams) lintel, column, floor slab (one way and two-way span) straight flight and dog-leg stairs, roof gutter and parapet wall, road slab, retaining walls, cantilevers	• Show how to sketches to illustrate the following stress effects in concrete structures – bending, buckling, stretching, twisting, shearing. • Show how to sketches to illustrate the normal stress effects in the following concrete structures – (a) foundations, retaining walls, columns, beams, slab (simple supported continuous and cantilevered). • Guide how to sketches to show typical methods of reinforcing the following concrete structures, beams (free support beams) lintel, column, floor slab (one way and two-way span) straight flight and dog-leg stairs, roof gutter and parapet wall, road slab, retaining walls, cantilevers	• State need for reinforcing concrete. • What are the common symbols in structural drawing?

General Objective 12.0: UNDERSTAND THE BASIC PRINCIPLES AND CONVENTIONAL METHODS OF STRUCTURAL DETAILING.						
Week	**Specific Learning Objective:**	**Teachers's Activities**	**Learning Resources**	**Specific Learning Outcomes**	**Teachers' Activities**	**Evaluation**
	12.1 Explain reinforcement schedules using appropriate structural detailed drawings. 12.2 State common representation and symbols in structural drawings e.g. R,Y,X,B,T, alt, Stg, a, b ,r, etc. 12.3 Explain conventional rules in structural detailing.	• The teacher instructs the students to draw the conventional rules in structural detailing as shown on the chalkboard. • Discuss how to Interpret common representation and symbols in structural drawings e.g. R,Y,X,B,T, alt, Stg, a, b ,r, etc. • Explain conventional rules in structural detailing.	• Sketches and drawings.	12.1 Show with Sketches the conventional rules in structural detailing. 12.2 Show the conventional methods of calling up; (a) bars eg R12, R16 R10 (b) kicker (c) blinding (d) Cover. 12.3 Interpret simple structural drawings to obtain formwork construction drawings to obtain formwork construction and steel fixing details. 12.4 Produce reinforcement schedules using appropriate structural detailed drawings.	• Illustrate with Sketches the conventional rules in structural detailing. • Illustrate the conventional methods of calling up; (aui) bars R12, R16 R 10,etc (b) kicker (c) blinding (d) Cover. • Guide students on how to interpret simple structural drawings to obtain formwork construction drawings to obtain formwork construction and steel fixing details. • Demonstrate how to produce reinforcement schedules using appropriate structural detailed drawings.	• What are the conventional rules in structural detailing?

General Objective 13.0: Understand How to Produce Sound Reinforced and Mass Concrete Structures to Specification.						
Week	**Specific Learning Objective:**	**Teachers's Activities**	**Learning Resources**	**Specific Learning Outcomes**	**Teachers' Activities**	**Evaluation**
	13.1 List common reinforcing steels and state their uses (reinforcing steels should include plain round bars, plain square bars, twisted bars, steel fabrics etc. 13.2 State reasons for the use of the following:- (a) blinding at foundation (b) hardcore (e) kicker at column base, (d) spacer block (concrete biscuits), (e) starter bars at column base. 13.3 Describe methods of casting and curing the	• List common reinforcing steels and state their uses (reinforcing steels should include plain round bars, plain square bars, twisted bars, steel fabrics etc. • State reasons for the use of the following:- (a) blinding at foundation (b) hardcore (c) kicker at column base, (d) spacer block (concrete biscuits), (e) starter bars at column base. • Describe methods of casting and curing the following in-situ concrete	▪ Sketches, and short lengths of:- ▪ Plain round bars. ▪ Plain square bars. ▪ Twisted Fabrics ▪ Steel fabrics ▪ Get some spacer blocks, starter bars kicker etc. ▪ Charts and field-trip	13.1 Identify common reinforcing steels and state their uses (reinforcing steels should include plain round bars, plain square bars, twisted bars, steel fabrics etc. 13.2 Specify with reasons the qualities of reinforcing steel for concrete production. 13.3 use common reinforcement materials like bars, steel fabrics etc in concreting with the students participation. 13.4 demonstrates the uses of blinding at foundation, hardcore kicker at column base spacer block and starter bars at the workshop with the students. 13.5 Organise and execute the production of in-situ reinforced	▪ Identify common reinforcing steels and state their uses (reinforcing steels should include plain round bars, plain square bars, twisted bars, steel fabrics etc. ▪ Guide how to use of common reinforcement materials like bars, steel fabrics etc in concreting with the students participation. ▪ Guide how to use of of blinding at foundation, hardcore kicker at column base spacer block and starter bars at the workshop with the students. • Guide how to use of blinding at foundation,	▪ What are the common structural steel bars? ▪ Explain the uses of common reinforcement bars ▪ Explain the methods of casting and curing strip foundation.

	following in-situ concrete structures in wet or hot and dry weather (severe harmattan) conditions . - Strip foundation (mass and reinforced. - Lintels, beams, columns. - Ground and upper floors - Walls (including parapet) - Large areas eg petrol station 13.4 Describe methods of producing the integral finishes on insitu concrete:- a. exposed aggregate	structures in wet or hot and dry weather (severe harmattan) conditions . - Strip foundation (mass and reinforce). - Lintels, beams, columns. - Ground and upper floors - Walls (including parapet) - Large areas eg petrol station 13.4 Discuss methods of producing the integral finishes on insitu concrete:- a. exposed aggregate b. board marked surface		concrete structures eg simple structural frames, culverts, channels and stairs. 13.6 demonstrate how to fix to specification steel reinforcements in sample concrete structures eg. Column, beam, floor slab, parapet wall of simple building. 13.7Demonstrate how to Cast to specification precast units of the following: - Concrete blocks - paving slabs - Kerbs - Fence posts - Terrazzo Tiles **13.8**produced specified integral finish on concrete structure. 13.9Fix to specification steel reinforcements in sample concrete structures eg. Column, beam, floor slab, parapet wall of simple building.	hardcore kicker at column base spacer block and starter bars at the workshop with the students. • Organise and execute the production of in-situ reinforced concrete structures eg simple structural frames, culverts, channels and stairs. • Guides how fix to specification steel reinforcements in sample concrete structures eg. Column, beam, floor slab, parapet wall of simple building. ▪ Guides how to Cast to specification precast units of the following: - Concrete blocks - paving slabs - Kerbs - Fence posts - Terrazzo Tiles	

	b. board marked surface screen-board damped and rolled surface c. exposed aggregate	screen-board damped and rolled surface			▪ The teacher guides to produced specified integral finish on concrete structures.	

General Objective 14.0: Understand The Basic Principles of Production And Use of Pre-stressed Concrete in the Construction Industry.						
Week	**Specific Learning Objective:**	**Teachers's Activities**	**Learning Resources**	**Specific Learning Outcomes**	**Teachers' Activities**	**Evaluation**
	14.1 State the advantages of pre-Stressed concrete e.g. a. reduced tendency to cracking b. Non-use of shear reinforcement c. Comparative to reduction in size and weight of members etc. 14.2 Explain the meaning of pre-tensioning and post-tensioning and state their relative advantages. 14.3 State reasons for the use of the following materials in the production of pre-stressed concrete. a. Medium and high tensile wires or rods	• State the advantages of pre-Stressed concrete e.g. d. reduced tendency to cracking e. Non-use of shear reinforcement f. Comparative to reduction in size and weight of members etc. • discuss the meaning of pre-tensioning and post-tensioning and state their relative advantages. • explain reasons for the use of the following materials in the production of pre-stressed concrete.	▪ Charts and samples of these units.	14.1 Visit a production site with students to have on-the-site experience 14.2 Demonstrate production process of pre-tension and post-tension concrete.	• Visit a production site with students to have on-the-site experience. • Guide how to demonstrate production process of pre-tension and post-tension concrete.	• What is pre-stressed concrete? • Differentiate between the pre-tensioning and post-tensioning • What are the safety precautions to be observed in the production of pre-stressed concrete

	b. High strength concrete 14.4 Describe at least one methods of producing- ▪ Pre-tensioned concrete units ▪ Post-tensioned concrete units. 14.5 State with examples the use of pre-stressed concrete in the Nigerian construction scene 14.6 State necessary safety precautions in the production of pre-stressed concrete	a. Medium and high tensile wires or rods b. High strength concrete • Describe at least one methods of producing- a. Pre-tensioned concrete units b. Post-tensioned concrete units. • State with examples the use of pre-stressed concrete in the Nigerian construction scene • State necessary safety precautions in the production of pre-stressed concrete.				
	EXAMINATION					

	Define the following tests on aggregates: a. silt test b. bulking test c. moisture content test d. colourmetric test e. physical test	Define the following tests on aggregates: a. silt test b. bulking test c. moisture content test d. colourmetric test e. physical test	▪ Sieves Aggregates Sample	Carry out the following operations as regards sieve analysis: a. aggregate sampling b. quartering c. sieving d. recording of results and interpretation of results	Carry out the following operations as regards sieve analysis: a. aggregate sampling b. quartering c. sieving d. recording of results and interpretation of results	• Explain moisture content
			▪ Aggregate samples ▪ Measuring vessels ▪ Weighing machine	Experimentally carry out the following tests on aggregates: a. silt test b. bulking test c. moisture content test d. colourmetric test e. physical test f. record result Interpret results	Experimentally carry out the following tests on aggregates: a. silt test b. bulking test c. moisture content test d. colourmetric test e. physical test f. record result Interpret results	
	Define the following a. fineness b. Soundness c. Setting time	Discuss the following a. fineness b. Soundness c. Setting time	▪ Sample of ordinary Portland cement ▪ Water ▪ Time Clock	Carry out laboratory tests on cements a. Student should carry out the following tests on ordinary Portland cements b. fineness c. Soundness Setting time	Carry out laboratory tests on cements a. Student should carry out the following tests on ordinary Portland cements b. fineness c. Soundness Setting time	
			▪ Mixing surface ▪ Aggregates ▪ Cement ▪ Water	Produce good quality concrete by manual method after batching either by volume or by weight	Produce good quality concrete by manual method after batching either by volume or by weight	

			Bricklayers tools			
			▪ 3½T mixer ▪ Aggregates ▪ Cement Water	Using light duty batch mixer (e.g. 3½T mixer) produce good quality concrete after batching.	Using light duty batch mixer (e.g. 3½T mixer) produce good quality concrete after batching.	
	Examination: Practical 60%; Theory 40%.					

	Define expansion/contraction joints joint and its importance's. explain compression/construction joints	Discuss expansion/contraction joint and its importance's. Discuss compression/construction joints	▪ Concrete mix ▪ Transportation equipment ▪ Curing materials or equipment	▪ Carry out concrete transportation placing and curing operations. ▪ Student should transport the already mixed concrete by any specified mode, place and cure the concrete using appropriate materials/equipment as specified. ▪ While carrying out a simple concreting job student should construct the following joints. a. Expansion/contraction joint b. Compression/construction joints. With the ready mixed concrete student should produce concrete biscuits. ▪ Cast concrete spacers for use in a given situation. ▪ Fix to specification steel reinforcement in simple concrete structures cast to specification precast concrete units. ▪ Student should fix steel reinforcements in simple concrete structures e.g. a. Column	▪ Guide how to carry out concrete transportation placing and curing operations. ▪ Guides Student should transport the already mixed concrete by any specified mode, place and cure the concrete using appropriate materials/equipment as specified. ▪ While carrying out a simple concreting job student should construct the following joints. a. Expansion/contraction joint b. Compression/construction joints. ▪ With the ready mixed concrete student should produce concrete biscuits. ▪ Cast concrete spacers for use in a given situation. ▪ Fix to specification steel reinforcement in simple concrete structures cast to specification precast concrete units. ▪ Student should fix steel reinforcements in simple concrete structures e.g. d. Column	

				b. Floor slab c. Parapet wall ▪ Cast to specification the following pre-cast units. a. concrete blocks b. Paving slabs c. Kerbs ▪ Fence postsTerrazzo tiles	e. Floor slab f. Parapet wall Cast to specification the following pre-cast units. d. concrete blocks e. Paving slabs f. Kerbs ▪ Fence postsTerrazzo tiles	
			▪ Ready mixed concrete ▪ Masons' and bricklayers' tool			
			▪ Ready mixed concrete ▪ Mould ▪ Bricklayers' tool			
			▪ Steel reinforcement ▪ Simple concrete structures. ▪ Concrete mix ▪ Mould ▪ Cement ▪ Aggregates ▪ Bricklayers' tools ▪ Water			
	EXAMINATION 70% Practical ; 30% Theory					

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN BRICKLAYING, BLOCK LAYING AND CONCRETING		
MODULE: WALL, FLOOR AND CEILING FINISHING	**Course Code: CBC 15**	**Contact Hours: 12hrs/wk**

GOAL: This module is designed to provide the trainee with the basic knowledge finishing materials related to the builders work and to enable him apply such finished proficiently.

GENERAL OBJECTIVES:

On completion of this module, the trainee should be able to:

1. Know the function and methods of care of finishing tools and equipment.
2. State the characteristics and application of various finishing materials
3. Understand the principles and technique of insitu floor finishes and be able to lay specified insitu finishes proficiently.
4. Understand the principles and techniques of laying pre-cast floor finishes and be able to lay materials to specification
5. Understand the principles and techniques of laying synthetic floor tiles and be able to lay the materials to specification
6. Understand the principles and be able to organise and execute external and internal rendering.
7. Understand the principles and techniques of fixing various walls and ceiling tiles and be able to fix the materials to specification.
8. Understand the method of fixing and be able to fix claddings to specification under supervision
9. Understand the principles and be able to apply premixed renderings.

	PROGRAMME: NTC IN BRICKLAYING, BLOCKLAYING AND CONCRETE WORK					
Module: CBC 15 WALL, FLOOR/CEILING FINISHING		**Module Code: CBC 15**		**Contact Hours: 2hrs Theory, 10hrs Practical**		
	Module Specification: Theoretical Content					

General Objective: 1.0 KNOW THE FUNCTIONS AND METHODS OF CARE OF FINISHING TOOL AND EQUIPMENT.						
WEEK	**Specific Learning Objective:**	**Teachers Activities:**	**Learning Resources:**	**Specific Learning Objective:**	**Teachers Activities:**	**Evaluation**
1	1.1 List common finishing tools and equipment. 1.2 State the functions of each equipment and tool in 1.1 and precautions to be observed in their use. 1.3 Explain routine care and maintenance of tools in above use.	1.1List common finishing tools and equipment. 1.2 the functions of each equipment and tool in 1.1 and precautions to be observed in their use 1.3 Discuss routine care and maintenance of tools in use	▪ Frenchman, tyrolean machine ▪ Tools and equipment ▪ Charts ▪ Pictures ▪ plastering trowel, pointing trowel, gauge rod, ▪ terrazzo	1.1 Identify, sketch and describe common finishing tools and equipment in the trade 1.2 Carry out routine care and maintenance of tools in use	▪ Guide how to Identify, sketch and describe common finishing tools and equipment in the trade. ▪ guide on routine care and maintenance of tools in use	▪ List common finishing tools and equipment. ▪ State the functions of each equipment and tool. ▪ Explain routine care and maintenance of tools in use above.

General Objective: 2.0 State The Characteristics and Application of Various Finishing Materials						
WEEK	**Specific Learning Objective:**	**Teachers Activities:**	**Learning Resources:**	**Specific Learning Objective:**	**Teachers Activities:**	**Evaluation**
	2.1 Explain the various types of finishing materials taking into account their characteristics. 2.2 Discuss methods of care and maintenance and use a. insitu concrete floorings; terrazzo and granolithic concrete. b. Clay and precast finishes: bricks, ceramic tiles, mosaic tiles concrete slabs, terrazzo tiles; c. Stone floorings: marbles and granite d. Other tiles: linoleum, thermoplastic and vinyl tiles. 2.3 List different types of finishing materials	▪ Describe the various types of finishing materials taking into account their characteristics. ▪ Describe methods of care and maintenance and uses. List different types of finishing materials and a. insitu concrete floorings; terrazzo and granolithic concrete. b. Clay and precast finishes: bricks, ceramic tiles, mosaic tiles concrete slabs, terrazzo tiles; c. Stone floorings: marbles and granite d. Other tiles: linoleum, thermoplastic and vinyl tiles.	▪ Epoxy ▪ Polystyrene. ▪ Charts ▪ Pictures ▪ Insitu concrete flooring ▪ Terrazzo ▪ Granolithic concrete, clay ▪ Bricks ▪ Ceramic tiles ▪ Mosaic tiles	2.1 Identify different types of finishing materials and a. insitu concrete floorings; terrazzo and granolithic concrete. b. Clay and precast finishes: bricks, ceramic tiles, mosaic tiles concrete slabs, terrazzo tiles; c. Stone floorings: marbles and granite d. Other tiles: linoleum, thermoplastic and vinyl tiles. e. f. Carry out routine care and maintenance of finishing materials Examples may include	▪ Guide to carry out routine care and maintenance of finishing materials. Examples may include a. insitu concrete floorings; terrazzo and granolithic concrete. b. Clay and precast finishes: bricks, ceramic tiles, mosaic tiles concrete slabs, terrazzo tiles; c. Stone floorings: marbles and granite d. Other tiles: linoleum, thermoplastic and vinyl tiles.	▪ List different types of finishing materials. ▪ Discuss in detailed of care and maintenance of the finishing materials.

	e.g a. insitu floor finishing; terrazzo and granolithic concrete. b. Pre-cast finishes: bricks, ceramic tiles, mosaic tiles concrete slabs, terrazzo tiles; c. Stone floorings: marbles and granite d. Other tiles: linoleum, thermoplastic and vinyl tiles.			g. insitu concrete floorings; terrazzo and granolithic concrete. h. Clay and precast finishes: bricks, ceramic tiles, mosaic tiles concrete slabs, terrazzo tiles; i. Stone floorings: marbles and granite j. Other tiles: linoleum, thermoplastic and vinyl tiles.		

	General Objective 3.0 : Understand the principles and techniques of application of insitu floor finishes and be able to lay specified insitu finishes proficiently					
WEEK	**Specific Learning Objective:**	**Teachers Activities:**	**Learning Resources:**	**Specific Learning Objective:**	**Teachers Activities:**	**Evaluation**
	3.1 Discuss types of insitu floor finishes e.g. screeds, granolithic concrete and terrazzo. 3.2 Explain insitu floor finishes e.g. Screeds, granolithic concrete, terrazzo	• List different types of insitu floor finishes e.g. screeds, granolithic concrete and terrazzo. • Describe insitu floor finishes e.g. Screeds, granolithic concrete, terrazzo	▪ Lesson plan ▪ Charts, ▪ Pictures	3.1 Calculate the amount of insitu finishing materials from a given drawing and specification	▪ Calculate the amount of insitu finishing materials from a given drawing and specification	▪ Explain insitu floor finishes. ▪ Distinguishbetween the following methods of having insitu floor finishes and explain their uses. a. monolithic b. bonded c. unbonded. ▪ State the functions of floor screed and specify suitable screed thickness for the following bonding methods a. monolithic b. unbonded c. bonded

	3.3Distinguish between the following methods of having insitu floor finishes and explain their uses. d. monolithic e. bonded f. un-bounded 3.4 Explain the causes of and state the precautions to be taken against the following defects in insitu floor finishes (screed, terrazzo, grano). a. laitance b. lifting c. cracking and crazing d. dusting 3.5 State the functions of floor screed and specify suitable screed thickness for the following bonding methods - monolithic - bonded - un-bonded	• Distinguish between the following methods of having insitu floor finishes and explain their uses. a. monolithic b. bonded c. unbounded. • Explain the causes of and state the precautions to be taken against the following defects in insitu floor finishes (screed, terrazzo, grano). e. laitance f. lifting g. cracking and crazing h. dusting • Tabulate the causes and precautions taken to prevent defects in insitu finishes ▪ Laitance ▪ Lifting ▪ Cracking and crazing ▪ Dusting • State the thickness of a. monolithic b. un-bonded c. bonded		- Show the difference between - Monolithic - Bonded - Un-bonded 3.2 Identify the following defects in insitu floor finishes (screed, terrazzo, grano). a. laitance b. lifting c. cracking and crazing d. dusting 3.3Specify the qualities of sand for floor screeds and state the use of various recommended screed mixes, e.g. 1:3, 1:1½, 1:4; 1:2, etc. 3.4Specify the properties of base suitable for laying screed, terrazzo and granolithic concrete.	- Show the difference between - Monolithic - Bonded - Un-bonded ▪ Identify the following defects in insitu floor finishes (screed, terrazzo, grano). i. laitance j. lifting k. cracking and crazing l. dusting • Specify the qualities of sand for floor screeds and state the use of various recommended screed mixes, e.g. 1:3, 1:1½, 1:4; 1:2, etc. • Specify the properties of base suitable for laying screed, terrazzo and granolithic concrete.	

	3.6 Outline the procedures and precautions to be taken in mixing, laying, compacting, curing and protecting insitu floor finishes (screeds, terrazzo and granolithic concrete).	▪ List the procedures and precautions taken in mixing ▪ laying ▪ compacting curing and protecting insitu floor finishes ▪ State the qualities of aggregates, mix proportion, thickness of granolithic and terrazzo floors.		3.5 Specify qualities of aggregates, mix proportions and thickness of granolithic and terrazzo floors for specified situation. 3.6Carry out mixing, laying, compacting, curing and protecting insitu floor finishes (screeds, terrazzo and granolithic concrete).	• Specify qualities of aggregates, mix proportions and thickness of granolithic and terrazzo floors for specified situation. • Guide to carry out mixing, laying, compacting, curing and protecting insitu floor finishes (screeds, terrazzo and granolithic concrete).	

	General Objective 4.0: Understand the principles and techniques of laying precast floor finishes to specification					
WEEK	**Specific Learning Objective:**	**Teachers Activities:**	**Learning Resources:**	**Specific Learning Objective:**	**Teachers Activities:**	**Evaluation**
5&6	4.1Discuss the properties of backgrounds suitable for laying the following precast materials a. bricks b. ceramic/clay tiles c. concrete slabs d. terrazzo slabs e. mosaic tiles 4.2 Describe the procedures and precautions to be taken in laying the materials in 4.1 4.3 Describe methods of laying floor tiles: solid bedding and separating layer methods and state their relative advantages 4.4 Name common laying defects in pre-cast floorings (and explain their causes. Examples of defects may include: lifting, uneven surface, misalignment of tile units, cracking, etc).	▪ Explain the properties of backgrounds suitable for laying the following precast materials a. bricks b. ceramic/clay tiles c. concrete slabs d. terrazzo slabs e. mosaic tiles ▪ Describe methods of laying floor tiles: solid bedding and separating layer methods and state their relative advantages ▪ Name common laying defects in pre-cast floorings (and explain their causes. Examples of defects may include: lifting, uneven surface, misalignment of tile units, cracking, etc).	▪ Lesson notes ▪ Sample of the following precast floor units ▪ Bricks ▪ Ceramics ▪ Concrete slabs terrazzo slabs ▪ Mosaic tiles ▪ Mortar ▪ Water ▪ Cleaning rag/foam	4.1Specify the mix and quality of the bedding mortar for each of the materials in 4.1 4.2Visit a medium sized construction site to observe the procedure of laying pre-cast floor units **4.3** Identify common laying defects in pre-cast floorings (and explain their causes. Examples of defects may include: lifting, uneven surface, misalignment of tile units, cracking, etc).	▪ Specify the mix and quality of the bedding mortar for each of the materials in 4.1. ▪ Visit a medium sized construction site to observe the procedure of laying pre-cast floor units ▪ Identify common laying defects in pre-cast floorings (and explain their causes. Examples of defects may include: lifting, uneven surface, misalignment of tile units, cracking, etc).	▪ List methods of laying floor tiles. ▪ Name common laying defects in pre-cast floorings

	General Objective 5.0: UNDERSTAND THE PRINCIPLES AND TECHNIQUES OF LAYING SYNTHETIC FLOOR TILES AND BE ABLE TO LAY THE MATERIAL TO SPECIFICATION					
WEEK	**Specific Learning Objective:**	**Teachers Activities:**	**Learning Resources:**	**Specific Learning Objective:**	**Teachers Activities:**	**Evaluation**
6	5.1 List common synthetic floor tiles and state their standard sizes. 5.2 Describe methods of application and maintenance. 5.3 Explain the cause and state precautions against defects in PVC tiling	▪ List common synthetic floor tiles and state their standard sizes. ▪ Describe methods of application and maintenance. ▪ state precautions against defects in PVC tiling.	▪ Thermoplastic tiles ▪ Vinyl asbestos tile ▪ P.V.C. tiles ▪ Adhesives ▪ Cutting knife/edge	5.1 Present samples of the various synthetic floor tiles for students to identify 5.2 Estimate from working drawing the quantity of tile units required for a specified floor area. 5.3 Specify the properties of background suitable for laying the above tiles.	• Guide to identify samples of the various precast synthetic floor tiles. . • Estimate from working drawing the quantity of tile units required for a specified floor area. • Guide to specify the properties of background suitable for laying the above tiles.	

	General Objective 6.0: UNDERSTAND THE PRINCIPLES, ORGANIZATION AND EXECUTION OF EXTERNAL AND INTERNAL RENDERING					
WEEK	**Specific Learning Objective:**	**Teachers Activities:**	**Learning Resources:**	**Specific Learning Objective:**	**Teachers Activities:**	**Evaluation**
7-8	6.1 Define rendering. 6.2State its function. 6.3 List the qualities of a good rendering mix. 6.4 Describe the following types of renderings taking into consideration materials used, based preparation, mix ratios, methods of application and curing: a. smooth rendering b. rough cast c. pebble dash, etc 6.5 Explain the problems associated with rendering of the following	• Define rendering. • State its function. • List the qualities of a good rendering mix. • Describe the following types of renderings taking into consideration materials used, based preparation, mix ratios, methods of application and curing: b. smooth rendering c. rough cast d. pebble dash, etc • Describe the problems associated with rendering of the following backgrounds and state possible remedies:	▪ Sand Crete and laterite block work ▪ Brickwork ▪ Concrete (dense, light weight, no fine) ▪ Scaffolds ▪ Tie rod or wood string Line Admixtures ▪ Water. ▪ Protective clothing	6.1 Prepare rendering mix to specification. 6.2. Specify the qualities of a good rendering mix and explain the function of lime and other admixtures in the mix 6.3 Identify the following types of renderings taking into consideration materials used, based preparation, mix ratios, methods of application and curing: a. smooth rendering b. rough cast c. pebble dash. i. Establish levels using tie rod or wood strip ii Organize and execute rendering operations involving the application of pebble-dash finish, textured and ornamental	• Prepare rendering mix to specification. • Specify the qualities of a good rendering mix and explain the function of lime and other admixtures in the mix • Identify the following types of renderings taking into consideration materials used, based preparation, mix ratios, methods of application and curing: a. smooth rendering b. rough cast c. pebble dash, • Establish levels using tie rod or wood strip • inorganize and execute rendering operations involving the application of pebble-dash finish, textured and	• What are the problems associated with rendering of the following backgrounds and state possible remedies: a. sand-crete and laterite blockwork b. brickwork c. concrete (dense, light weight, no-fines) **d.** set up necessary support platforms (scaffolds) e. clean, key and wet slabs soffit as necessary

	backgrounds and state possible remedies: a. sand-crete and laterite blockwork b. brickwork c. concrete (dense, light weight, no-fines) 6.6 (a. set up necessary support platforms (scaffolds) (b. clean, key and wet the background as necessary **NOTE:** Keys may be provided by hacking, spatter dash or chiseling; establish level using tie rod or wood strips prepare mix to specification render to level and float to finish using wood and steel float;	a. sand-crete and laterite block work b. brickwork concrete (dense, light weight, no-fines) (a) set up necessary support platforms (scaffolds) (b) clean, key and wet the background as necessary **NOTE:** Keys may be provided by hawking, spatter dash or chiseling; establish level using tie rod or wood strips prepare mix to specification render to level and float to finish using wood and steel float;		finishes. 6.4 set up necessary support platforms (scaffolds) (b. clean, key and wet the background as necessary	ornamental finishes. (a). set up necessary support platforms (scaffolds) (b). clean, key and wet the background as necessary	

	General Objective 7.0: UNDERSTAND THE PRINCIPLES AND TECHNIQUES OF FIXING VARIOUS WALLS AND CEILING TILES AND BE ABLE TO FIX THE MATERIALS TO SPECIFICATIONS					
WEEK	**Specific Learning Objective:**	**Teachers Activities:**	**Learning Resources:**	**Specific Learning Objective:**	**Teachers Activities:**	**Evaluation**
9-10	7.1 Outlines the procedures in fixing wall tiles/mosaics by a. cement mortar method. b. adhesive method. 7.2 Outline precautions to be taken in fixing wall tiles/mosaics by c. cement mortar method d. adhesive method 7.3 Estimate the quantity of wall tiles required for a specified wall area using working drawings or given data.	• List out the procedures for fixing wall tiles/mosaic by. a. cement mortar method. b. adhesive method. • List precautions to be taken in fixing wall tiles/mosaics by a. cement mortar method. b. adhesive method • Estimate the quantity of wall tiles required for a specified wall area using working drawings or given data	e. Working drawings f. Given data g. Cement mortar, Adhesives h. Tiles i. Cement powder j. Sand k. Mosaics Protective clothing	7.1 Outlines the procedures in fixing wall tiles/mosaics by a. cement mortar method. b. adhesive method. 7.2 Outline precautions to be taken in fixing wall tiles/mosaics by a. cement mortar method b. adhesive method l. Organise and execute the tiling operations with the active Participation of students. m. Estimate the quantity of wall tiles required for a specified wall area using working drawings or given data. n. Specify the properties of background suitable	7.1 Outlines the procedures in fixing wall tiles/mosaics by a. cement mortar method. b. adhesive method. 7.2 Outline precautions to be taken in fixing wall tiles/mosaics by a. cement mortar method. b. adhesive method. p. Guides to organize and execute the tiling operations with the active Participation of students. q. Guidesto estimate the quantity of wall tiles required for a specified wall area using working drawings or given data	

				for fixing tiles by the methods in 7.1 o. Specify the quality of sand and mix ratios for bedding and jointing mortar.		

	General Objective 8.0: UNDERSTAND THE METHOD OF FIXING AND BE ABLE TO FIX CLADDINGS TO SPECIFICATION UNDER SUPERVISION					
WEEK	**Specific Learning Objective:**	**Teachers Activities:**	**Learning Resources:**	**Specific Learning Objective:**	**Teachers Activities:**	**Evaluation**
11	8.1 Define the term "cladding". 8.2 List uses of cladding. 8.2 State the use of various types of cramps and fixing used in securing claddings to structure e.g. channel cramps, dowel cramp, fish-tail cramp and dowel, corbel plate, rod cramps and hooks, etc. 8.4 Name types of materials used in cladding. 8.5 state the recommended slab sizes and illustrate methods of fixing them. E.g. granite, marble, slate, plastics, concrete, brick etc. 8.6 Explain the purpose of expansion joint in claddings and describe a method of forming it. 8.7 Explain the need for protection after fixing	• Discuss the term "cladding". • List uses of cladding. • State the use of various types of cramps and fixing used in securing claddings to structure e.g. channel cramps, dowel cramp, fish-tail cramp and dowel, corbel plate, rod cramps and hooks, etc. • Name types of materials used in cladding. • state the recommended slab sizes and illustrate methods of fixing them. E.g. granite, marble, slate, plastics, concrete, brick etc. • State the purpose of expansion joint in claddings and describe a method of forming it. • Explain the need for protection after fixing claddings • Describe methods of storing and handling claddings on site.	▪ Cramps ▪ Granite ▪ Marble ▪ Slate ▪ Plastics ▪ Concrete ▪ Brick ▪ Mortar Protective clothing.	8.1 Present the various types of cramps **8.2** Identify the various types of cramps 8.3 Present the various types of cramps **8.4** Identify the various types of cramps 8.5 Identify the various materials used in cladding e.g. granite, plastics, marble etc ▪ organize and execute under supervision the various operations in fixing cladding ▪ Demonstrate safety habits in handing claddings. ▪ Illustrate the various methods of fixing cladding ▪ Prepare mortar for fixing stone, concrete and granite claddings ▪ Carry out of storing and handling claddings on site.	i. Present the various types of cramps. ii. Guide to identify the various types of cramps i. Present the various types of cramps **ii.** Identify the various types of cramps ▪ Identify the various materials used in cladding e.g. granite, plastics, marble etc ▪ organize and execute under supervision the various operations in fixing cladding ▪ Demonstrate safety habits	▪ What are the needs for protection after fixing claddings? ▪ How do we store and handle claddings on site?

	claddings 8.8 Describe methods of storing and handling claddings on site.				in handing claddings. ▪ Illustrate the various methods of fixing cladding ▪ Guide to prepare mortar for fixing stone, concrete and granite claddings ▪ Carry out of storing and handling claddings on site.	

	General Objective 9.0: UNDERSTAND THE PRINCIPLES AND BE ABLE TO APPLY PREMIXED RENDERINGS					
WEEK	**Specific Learning Objective:**	**Teachers Activities:**	**Learning Resources:**	**Specific Learning Objective:**	**Teachers Activities:**	**Evaluation**
12	9.1 Describe the composition of Tyrolean and state the properties of the base suitable for its application. 9.2 Describe method of application and curing Tyrolean 9.3 Explain causes of failure in Tyrolean finish, examples of failure may include, Peeling, discoloration, cracking and crazing, etc. 9.4 Describe the basic composition of "santex" finish. 9.5 Distinguish between "santex matt" and "santex trowel" in terms of finished texture and methods of application. 9.6 Describe the properties of base suitable for the application of "sandtex" finishes.	▪ Describe the composition of Tyrolean and state the properties of the base suitable for its application. ▪ Describe to method of application and cunning Tyrolean ▪ Explain causes of failure in Tyrolean finish, examples of failure may include, Peeling, discoloration, cracking and crazing, etc. ▪ List the basic composition of "santex" finish. ▪ Distinguish between "santex matt" and "santex trowel" in terms of finished texture and methods of application. ▪ List properties of base suitable for the application of "sandtex" finishes	▪ Tyrolean ▪ Sandtex, ▪ Water	9.1 Present samples of Tyrolean and sand-tex. 9.2 Estimate the quantity of Tyrolean required for a specified job 9.3 Execute the following operations in the application of Tyrolean; a. clean and wet wall surface b. prepare Tyrolean to specification c. spray Tyrolean evenly onto wall using Tyrolean gun d. cure Tyrolean by wetting 9.4 Prepare the Sandtex to makers specification 9.5 Estimate the quantity of sandtex finish required in a given situation and demonstrate its application 9.6 Apply sandtex-trowel and sandtex-matt according to the marker's instruction.	▪ Present samples of Tyrolean and sand-tex. ▪ Estimate the quantity of Tyrolean required for a specified job ▪ Guide to Execute the following operations in the application of Tyrolean; a. clean and wet wall surface b. prepare Tyrolean to specification c. spray Tyrolean evenly onto wall using Tyrolean gun d. cure Tyrolean by wetting ▪ Prepare Sandtex to makers specification ▪ Estimate the quantity of sandtex finish required in a	▪ What is the composition of tyrolean? ▪ Estimate the quantity of Tyrolean required for a specified job ▪ What are causes of failure in tyrolean finish. ▪ Estimate the quantity of sandtex finish required in a given situation

					given situation and demonstrate its application ▪ Guide students to apply sandtex-trowel and sandtex-matt according to the marker's instruction.	
	Examinations: Practical – 60% Theory – 40%					

ADVANCED NATIONAL TECHNICAL CERTIFICATE COURSE

ADVANCED NATIONAL TECHNICAL CERTIFICATE COURSE

PROGRAM: ADVANCE NATIONAL TECHNICAL CERTIFICATE IN BRICKLAYING, BLOCK MAKING CONCRETING		
MODULE: BASIC CONSTRUCTION MANAGEMENT I	**Course Code: CBM 20**	**Contact Hours: 3hrs Theory/wk**

GOAL: This module is designed to enable the trainee to acquire basic knowledge of construction management

GENERAL OBJECTIVES:
On completion of this module, the trainee should be able to:

1. Understand the basic elements of craft leadership
2. Understand and apply the basic principles of site and workshop organization
3. Maintain site record
4. Carry out accurate work measurement
5. Understand the basic elements of industrial relations.

PROGRAM: ADVANCE NATIONAL TECHNICAL CERTIFICATE IN BRICKLAYING, BLOCK LAYING AND CONCRETING						
MODULE: BASIC CONSTRUCTION MANAGEMENT I			**Course Code: CBM 20**		**Contact Hours: 3 Hrs Theory and Practical /week**	
COURSE SPECIFICATION: THEORETICAL CONTENT				**PRACTICAL CONTENT**		
General Objective 1.0: Understand the basic elements of craft leadership				**General Objective**		
THEORETICAL CONTENTS				**PRACTICAL CONTENT**		
WEEK	**Specific Learning Outcomes**	**Teachers/ activities**	**Learning Resources**	**Specific learning outcome**	**Teachers/ activities**	**Evaluation**

1 -2	**1.1** Explain the benefit of an efficient control of craft force. **1.2** Explain the benefits of team work. **1.3** State steps to follow to obtain and pass information to colleagues in a construction company **1.4** Explain how to report to the personnel when request for assistance Fall outside area of responsibility. **1.5** Describe the personal qualities essential for craft leadership **1.6** State the technical qualifications required for craft leadership **1.7** Identify the basic elements in the cultivation of team spirit and the development of favourable attitude toward team work. **1.8** Explain the scope,	• Discuss the benefit of an efficient control of craft force. • Discuss the benefits of team work • Describe steps to follow to obtain or communicate information to colleagues • State how to report to the personnel when request for assistance fall outside • Area of responsibility . • State the qualities of a	• Chalkboard • Chalk etc. • Personal interaction, leadership qualities etc • Individual projects in subject areas.	**1.1** Identify the need for developing positive working relationship with colleagues. **1.2** Recognized the importance of relating with other people in away that makes them feel valued and respected. **1.3** Communicate information to Colleagues about own work that might affect others. **1.4** Visit a well-organised construction company and study its organizational structures. **1.5** Recognize own role and Responsibilities within the team.	• Identify the need for developing positive working relationship with colleagues. • Show students how to recognize the importance of relating with other people in away that makes them feel valued and respected. • Arrange a site visit to a well-organized construction company and study its organizational structure. • Show students how to recognize own role and responsibilities within the team. • Demonstrate how to perform individual tasks in line with the team rules and regulations. • Guide students to participate effectively in team work.	• Explain the team work • State how information are circulated in a construction company • Enumerate benefits of team work • Describe good personal qualities essential for craft leadership. • List factors that can influence good workmanship

	application and limitation of discipline. **1.9** List the factors which influence good workmanship and explain how they can be optimally used	good leader on the chalkboard for the students to copy e.g. a good leader must be a good listener, must be selfless etc. • List the qualifications essential for craft leadership. This should be personal and academic qualifications e.g. NTC, ANTC, ND, HND, NSQ(s),Bsc etc • The teacher should identify with the students' factors that can influence good		**1.6** Perform individual tasks in line with the team rules and regulations. **1.7** Participate effectively in team work.		

		workmanship				
	General Objective 2.0: Understand the Basic Principles of Site and Workshop Organization.					
WEEK	**Specific learning outcome**	**Teachers activities**	**Learning Resources**	**Specific learning outcome**	**Teachers activities**	**Evaluation**
3 – 5	**2.1** Identify incentive schemes essential for the maintenance of optimal production level and standard craftsmanship. **2.4** Outline the basic considerations in production planning e.g. resources availability, labor and machines, etc. **2.5** Define the terms 'programming' and 'progressing' in relation to site work. **2.7** Outline the basic considerations in a planning and layout of company and workshop. **2.8** Describe the procedures involved in stock order, delivery and issue in relation to a workshop or building site. **2.9** State the objectives of inventory control.	• Identify incentive schemes essential for the maintenance of optimal production level and standard craftsmanship. • Outline the basic considerations in production planning e.g. resources availability, labor and machines, etc • Define the terms 'programming' and	• Chalkboard, highlighter pen, paper etc. • Charts showing the layout • Charts showing inventory control • Some templates pre-prepared by the teacher and charts • Organization chart. • Ditto • Teaching aids and materials	**2.1** Develop methods of protecting materials, plant and components on site. **2.2** Prepare a maintenance schedule customized for the college workshop. And practically maintain the equipment and tools in the workshop. **2.3** Devise and use a maintenance scheme for craft equipment, plant and machinery. **2.4** Devise and use a maintenance scheme for craft	• Guide students to develop method of protecting materials, plant and components. • Guide students to prepare a maintenance schedule customized for the college workshop. Use this as a guide for students to practically maintain the equipment and tools in the workshop. • Draw a program work schedule for a 2 storey building as a guide to students • Use line diagram to describe a typical workshop layout and planning.	• Explain what is site organization • List the incentive scheme • Enumerate basic consideration in building production • Define the terms "Programming " and "progressing " in relation to building production. • Describe the procedures in Stock order.

	2.10 Describe an inventory system suitable for construction site . **2.11** Distinguish between one-off, batch production and mass production. **2.12** Describe the procedures in production planning, (e.g.) presentation of cutting list and materials schedule, setting out rods/templates, etc.) **2.13** Plan a given concrete batch production project. **2.13** Draw up schedules a in relation to a given project. **2.14** Explain the importance of systematic on-the-job training of the labor force and its implication on the reward system **2.15** Outline the purpose of work study and describe some work study techniques suitable for building work. **2.16** Prepare an organization	'progressing' in relation to site work • Outline the basic considerations in a planning and layout of company and joinery workshop. • Describe the procedures involved in stock order, delivery and issue in relation to a workshop or building site. • Explain the procedures in stock order, delivery and issue • Demonstrates to show		equipment, plant and machinery **2.5** Draw up program and progress charts for a given light construction project (e.g. 3 bedroom bungalow or a two storey building).		• List objective of inventory control • Describe an inventory system suitable for construction site • Prepare a program and progress charts for a given construction project • Describe the importance of systematic on the -job training of the labor force • Explain the purpose of

	chart for a given light construction project.	the differences between one-off batch production and mass production. • Guide students to make cutting list of a simple project. • Teacher tells the students to plan a batch production • Ditto • Use the chalkboard to write out example and ensure that all the students learn the terms.				work study

		• Draw a program work schedule for a 2 storey building as a guide to students				

	General Objective 3.0: Understand the maintenance of site records					
WEEK	**Specific learning outcome**	**Teachers activities**	**Learning Resources**	**Specific learning outcome**	**Teachers activities**	**Evaluation**
6 – 7	**3.1** Explain the minimum office accommodation requirements for the craft foreman's need. **3.2** Explain the purpose of time sheets and describe the method of preparing, analyzing and filing them. **3.3** Explain the purpose of keeping records. **3.4** State the methods of keeping the following records: accidents, site conditions, incidents, variations etc. **3.5** Keep daily records, confirm variations and work done in attendance of other trades. **3.6** Order and record deliveries of materials, components and	• State the minimum office accommodation requirements for the craft foreman's need. • State the purpose of time sheets and describe the method of preparing, analyzing and filing them. • State the purpose of keeping records.	• Charts showing office accommodation • Organization charts • Samples of time sheets • Record of accident, site condition, semiotic variation etc	**3.1** Determine the minimum office accommodation requirements for the craft foreman's need. **3.2** Keep daily records, confirm variations and work done in attendance of other trades. **3.3** Order and record deliveries of materials, components and plants using appropriate methods.	• Show how to determine the minimum office accommodation requirements for the craft foreman's need. • Show how to keep daily records, confirm variations and work done in attendance of other trades. • Show how to order and record	• State the minimum office accommodation requirements for the craft foreman's need. • State the purpose of time sheets and describe the method of preparing, analyzing and filing them. • State the purpose of keeping records.

	plants using appropriate methods. **3.7** Explain the purpose of site meeting and the method of its organization.	• Describe the methods of keeping the following records: accidents, site conditions, incidents, variations etc. • Discuss how to keep daily records, confirm variations and work done • State how to order and record deliveries of materials, components and plants using appropriate methods. • Discuss the			deliveries of materials, components and plants using appropriate methods. • Visit a moderate site with learners to observe the various building records of building management • Visit a construction site with students to observe a typical site meeting in progress	• Describe the methods of keeping the following records: accidents, site conditions, incidents, variations etc. • Discuss how to keep daily records, confirm variations and work done in attendance of other trades. • State how to order and record deliveries of materials, components and plants using appropriate methods.

		purpose of site meeting and the method of its organization.				• Discuss the purpose of site meeting and the method of its organization.
	General Objective: 4.0 Understand accurate work measurements					
WEEK	**Specific learning outcome**	**Teachers activities**	**Learning Resources**	**Specific learning outcome**	**Teachers activities**	**Evaluation**
8 – 9	**4.1** Explain the importance of systematic on-the-job training of the labour force and its implication on the reward system **4.2** Outline the purpose of work study **4.3** Describe some work study techniques suitable for building work. **4.4** Outline the procedure of recording and interpretation of daily or weekly progress by means of progress charts. **4.5** Explain the calculation of amount of bonus from a given measured work.	• State the importance of systematic on-the-job training of the labour force and its implication on the reward system and the purpose of work study. • Explain work study techniques suitable for building work • Explain the procedure of recording and interpretation of daily or weekly progress by means	• Progress charts, • Charts and Chalkboard	**4.1** Record and interpret daily or weekly progress by means of progress charts. **4.2** Calculate the amount of bonus from a given measured work. **4.3** Measure completed work and variations	• Show students how to; - Record and interpret daily or weekly progress by means of progress charts. - Calculate the amount of bonus from a given measured work. - Measure completed work and	• Explain steps to carry out accurate work measurements • Explain some work study techniques in building work • Calculate the amount of bonus from a given measured job.

	4.6 Define interim certificate **4.7** Explain the measurement of completed work and variations	of progress charts. • Show the calculation of amount of bonus from a given measured work • Explain interim certificate • Show the measurement of completed work and variations			variations	• Define the term interim certificate

PROGRAM: ADVANCED NATIONAL TECHNICAL CERTIFICATE IN BRICKLAYING, BLOCK LAYING AND CONCRETING.						
MODULE: BASIC CONSTRUCTION MANAGEMENT II			Module Code: CBM 21		Contact Hours: 72	
Course Specification: Practical Content						
WEEK TERM 1	General Objective: 1.0 UNDERSTAND THE BASIC PRINCIPLES ORGANIZATION AND MANAGEMENT.					
	Specific Learning Outcome:	Teachers Activities	Resources	Specific Learning Outcome :	Teachers Activities	Evaluation

1 - 2	**1.1** Explain the meaning of the term 'company'. **1.2** Distinguish between private and public company. **1.3** Outline the principles of organization and management of the following business units: a. Sole proprietorship b. Partnership c. Limited liability Company. **1.4** Explain the legal meaning and advantages of: a. Limited liability b. Incorporation in reference to formation of a company. **1.5** List various ways in which construction firm may raise capital. **1.6** Distinguish between fixed and working capital. **1.7** Describe various ways in which construction firm may raise capital. **1.8** Describe the various organizational structures e.g. • line • line and staff • function staff • matrix **1.9** Explain the application of organizational structures in the construction Industry. **1.10** Analyze the characteristics of organization	• Organized a visit to the various business units to observe the distinguishing features. • Describe the various business units. • Explain the various ways in which construction firm may raise capital. • Discuss the between fixed and working capital. • Illustrate the basic features of the organization Structures by means of organizational chart. • Discuss Organizational structures in the	• Certificate of registration of companies. • Slide. • Videos. • Company profile. • Organizational charts • Organization Charts			• Define the term company. • Distinguish between private and public company. • Define the following: a. Sole proprietorship. b. Partnership limited liability Company • List various ways in which construction firm may raise capital. • Distinguish between fixed and working capital. • What is the application of organizational structures in the construction Industry? • State the importance of clearly defined policies in an organizational

	General Objective 2.0: CONTRACTUAL RELATIONSHIP & TENDERING ARRANGEMENTS.					
10 – **4**	**2.1** Explain the legal meaning of the term 'contract'. **2.2** State the basic elements of a valid contract e.g	• Identify and explain the basic features	• Sample of contract documents			• Define contract.

	offer, acceptance, consideration. **2.3** List and explain the various forms of general remedies available in the law courts for a breach of contract. • damages, order of payment of debt, specific performance • Injunction • Rescission **2.4** Name and explain the various types of contracts in the construction industry**.** **2.5** Explain the nature and uses of the following contract documents. • articles of agreement • conditions of contract • specification • bill of quantities • contract drawings **2.6** List the parties involved in the building contracts i.e. • Employer or client • Architect • Engineer (structural and service) • Quantity surveyor • Builder • Contractor • Sub-contractors • Suppliers • Agent and foreman • Clerks of works **2.7** Describe the procedures for the preparation of	of the following classes of contract. - Specialty or sealed contract. -Simple contract. • Discuss the remedies available in the law courts for a breach of contract. • Explain the basic features of the following types of contracts: a. negotiated contracts (cost plus target cost), lump sum, schedule contracts, serial contracting etc. b. package deals	• Present to learners a standard contract documents and let learners internalize with the documents. • A visit to a standard construction site where all the parties involved in the building contract can be identified • An already prepared tendering documents for building contract			• What are the basic elements of a valid contract. • Name and explain the various types of contracts in the construction industry. • Explain the nature and uses of the following contract documents. • articles of agreement • conditions of contract • specification • bill of quantities contract drawings • List the parties involved in the building contracts i.e. • Employer or client • Architect

	General Objective 3.0: SITE ORGANIZATION AND ADMINISTRATION					
5 – 6	**3.1** State basic consideration in the planning of construction site.	• Discuss the various factors	• Drawings/pictures of			• List basic consideration in

	3.2 Explain the importance of security and safety on project. **3.3** List factors to be considered in the planning of the site offices and welfare facilities. **3.4** State factors to be considered in the placing of order for materials, equipment and plants. **3.5** Describe standard procedure for ordering and receiving/deliveries of materials, equipment and plant. **3.6** State the functions of essential site records. **3.7** State the functions of essential site records. **3.8** Explain the purpose of site meeting. **3.9** Describe the method of organizing site meeting. **3.10** State the purpose of inventory. **3.11** Describe inventory system suitable for construction site. **3.12** Outline the problems that are encountered in executing a project in a restricted area. **3.13** Explain the solutions to the problems encountered in executing a project in a restricted site**.**	to be considered in providing, access road, temporary roads, hutments, stationary plant location, materials (storage and waste disposal). • Draw up and discuss security and safety plans for a typical medium – sized construction project. • Discuss the importance of the site office and welfare facilities. • Plan and explain a given construction site for light construction project. e.g Bungalow.	construction sites. • Films and slides • Standard and essential site records from an organized site. • Minutes of a site meeting. • Inventory sheet of a small construction project. • Video clips of a congested construction site.			the planning of construction site. • List the importance of security and safety on project. • List factors to be considered in the planning of the site offices and welfare facilities. • State factors to be considered in the placing of order for materials, equipment and plants. • List the functions of essential site records. • State the purpose of

	General Objective 4.0: UNDERSTAND APPLICATION OF THE BASIC TECHNIQUES OF PLANNING AND CONTROL OF BUILDING PROJECTS					
7 – 9	**4.1** Define planning in relation to building construction.	• Prepare and discuss	• Board.			• Describe the various aspects

	4.2 Describe the various aspects of pre-tender and pre-contract planning. **4.3** Describe aspects of planning during and after construction. **4.4** Explain the use of program and progress charts network diagram (CPM). **4.5** Explain the use of line of balance as planning techniques in the construction industry. **4.6** Define work study. **4.7** Describe work study scope **4.8** State the objectives of work study. **4.9** Describe the basic techniques of method study e.g scale models, string diagrams, progress chart etc. **4.10** Outline the general problems of work study. **4.11** Describe the standard procedure for carrying outwork measurement. **4.12** Outline the general problems of work study. **4.13** Propose solutions to problems of work study. **4.14** Explain the various methods of cost control.	program and progress Charts for a given light construction project. • Produce and Explain the following basic techniques of method study for a light construction work e.g a bungalow. • Scale models • String diagrams • Progress charts • Activity sampling etc. • Carry out method and time study using appropriate techniques. • Explain various methods of cost control.	• Program and progress charts of a construction project. • The various diagrams of the techniques of method study. • The building plan • Bill of quantities • Contract drawings. • Program and progress charts • Pencil, paper and eraser.			of planning during and after construction. • What is the use of program and progress charts network diagram (CPM). • Differentiate work study and work-study scope. • Outline the general problems of work study. • List solutions to problems of work study. • What are the various methods of cost control.

	General Objective 5.0: DRAFT AND INTERPRET BUILDING SPECIFICATIONS AND DETERMINE QUANTITIES FROM PROJECT DRAWINGS.					
10 -12	**5.1** Define 'specification' in relation to	• Draft and	• Project			• Define

	building work. **5.2** Describe the general form of specification. **5.3** Outline the essential features of a specification. **5.4** Describe sources of specification information. **5.5** Outline the general rules for measurement of building works. **5.6** State the purpose of the bill of quantities. **5.7** Describe steps in preparation of bill of quantities i.e taking off, squaring, abstracting and billing	interpret specifications, detailing. • Standards of workmanship, quality of materials and tests covering all trades and sections of given project drawings e.g. a bungalow or two storey building. • Prepare and explain bill of quantities for a given light construction work e.g a bungalow or two storey building.	drawings • Specifications of various trades • Standard method of measurement (SMM). • Building drawings • SMM • Abstracting sheet • Adding machine or calculator.			‘specification’ in relation to building work. • Outline the general rules for measurement of building works. • State the purpose of the bill of quantities. • List the steps in preparation of bill of quantities

13	**EXAMINATIONS**					
TERM 2 WEEK	**General Objective 6.0: UNDERSTAND THE BASIC PRINCIPLES OF COSTING AND ESTIMATING.**					
1-3	**6.1** State the principal elements of construction contracts.	• Support student to carry	• Price list of materials			• State the principal

	6.2 Explain the influence of the elements on construction cost e.g. • Materials and plants • Establishment and overhead charges and profit • Time allowed for work execution. • Quality of work expected etc. **6.3** Describe common methods of approximate estimating e.g. • Floor area method • Unit method • Approximate quantities methods etc. **6.4** Describe the various sources of information for pricing. **6.5** List constituents of rates in all trades.	out market survey • Prepare and discuss an approximate estimate for a building project using the following methods • Floor area method • Unit method • Approximate quantities etc. • Compare the approximate estimates devised by the various methods. • Analyze and discuss build-up 'all in-rates' for a given simple project. • Prepare and Explain builder's	• Project drawings • Bill of quantities • Specification tables/schedule of the various trades. • Project drawings • Sample of quotation paper for a simple contract. • Adding machine or calculator.			elements of construction contracts • Discuss the effects of various element on construction cost • List common methods of approximate estimating. • Describe the common method of approximate estimating • List the various sources of information for pricing. • List constituents of rates in all trades.

	General Objective 7.0: UNDERSTAND THE APPLICATION OF ORGANIZATION AND USE OF CRAFT FORCE.					
1 – 7	**7.1** Outline the personal qualities, the roles and	• Guide student	• Construction			• Outline the

	responsibilities of the craft force supervisor in the construction industry. **7.2** Explain the influence of leadership style on work forces performance. **7.3** Outline basic considerations in the recruitment and selection of construction operatives **7.4** Describe various means of controlling operatives. **7.5** Describe various methods of determining the salaries and wages of the operatives on site e.g day work, job pricing, wage schedule etc. **7.6** Explain the function of motivation and team spirit in an organization. **7.7** Describe various means of motivating and cultivating team spirit and morals among construction craft force. **7.8** Explain Magregor's theory X and theory Y **7.9** Solve simple case studies involving supervisory problems. **7.10** Plan suitable incentive schemes.	to visit a well-organized construction site to observed the various craft force. • Discuss hour-input by the operatives using. a. time-clock, b. tally board c. time sheets in a construction site for the various trades. • Explain how to calculate the salaries and wages of operatives on site using: - day work, job pricing, wage schedules etc • Use case study method	site • Craft force • Craft supervisor • Time sheet • Stop clock • Tally board • Construction site • Case file of a simple supervisory problem • A supervisor from an organized construction site.			personal qualities, the roles and responsibilities of the craft force supervisor in the construction industry. • Outline basic considerations in the recruitment and selection of construction operatives. • Explain the various method of determining salaries and wages of workers on site • What is Magregor's theory X and theory Y. • Describe how to Plan suitable incentive a scheme for a small construction

	General Objective 8.0: UNDERSTAND THE BASIC ELEMENTS OF ACCOUNTING AND ABLE TO PREPARE AND INTERPRET TRIAL BALANCE.					
8 – 10 11-12	**8.1** Describe the various forms of day-to-day transactions in a medium sized construction firm. **8.2** Describe the system of original entry into books of account.	• Guide student to visit a medium sized construction site to observe the various	• books of account • petty cash or impress book			• List the various forms of day-to-day transactions in a medium sized construction

	8.3 Describe the petty cash or impress system. **8.4** Classify ledgers for different purposes. **8.5** Describe the method of maintaining ledger accounts. **8.6** State the uses of trial balance. **8.7** Describe the preparation of trial balance. **8.8** State the uses of final accounts and balance sheet. **8.9** Describe the basic nature of final accounts and balance sheet. **8.10** Describe the relationship between the various accounting stages: original entry, ledger accounts, trial balance, final accounts and balance sheet. **8.11** Explain the importance of efficient accounting system in a business organization.	books of account and how they are maintained. • Prepare a petty cash book for a simple construction work. • Solve problems involving trial balance. • Prepare and explain a trial balance account for a simple contract job. • Explain how to prepare a final accounts and balance sheet for a simple contract job.	• ledgers • The various books of account • Adding machine or calculator. • Specimen copy of accounting books of a medium construction firm.			firm. • Explain the use of petty cash or impress system • State the uses of trial balance. • State the uses of final accounts and balance sheet. • What are the uses of final accounts and balance sheet. • What is the importance of efficient accounting system in a business organization.
13	• EXAMINATION: Examination 60%; Theory 40					

PROGRAM: ADVANCED NATIONAL TECHNICAL CERTIFICATE IN BRICKLAYING, BLOCK LAYING AND CONCRETING WORK.					
MODULE: BUILDING DRAWING II	**MODULE CODE: CTD 23**	**CONTACT HOURS: 36 (3**-0)			
Course Specification Theoretical Content/Practical					
W	**General Objective 1.0: UNDERSTAND THE GENERAL PRINCIPLES OF DESIGN OF A TWO STOREY HOUSE.**				

EEK	Specific Learning Outcome:	Teachers Activities	Resources	Specific Learning Outcome:	Teachers Activities	Evaluation
1 -	**1.1** Explain the	• List the relationship between	• Pictures	**1.1** Prepare a	• Guide to Prepare	• Prepare a site

2	importance and relationship between function, form, aesthetic in building design. **1.2** Explain the basic structural differences between a bungalow and a storey building. **1.3** Explain the principles of balance and harmony as used in the design of elevations and general exterior of buildings. **1.4** Describe the basic considerations in the planning of a storey residential house. **1.5** Describe the characteristics of a give plot plan (i.e. solar	function, form and Aesthetic in building design. • List the basic structure differences between a bungalow and a storey building. • List the principles of balance and harmony used in design of elevations and exterior building. • Explain the basic considerations in planning of storey/residential house. • List characteristics of a given plot plan e..g 1. solar orientation 2. size of plot 3. access road 4. services etc • Explain the influence of 1.5 above on the pattern of design. • Sketch design of a two-storey building suitable plot. • Explain the choice of materials for the proposed house in 1.6.	• Posters • Drawings	preliminary sketch design of a two-storey building suitable for the plot in 1.5. **1.2** Explain the structural differences between a bungalow and duplex building. **1.3** Explain function, form, aesthetic and orientation of a building plan	a preliminary sketch design of a two-storey building suitable for the plot. • Describe the form, function, orientation and aesthetic of a building plan	lay out plan. • Identify the difference between a bungalow and a duplex building • Identify function, form, aesthetic and orientation of a building plan

	General Objective 2.0 Draw the Site and Floor Plans, Elevations and Sections of a Specified Two-Storey Building.

1 - 4	**2.1** Draw the site plan. (Site plan should indicate the drainage system, building line and access, landscaping, etc.)	• Draw floor plans indicating -furniture arrangement - landscaping • Draw floor plans to scale i.e ground and first floor. • Draw elevations to scale i.e front, side, left and right. • Draw site plan showing. 1. Drainage system 2. Building live 3. Access road 4. Landscaping etc	• Board • Drawing Board, • Tee Square • Pencil • Set squares • Scale rule	**2.1** Draw presentation floor plans. (Presentation floor plans should show furniture arrangement, as well as landscaping). **2.2** Prepare the floor plans to suitable scale (Elevations may include: front, side, left, and right). **2.3** Draw to suitable scale essential sections. (Use may be made of-set and part sections) **2.4** Draw the elevations to suitable scale (Elevations may include front, side, left, and right). **2.5** Draw the site plan. (Site plan should indicate the drainage	• Draw presentation floor plans. (Presentation floor plans should show furniture arrangement, as well as landscaping). • Prepare the floor plans to suitable scale (Elevations may include: front, side, left, and right). • Draw to suitable scale essential sections. • Draw the elevations to suitable scale (Elevations may include front, side, left, and right). • Draw the site plan. (site plan should indicate the drainage system, building line and access, landscaping, etc.)	• Draw a detail Architectural drawing and detail all sections and elevations

	General Objective 3.0: Prepare Essential Detail Drawing of Components.					
5-6	**3.1** Draw to	• Draw to scales details of	• Charts	**3.1** Draw to	• Draw to scales	• Draw to scale

	suitable scales, essential details of components (Details may include: floor, stairs, screen walls, boundary wall, plumbing system, floor slabs, etc.) **3.2** Prepare working drawings of the septic tacks and soak aways suitable for the house. **3.3** Draw the interior elevations and sections of the kitchen and utility room. **3.4** Draw details of the kitchen and utility room cabinets workshop.	components. Ie floor stairs, and screen walls. • Make a working drawing of septic tank and soak aways. • Draw the interior elevations. • Draw sections of kitchen. • Draw section of utility room. • Draw details of 1. Kitchen 2. Utility room 3. Cabinets workshop	• Posters • Drawing board • Papers • Tee squares • pencils	suitable scales, essential details of components (Details may include: floor, stairs, screen walls, boundary wall, plumbing system, floor slabs, etc.) **3.2** Prepare working drawings of the septic tanks and soak aways suitable for the house. **3.3** Draw the interior elevations and sections of the kitchen and utility room. **3.4** Draw details of the kitchen and utility room cabinets workshop.	details of components. of floor stairs, and screen walls. • Make a working drawing of septic tank and soak-aways. • Draw the interior elevations. • Draw sections of kitchen. • Draw section of utility room. • Draw details of - Kitchen - Utility - Cabinets workshops.	details of floor, stair cases, septic tank, soak away. • Draw interior elevation of kitchen, laundry and utility room.
	General Objective 4.0:Draw detail plan of the electrical services					

7–8	**4.1** Use the presentation floor plan to determine the type and allocation of electrical services. **4.2** Draw the electrical services plan	• Determine the type of allocation of electrical services on a floor plan. • Sketch electrical services plan. • Draw to scale the electrical services on a plan.	• Charts • Pictures • Drawing board • Tee square • Set square • Pencil	**4.1** Use the presentation floor plan to determine the type and allocation of electrical services. **4.2** Draw the electrical services plan	• Determine the type of allocation of electrical services on a floor plan. • Sketch electrical services plan. • Draw to scale the electrical services on a plan.	• Draw an electrical service plan of a three - bedroom bungalow • Identify the functions of symbols in electrical design

	General Objective 5.0 Prepare schedules

9 - 10	**5.1** Prepare the following schedules: • doors • windows • electrical installation • plumbing • painting • reinforcement schedule.	• Prepare doors schedule • Prepare windows schedule • Prepare electrical installation schedule. • Prepare plumbing schedule • Prepare painting schedule • Prepare reinforcement schedule.	• Charts • Drawing papers • Drawing board • Tee square • Set square • Pencil	5.1 Prepare the following schedules: • doors • windows • electrical installation • plumbing • painting 5.2 reinforcement schedule.	• Prepare doors schedule • Prepare windows schedule • Prepare electrical installation schedule. • Prepare plumbing schedule • Prepare painting schedule • Prepare reinforcement schedule.	• Use a given drawing to prepare the following schedules: a. Doors b. Windows c. Electrical d. Plumbing e. Reinforcement

	General Objective 6.0: Understand the principles, preparation and interpretation of simple structural drawings.

11 - 12	**6.1** Interpret and apply conventional representation of structural elements**.** **6.2** Interpret simple structural design drawing**.** E.g. design drawing for the two storey project drawing in this module. **6.3** Prepare structural detail drawing from given design data and sketches. **6.4** Prepare and interpret bending schedules. **6.5** Trace and reproduce structural drawings.	• List conventional ways of representing structural elements. • Explain simple structural design data for two storey projects. • Prepare detail structural drawing • Using given data and sketch Prepare and interpret bending drawings • Trace structural drawings. • Reproduce structural drawings.	• Charts • Drawing papers • Drawing board • Tee square • Set square • Pencil • Reproduction equipment.	**6.1** Prepare structural detail drawing from given design data and sketches. **6.2** Prepare and interpret bending schedules. **6.3** Trace and reproduce structural drawing.	• Prepare structural detail drawing from given design data and sketches. • Prepare and interpret bending schedules. • Trace and reproduce structural drawing. • Prepare the students to use the computer aided design software	• Trace and reproduce structural drawing • Use the computer aided design software for structural detailing and analysis

13	EXAMINATIO N: 100%					

PROGRAM: ADVANCED NATIONAL TECHNICAL CERTIFICATE IN BRICKLAYING, BLOCK LAYING AND CONCRETING.					
MODULE : SURVEYING IN BUILDING	**Module Code: CBS 20**	**Contact Hours: 48 .(1-3)**			
Course Specification: Theoretical Content					
WEEK	**General Objective 1.0: UNDERSTAND THE BASIC PRINCIPLES AND SCOPE OF SURVEYING AND GEO-INFORMATICS**				
	Specific Learning Outcome :	**Teachers Activities**	**Resources**	**Specific Learning Outcome:**	**Teachers Activities**	**Evaluation**

1 - 2	**1.1** Explain the principle of working from 'whole to part' in survey/Geo-data works **1.2** State the importance of 'scientific honesty' made on observations. **1.3** Explain with examples the various 'checks' made on field observations and during computation. **1.4** Define errors or disclosure in surveys and describe methods of 'balancing' these. **1.5** Describe the various classes of survey/Geo-data and their order of accuracy. **1.6** Explain the principles of 'economy of accuracy' and its influence on choice of equipment and methods. **1.7** Explain the principles of 'consistency' in surveys/Geo-data.	• Run the scope of surveying working from whole to part. • Describe the implication of error checks during computing. • Discuss sources of error. Explain the classes of survey, economy of accuracy, consistency, precision and data storage in surveying.	• Total Station • Theodolite • Dumpy level • Tape • Ranging pole • Staff • Plumb bob • Videos Slides	**1.1** Identify the principle of working from 'whole to part' in survey/Geo-data works. **1.2** Undertake a survey, record result, perform error cancellation **1.3** Apply basic survey checks Identify the importance of the following items in surveying: classes of surveying Economy of accuracy Consistency Accuracy Precession Data storage	• Discuss the principle of working from 'whole to part' in survey/Geo-data works • Highlight the process involve in the surveying process from equipment selection, assembly, surveying, recording, error adjustments and data storage • Identify the importance of the following items in surveying: classes of surveying • Economy of accuracy • Consistency	• Identify the principle of working from 'whole to part' in survey/Geo-data works • Highlight the process involve in the surveying process from equipment selection, assembly, surveying, recording, error adjustments and data storage

	1.8 Distinguish between accuracy and precision . **1.9** Describe the procedure of entrusting 'custody' of survey/Geo-data monuments to local officials and the instructions for their 'preservation'.				• Accuracy • Precession • Data storage	

	General Objective 2.0: Understand the use and method of using Linen and steel tapes in making linear measurements.					
3 - 4	**2.1** Explain the effect of I misalignment II slope temperature III tension IV standardization of error on measured distances. **2.2** Apply the corrections **2.3** Explain the chain surveying instruments e.g. Linen tapes, steel tapes, ranging rods. **2.4** State the necessary precautions in the use of above instruments. **2.5** State the criteria for selection of survey lines and off sets and the limitations on lengths. **2.6** Describe the methods of making linear measurements in chain surveys – both along the survey line and along off sets stating limiting conditions on measurement accuracy.	• Show the various measuring equipment's in use – steel tape leather and chains. • Explain the accuracy attached to each equipment. • Choose a location and organize for the execution of the chain survey. • Describe survey line and off sets. • Describe limitations on lengths • Describe common errors in surveying • Discuss the steps involved in chain surveying. • List and discuss possible problems to be encountered in chain surveying.	• Steel tape • Leather • chain. • Lesson note • charts • chalk board	**2.1** Carry out chain surveying while emphasizing on the necessary precaution to be taken **2.2** With the aid of sketch describe the Survey process while drawing the basic tools required. **2.3** Identify common errors in surveying	• Identify the process involved in chain surveying while emphasizing on the precautions needed • Identify the tools in the sketch provided and state their importance and precautions needed when using them	• List chain surveying instruments . • Identify the processes involving in chain surveying. • List the precautions involving in chain surveying. • List surveying tools and the common errors associated with each tool,

	2.7 Explain common errors in chain surveying and their sources – e.g. squaring of building corners, wrong booking of values. **2.8** Explain with sketches the basic methods of check or proof lines, and the use of control frame work for position and orientation. **2.9** Describe the general procedure for carrying out a chain survey. **2.10** Illustrate the method of booking field measurements in chain surveys. **2.11** Enumerate field problems and methods of overcoming them. **2.12** Identify errors in simple chain surveys.					

	General Objective 3.0: UNDERSTANDING THE PRINCIPLES OF MEASUREMENT OF ANGLES WITH THEODOLITES AND BEARINGS WITH A MAGNETIC COMPASS AND PERFORM SUCH MEASUREMENT.					
5-6	**3.1** Describe the various units of angular measure e.g. grads and radian measures, working out their conversion factors. **3.2** Explain the working principles of a surveyors' (Prismatic) compass. **3.3** Describe the procedure of observation with a surveyors' (prismatic) compass. **3.4** Explain the method of observation with a theodolite.	• Identify equipment used in measuring angles i.e. theodolite prismatic compass. • Explain the units degree and a radian. • Illustrate the setting up of equipment in surveying.	• Prismatic compass • Theodolite • Staff • Ranging pole • Record sheet	**3.1** Demonstrate the use of theodolite and compass while emphasizing on the method of observations in surveying. **3.2** Carry out angular measurements with prismatic compass and theodolite.	• Guide the students to perform a simple measurement of angles, grads, and radian using theodolite and prismatic compass while making emphasis on the reading procedure	• Select theodolite, prismatic compass and demonstrate simple measurement with them. • Explain the difference in the reading procedure of a theodolites.

	General Objective 4.0: UNDERSTAND THE BASIC PRINCIPLES AND METHODS OF USING TOTAL STATION AND GPS EQUIPMENT.					
6 - 8	**4.1** Describe a total station and its accessories. **4.2** Compare total station with a theologize **4.3** Explain the working principles of a total station. **4.4** Describe the procedures of observation with total station.	• Train students to use total station and plot readings. • Use question and answer.	• Total station • Target, • Hand held GPS • Theodolite • poles	**4.1** Explain the working principles of GPS **4.2** Carry out GPS observations on selected points with hand held GPS. **4.3** Demonstrate the use of total station	• Guide the students to undertake simple activity with total station as well as cross check it with the hand-held GPS	• Undertake simple activity with total station and cross check with hand held GPS.

	General Objective 5.0 UNDERSTAND THE METHODS OF HEIGHTENING AND LEVELING.					
7 - 10	**1.1** List the specifications of leveling. **1.2** Explain the (optimum) observing procedure. **1.3** Describe the use of and criteria for selection of leveling datum. **1.4** Adjust collimation error in level **1.5** Describe the construction and use of semi-permanent and permanent tertiary bench-marks. **1.6** Enumerate the uses of tertiary level.	• Explain the basic principle of leveling. • Define datum level and its relevance. • Identify various equipment used. • Compute the different methods instrument height rise and fall.	• Dumpy level • Tilting level • Burning rolls • Computing table.	**5.1** Identify the principle of leveling **5.2** Identify the importance of datum level in surveying **5.3** Identify the importance of height, rise and fall in leveling **5.4** Carry out a simple leveling activity	• Guide students to carry out a simple leveling activity • Draw the tools and equipment's in leveling as well as state their function	• List the tools and equipment use in leveling and explain their function

	General Objective 6.0: UNDERSTAND SETTING OUT PROCEDURE FOR A MEDIUM SIZED BUILDING					
11 - 12	**6.1** Explain the equipment required to set-out a building with accompanying access roads. **6.2** Explain how to set-out a building and the accompanying constraints. **6.3** Construct profiles and datum for a building. **6.4** Explain how profiles are used to control excavation and foundation levels. **6.5** Explain the instruments used for taking internal and external dimensions. **6.6** Determine the area of building site. **6.7** Explain how internal and external, horizontally and vertically measurements are taken.	• Define the building line. • Identify methods of setting out e.g. builders square, 3.4.5 and Instrument or various kinds e.g. theodolite, • Organize practical exercises. • Demonstrate the steps involved in measuring a simple square building, clearly stating the area, height, length, width and volume • Demonstrate the process of drawing the external area of a building using survey tools • Explain the process involved in site preparation, surface preparation, levelling and embankment in a simple road construction	• Site square • Theodolite • Total station • Dumpy level • Ranging pole • Plumb bob • Pegs • Line • tape	**6.1** Demonstrate simple square or rectangular setting out using total station, theodolite and 3:4:5 method **6.2** Establish a wooding profile for the setting out above while establishing the trench excavation **6.3** Calculate suitable length of a traveler and reduced levels of sight rails from given drawings. **6.4** Establish sight rails for horizontal and depth control of a straight drain between manhole **6.4** Calculate volumes of cut	• Identify the process involved in setting out of simple square or rectangular building as well as profiling it • Calculate suitable length of a traveler and reduced levels of sight rails from given drawings. • Identify the process involved in site preparation, surface preparation, levelling and embankment in a simple road construction	• Identify the process involved in setting out of simple square and rectangular building. • Explain the process of profiling. • Calculate suitable length of a traveler and reduced levels of sight rails from given drawings. • Explain the procedure in checking verticality

	6.8 State the procedure for checking verticality of building using Theodolite, optical plumb, and plum-Bulb. **6.9** Describe the invert of a drain, a sight rail and a traveler. **6.10** Explain the survey terms used in road construction. **6.11** Describe methods of route surveying **6.12** Describe the types of control used for Embankments, Cuttings and Levels.			and fill on a given straight road with transverse sloping ground.		of building using Theodolite, optical plumb, and plum-Bulb. • Identify the process involved in site preparation, surface preparation, levelling and embankment in a simple road construction
13	**EXAMINATION**					

PROGRAM: ADVANCED NATIONAL TECHNICAL CERTIFICATE IN BRICKLAYING, BLOCK LAYING AND CONCRETING.						
MODULE : BUILDING SCIENCE		**Module Code : CBC 21**	**Contact Hours: 48 (1-3)**			
Course Specification: Theoretical Content						
WEEK	**General Objective 1.0: UNDERSTAND THE BASIC PRINCIPLES THERMAL MOVEMENT IN BUILDING AND BUILDING MATERIALS**					
	Specific Learning Outcome :	**Teachers Activities**	**Resources**	**Specific Learning Outcome :**	**Teachers Activities**	**Evaluation**

	BUILDING SCIENCE					
	General Objective 1.0: UNDERSTAND THE BASIC PRINCIPLES OF THERMAL MOVEMENTS IN BUILDING AND BUILDING MATERIALS.					
1-2	**1.1** Define the following terms: a. thermal conductivity b. thermal resistivity c. heat transmittance coefficient or "U" value. d. Thermal emissivity e. Thermal absorptivity. **1.2** State the factors which determine the magnitude of the above terms for a structural unit or building materials. **1.3** Explain how to prevent thermal movements in building **1.4** Explain the variation of the amount of heat transmitted between the surface of a slab of building material of uniform thickness and composition.	• Compute the 'u' and 'k' values for structural units or building materials from given data. • Guide student to define and explain all the thermal terms. • Describe how to prevent thermal movements in building	• Slides • Videos • Pictures			• Explain thermal conductivity, resistivity and movement in building. • Explain basic principles in thermal movement. • Identify factors that determine thermal conductivity, resistivity and movement in building. • State ways to prevent thermal movement.

	General Objective 2.0: SOUND TRANSMISSION AND CONTROL: KNOW THE GENERAL PRINCIPLES OF SOUND TRANSMISSION AND CONTROL					
3 – 4	**2.1** Explain the general principles of sound transmission. **2.2** Explain the following terms. a. air borne sound b. structure-borne sound c. sound reflection, reverberation and reverberation time. d. Impact sound **2.3** Explain the general principles and methods of sound control.	• Measure sound transmission level (intensity) in decibels. • By visiting an acoustic building describe - the general principles and methods of sound control (Insulation and absorption) in buildings - Principle of discontinuity - Mass law - Sound reduction at source, etc.	• Sound measuring instruments • Sound producing source. • Acoustic building			• Define the various terms in sound transmission. • Explain the principles of sound transmission. • List the various methods of sound control in building.
	General Objective 3.0: UNDERSTAND THE BASIC PRINCIPLES OF LIGHTING					

5-6	**3.1** State the general functions of lighting. **3.2** Define the following terms: a. illumination b. luminous flex c. illuminance d. luminance e. day light factor **3.3** Distinguish between disability glare and discomfort glare. **3.4** State ways by which glare is controlled in buildings. **3.5** Describe the intensity of illumination due to a given source of light. **3.6** Calculation of day light factor. **3.7** Describe the main classes of lighting. **3.8** State the uses of the main classes of lighting. **3.9** Explain the interdependence of color and lighting in buildings.	• Explain the general functions of lighting e.g. • To illuminate the internal envelope and contents; • To illuminate task (reading, working with equipment etc.) to the extent appropriate to optimal functioning of the eye. • Emphasize the following ways of controlling glare in buildings. • Types, sizes, number and position of openings • Describe colour and texture of building surfaces. • Explain types of lighting fittings • Explain the structure of internal envelope etc. • Illustrate how to	• Source of light Hall with good lighting system. Hall with bad lighting system. • Data for calculating day-light factor • Instrument for calculating day-light factor by direct measurement. 230			• Define terms in lighting • Explain how lighting effects can be controlled. • Explain the difference between disability glare and discomfort glare • Solve simple calculation of day light factor. • Describe the interdependence of color and lighting in building. • List types of lighting fitting

	General Objective 4.0: UNDERSTAND THE PRINCIPLES OF ELECTRICITY SUPPLY IN BUILDINGS

7 – 8	**4.1** State the difference between alternating current and direct current. **4.2** Explain the construction and working principles of generators, motors and transformers. **4.3** Explain with the aid of experiments the heating, lighting, magnetic and chemical effects of electric current. **4.4** Calculate the power and energy consumption in simple circuits. **4.5** Explain the function of earthing in electrical circuits. **4.6** State the purpose and explain the functioning of circuit breakers and fuses. **4.7** Illustrate the correct method of distributing electrical power from the mains to socket outlets and lighting points in house wiring systems. **4.8** Compute total electrical load of a given load for a	• Carry out experiments to demonstrate the heating, lighting, magnetic, and chemical effects of electric current. • Demonstrate mathematical calculation of power and energy consumption in simple circuit. • Guide students to identify earthing in an electrical circuit. E.g in a bungalow. • Identify circuit breakers and fuses in a building. • Emphasize the correct method of distributing electrical power from the mains (electric line or stand by generator) to socket outlets and lighting points in house wiring systems. • Demonstrate how to Interprete electrical installation drawings of	• Simple electric circuits • Electric heater • Electric busy • Solenoid • circuit breakers • fuses • Electric line • Generator • Bungalow with complete wiring system • Electrical installation. • Drawing of a small project i.e. the bungalow. 232			• Differentiate between AC and DC. • Explain the functions of fuses and circuits breakers • Explain the function of earthing in electrical circuit • Carry out simple calculations to determine power and energy consumption in simple circuit. • Explain the basic principles of electricity. • Explain the effects of electric current • Calculate total load for a given house wiring

	General Objective 5.0: Know the basic principles of plant installation in buildings.:					
9-10	**5.1** Explain the working principles of lift and escalators. **5.2** Outline safety, principles for lifts and escalators. **5.3** Explain the general principles of air-conditioning. **5.4** Describe various mechanical methods of ventilation. **5.5** Explain the principle of mechanical ventilation. **5.6** Explain the general installation requirements for central and room air conditioning equipment in dressings. **5.7** Define the following: a. relative humidity b. dew point **5.8** Explain the occurrence of condensation in buildings.	• Visit a building with escalators and/or lift. • Emphasize maintenance principles for lifts and escalators. • Illustrate the application of turbulent and non-turbulent flow in domestic water supply and drainage • Determine experiments the rate of flow from an orifice. • Calculate the velocity of flow of water from given date • Calculate pipe sizes for drains or water supply from given date. • Experimentally	• Escalators • Air conditioners • Orifice • water containers • water • data for calculating velocity of flow of water.			• Explain the working principles of mechanical/plant installations in building • Explain the general principles of installation of cold and hot water supply systems in building • Define the following -Relative humidity -Dew point • Explain the various occurrence of condensation in Building.

	5.9 Describe methods of control of condensation. **5.10** Explain the principle of turbulent and non-turbulent flow. **5.11** Explain the followings terms and state their importance in the design and installation of piped water supply system. a. static head of water b. velocity head c. friction head d. pressure head e. water hammer f. coefficient of velocity **5.12** coefficient of discharge.	explain the general principles of installation of cold and hot water supply systems having water pumps.				

	General Objective 6.0: ANALYZE FORCES IN SIMPLE BUILDING STRUCTURES AND STRUCTURAL FRAME WORK.					

11-12	**6.1** State the laws of static equilibrium. **6.2** Explain with illustrative examples the laws of static equilibrium e.g. $\sum V = 0$ $\sum H = 0$ $\sum M = 0$ **6.3** Determine the magnitude and position of the resultant of a simple system of coplanar forces. **6.4** Analyze forces in simple pin-jointed frame work. Statically determinate structures: $M = 3j - 6$ Where **M** is the total number of members, **j** is the number of joints **6.5** Identify common loading systems for various building structures **6.6** Explain beam reaction, shear force and bending moments in simply supported beams under various loading systems using. a. Link polygon system b. method of resolution c. experiments.	• Determine the magnitude and position of the resultant of a simple system of coplanar forces by: - graphical method. • Method of resolution experiment. • Experiment. • Analyze forces in simple pin-jointed frame-work • by method of resolution of force diagram method • method of section • Emphasize the following common loading systems: -concentrated load on beams, stanchion and nodes in frame-works. -Knife –edge load on partitions or walls. -Uniformly distributed load	• Charts • Model of simple pin-jointed frame work. • Model • beam • sections 236			• Explain the laws of static equilibrium • Calculate forces in given sections • Explain with sketches the various loading systems in building structures • In a simply supported beams explains the following -beam reaction -Shear force -bending moment. • Explain the properties a. center of gravity b. moments of inertia c. radius of inertia d. radius of gyration section modules

13	• **EXAMINATIONS**

PROGRAM: ADVANCED NATIONAL TECHNICAL CERTIFICATE IN BRICKLAYING, BLOCK LAYING AND CONCRETING WORK.				

	MODULE: ADVANCED BRICK AND BLOCK LAYING	**MODULE CODE: CBC 23**	**CONTACT HOURS: 288 (2-10)**	**MODULE: ADVANCED BRICK AND BLOCK LAYING**	**MODULE CODE: CBC 23**	
	Module Specification:	**PRACTICAL CONTENT**				
WEEK	**GENERAL OBJECTIVE: CARY OUT SURVEYING, LEVELING AND THE CONSTRUCTION OF ALL TYPES OF BRICK AND BLOCK WORK TO SPECIFICATION.**					
1 -3	**Specific Learning Outcome :**	**Teacher Activities**	**Resources**	**Specific Learning Outcome :**	**Teacher Activities**	**Evaluation**

	1.1 Define leveling **1.2** Explain the importance of setting out	• Discuss leveling and the importance of setting out	• Survey equipment etc. • Ditto. • Leveling instrument. • Field map, etc. • Setting out equipment.	**1.1** Set up centers and construct any types of gothics, of a specified span using a prepared visor. **1.2** Guide to identify area within your vicinity to be surveyed and take the students on a field trip to survey an area. **1.3** Carry out a given leveling project to specification **1.4** Carry out field work to Show how setting out is carried out in the field.	• Guide students to set up centers and construct any types of gothic, of a specified span using a prepared visors. • Explain how to identify area within your vicinity to be surveyed and take the students on a field trip to survey an area. • Guide to carry out a given leveling project to specification • Guide to carry out field work to Show how setting out is carried out in the field. • Guide students to transfer wall line from profile e.g herring bone pattern, basket weaves, etc. and set up wall to DPC level. • Guide the students to	• Define leveling And state the importance of setting out.

					perform a given task to specification	
13	**Examination: Practical 60% Theory 40%**					

PROGRAM: ADVANCED NATIONAL TECHNICAL CERTIFICATE IN BRICKLAYING ETC						
MODULE : ADVANCED CONCRETE WORK			Module Code : CBC 24	Contact Hours 96 (2-6)		
Module Specification: Theoretical/Practical Contents.						
WEEK	General Objective 1.0: KNOW THE EFFECTS OF THE PHYSICAL PROPERTIES OF CONCRETE MATERIALS ON QUALITY OF WET AND HARDENED CONCRETE.					
	Specific Learning Outcome :	Teacher Activities	Learning Resources	Specific Learning Outcome:	Teacher Activities	Evaluation

1	**1.1** State the Properties of Concrete & Concrete Materials. **1.2** State the effects of deteriorated cement on concrete e.g. **1.3** loss in strength, loss of adequate setting, susceptibility to chemical attack. **1.4** State the effect	• Enumerate the Properties of Concrete & Concrete Materials • Discuss the effect of deteriorated cement. • Describe the effect of particle shape on workability and strength e.g. -cubical aggregates -produce stronger concrete -partly aggregates produce poor concrete. • Describe the effect of particle shape on workability and strength e.g.	• Cement, etc. • Aggregates , cement, water etc. • different shapes of aggregates, cement, water, mixer etc. • all types of impurities, chemicals e.g HCL, mixed with aggregate.	**1.1** Carry out practical's show the effect of deteriorated cement. it by using state or deteriorated cement to show loss in strength loss of adequate setting etc. **1.2** Describe with sketch the process of using various shapes of aggregates	• Guide the student through practical's, to show the effect of deteriorated cement to show loss in strength loss of adequate setting etc. • Demonstrate with sketch the process of using various shapes of aggregates.	• List the Properties of Concrete and Concrete Materials. • List the effects of deteriorated cement on concrete. • List the effect of impurities in the

	of surface texture of. Aggregate on workability bond strength and quantity of water required in the mix. **1.5** Explain the effect of particle shape on workability and strength e.g. -cubical aggregates -produce stronger concrete -partly aggregates produce poor concrete. **1.6** State the effects of impurities (mud, chemicals etc) on the quality of wet and hardened concrete e.g. -Impurities may delay setting,	-cubical aggregates -produce stronger concrete -partly aggregates produce poor concrete. • Describe the effects of impurities (mud, chemicals etc) on the quality of wet and hardened concrete e.g. -Impurities may delay setting, reduce bond strength, cause discoloration and straining and reduce strength.	• Impure aggregate cement, sand water etc.			delay of concrete hardening. • What are the effects of particle shape on workability and strength of concrete.

	reduce bond strength, cause discolorations and straining and reduce strength.					
	General Objective 2.0: UNDERSTAND THE NEED FOR MIX DESIGN AND METHODS OF CONTROLLING QUALITY OF CONCRETE ON SITE.					
2-4	**2.1** Define the term 'Mix design'. **2.2** State reasons for the design of mix. **2.3** State factors to be considered when designing a mix e.g. workability, required strength and durability.	• Explain the term 'Mix design'. • Enumerate reasons for the design of mix. • Describe factors to be considered when designing a mix e.g. workability, required strength and durability. • State mix designs for concrete used in standard house construction.	• Concrete cubes, compression test machine etc. • Test materials as required. • Planks, hammer, nails, etc.	**2.1** Describe the various stage in quality control of concrete produced on site e.g. -Control of material storage. -Control of batching -Testing and checking of equality of cement and water adequacy **2.2** Carry out testing of cubes of concrete batches	• Show the various stage in quality control of concrete produced on site e.g. • Control of material storage. • Control of batching • Testing and checking of equality of cement and water adequacy • Demonstrate to carry out	• Define the term Mix design and State reasons for the design. • What are factors to be considered when

	2.4 Explain the mix designs for concrete used in standard house construction. **2.5** Explain the need for the control of quality of concrete produced on site e.g. - Control of material storage**.** -Control of batching -Testing and checking of quality of cement and water at adequate intervals. -Testing of cubes of concrete batches. **2.6** State the various stage in quality control of concrete produced on site e.g. -Control of	• Discuss the need for the control of quality of concrete produced on site e.g. - of batching -Testing and checking of quality of cement and water at adequate intervals. -Testing of cubes of concrete batches. • State the various stage in quality control of concrete produced on site e.g. • Control of material storage			testing of cubes of concrete batches **Note:** Students should be taught LIFO –"last in first out" on materials storage also FIFO – "first in first out" to enable them understand the storage system on site. 40 Cubes should be tested from concrete batches for compression test. This can be prepared in the workshop for crushing test. See 2.4 above After theoretical explanation, the teacher should carry out workshop test on the various subject matter.	designing a mix?

	material storage.					
	General Objective 3.0: UNDERSTAND THE BASIC PRINCIPLES OF REINFORCING VARIOUS CONCRETE STRUCTURES STRUCTURES.					
1 - 6	**3.1** Explain reinforcement arrangements in relation to structures listed below -Road slab -Stairs straight -flight, dog leg. -Open well and spiral -Retaining walls -Cofferdam, and caissons. -Suspended slabs	• Discuss reinforcement arrangements in relation to structures listed below -road slab -stairs straight -flight, dog leg. -Open well and spiral -Retaining walls -Cofferdam, and caissons. -Suspended slabs canopies cantilever -Water tank and reservoirs -Electric polis	• Detailed designed engineering drawing etc. • Chalkboard, design notes, chalk etc.	**3.1** Describe with sketches general reinforcement arrangements in relation to structures listed below -road slab -stairs straight -flight, dog leg. -Open well and spiral -Retaining walls -Cofferdem, and caissons. -Suspended slabs canopies	• Demonstrate with sketches general reinforcement arrangements in relation to structures listed below -road slab -stairs straight -flight, dog leg. -Open well and spiral -Retaining walls -Cofferdem, and caissons. -Suspended slabs canopies cantilever -Water tank and reservoirs	• What is reinforcement? • Highlight precautions to take when carrying out reinforcing concrete structure.

	canopies cantilever -Water tank and reservoirs -Electric polis -Concrete walls. Channels and -Concrete rings. **3.2** Explain precautions to take when carrying out reinforcing concrete structure. **3.3** State the precautions to be taken to ensure the production of sound insitu concrete structures.	-Concrete walls. -Channels and Concrete rings. • State precautions to take when carrying out reinforcing concrete structure\ • Enumerate the precautions to be taken to ensure the production of sound insitu concrete structures.		cantilever -Water tank and reservoirs -Electric polis **3.2** Design a simple, slab stair case etc. to teach the students simple design methods. **3.3** Use concrete ring structural drawing to describe the detailed, designed	-Electric polis • Guide to design a simple, slab stair case etc. to show the students simple design methods. • Show concrete ring structural drawing to describe the detailed, designed subject.	

	General Objective 4.0: KNOW THE BASIC METHODS OF PRODUCING PRECAST CONCRETE UNITS.					
	4.1 Describe methods of producing precast units e.g. -electric poles -culvert rings -box culvert units -panel walls. **4.2** Specify material and mix ratio for producing the precast as in 4.1 **4.3** List various machines and	• Prepare simple formwork of the different components at different mix ratio cast same and use the outcome to explain the methods of producing pre-cast units to the students. • Describe various machines and plants used in the making and bonding of pre-cast units in 4.1 above e.g. -spring machine -vibrators -hydraulic press -cranes, etc.	• Plank for form work, nails hammer etc. • Video films. • Television monitor, computer, slide etc. • Ditto. • Spinning	**4.1** Produce pre-cast units mentioned in 4.1 **4.2** Use pictorial method to show the students different plants used in making and handling pre-cast units. **4.3** Describe spinning machine vibrator etc	• Guide students to produce pre-cast units listed in 4.1 above. • Show using pictorial method the different plants used in making and handling pre-cast units. • Show examples of a spinning machine vibrator to the students.	• List various machines and plants used in the making and bonding of pre-cast units.

	plants used in the making and bonding of pre-cast units in 4.1 above e.g. -spring machine -vibrators -hydraulic press -cranes, etc.		machine vibrator, hydraulics press, cranes etc.			
	General Objective 5.0: UNDERSTAND THE PRINCIPLES OF CONSTRUCTION OF VARIOUS CONCRETE STRUCTURE FRAMES.					
6 - 10	**5.1** List the work sequence in the construction of in-situ concrete framed buildings up to four storeys high. **5.2** Describe the work sequence in the construction of in-situ concrete framed buildings up to four storeys high.	• Enumerate the work sequence in the construction of in-situ concrete framed buildings up to four storeys high. • Describe the work sequence in the construction of in-situ concrete framed buildings up to four storeys high. • State the factors to be considered in the erection of profile boards for setting out in-situ concrete framed	• Sketch, chalkboard etc. • Setting out equipment's. • Sketch etc. • Setting out equipment's. • Sketch etc.	**5.1** Describe with sketches methods of maintaining vertical and horizontal control in the construction of in-situ concrete framed buildings. **5.2** Identify critical areas framed building construction. **5.3** Carry out setting out of a framed.	• Describe with sketches methods of maintaining vertical and horizontal control in the construction of in-situ concrete framed buildings. • Show critical areas framed building construction. • Guide students to set out a framed. • • Guide student to use an	• List the work sequence in the constructi on of in-situ concrete framed buildings up to four storeys high. • Why do

	5.3 Outline factors to be considered in the erection of profile boards for setting out in-situ concrete framed buildings. **5.4** Explain the need for close supervision of concreting operations.	buildings. • Discuss the need for close supervision of concreting operations.	• Setting out materials etc.	**5.4** Use an optical plumbing method to align your profile and building lines during setting out to show the students how to go about doing it. **Note:** Treatment may cover use of reference frame for setting out of columns and center lines axes, plum-bob and optical plumbing methods to ensure vertical alignment.	optical plumbing method to align your profile and building lines during setting out to show the students how to go about doing it.	we need for close supervision of concreting operations?

	General Objective 6.0: KNOW THE MAIN TYPES OF CONCRETE FLOOR, METHODS OF CONSTRUCTION AND THEIR APPLICATION.					
7 - 12	**6.1** Explain the following types of floor construction: - bean and slab - drop bean slab - waffle grid slab -flush slab. **6.2** State the difference between. I. Self-centering and II. Non-self-centering floors	• Explain the process of floor construction to the students' using sketches and drawings on the chalkboard. • State why different types floors are used for different purposes. • Distinguish between. -Self-centering and Non-self-centering floors	• Sketch chalk, chalkboard etc. • board, chalk, etc. • Model, etc	**6.1** Pre-cast reinforced beans which laid between. **6.2** Construct models of self-centering floors **6.3** Describe with sketches various types of self-centering floors e.g. -hollow and ribbed pre-cast reinforced concrete slabs. -Solid light concrete slabs	• Guide students to Pre-cast reinforced beans with laid between. • Guide students to construct models of self-centering floors • Prepare models and use as an aid to describe self-centering of floors to the students.	• State the difference between. I. Self-centering and II. Non-self-centering floors. And state their advantages and

	6.3 State the relative advantages and disadvantages of 6.2 above.	• Describe the relative advantages and disadvantages of 6.2 above.		**6.4** Show with sketches various types of self-centering floors e.g. -hollow and ribbed pre-cast reinforced concrete slabs. -Solid light concrete slabs		disadvantages.
13	**EXAMINATION: Practical 60%, Theory 40%**					

PROGRAM: ADVANCED NATIONAL TECHNICAL CERTIFICATE IN BRICKLAYING, BLOCK LAYING AND CONCRETING.						
MODULE: COMPONENTS AND FINISHES		**MODULE CODE: CBC 25**		**Contact Hours: 96 (2-6)**		
Module Specification Theoretical/ Practical Content						
WEEK	**General Objective 1.0: UNDERSTAND THE PURPOSES AND USES OF FINISHES IN BUILDING.**					
	Specific Learning Outcome :	**Teachers Activities**	**Resources**	**Specific Learning Outcome :**	**Teachers Activities**	**Evaluation**

1	**1.1** Explain the functions of finishing in buildings e.g. Aesthetics, services, protection etc. **1.2** State the factors affecting the choice of various types of finishing. **1.3** explain the factors affecting the choice of various types of finishing. **1.4** Materials e.g. structural requirements. **1.5** Environmental requirements, cost dimensional requirements, statutory regulations, durability, workability etc.	• Describe the functions of finishing in building e.g Aesthetics. • List the factors affecting the choice of various types of finishing materials e.g structural requirements such as durability, stability, strength, aesthetic and so on. • Describe the factors affecting the choices of various types of finishing	• Charts • Showing • Finishing • Applied to wall, floor and ceiling. • Paint • Wall papers. • Tiles • Timber wall • PVC Ceiling • Plaster of Paris • Pebble dash	**1.1** illustrates the effect of finishing on floor. **1.2** illustrates the effect of finishing on wall. **1.3** illustrates the effect of finishing on roof construction to the students.	• Explain the effect of finishing on floor. • Describe the effect of finishing on wall. • Explain the effect of finishing on roof construction to the students.	• What are the functions of finishing in buildings. • List the factors affecting the choice of various types of finishing. • Demonstrate the effective method of painting on plastered wall.

	General Objective 2.0: Know the functions of rendering sand facing and how they are selected for use.

	2.1 Define renderings. **2.2** State the functions of rendering in buildings. **2.3** Explain the main factors in the choice of various types of renderings eg. a. Appearance required b. Type of background its **2.4** Enumerate the characteristics, suitability and methods of application of various types of renderings e.g a. smooth floated finish b. pebble dash c. scraped finished etc. **2.5** Enumerate the properties of the various background materials, and their effects on the choice of rendering. **2.6** Explain the factors, affecting the choice of different types of finishing.	• Explain renderings. • List the functions of rendering in buildings. • Describe the main factors in the choice of various types of renderings eg. a. Appearance required b. Type of background its	• Charts showing • Smooth floated finish • Pebble dash • Charts showing types of finishing.	**2.1** Carry out renderings as one method of finishing in the workshop.	• Guide to carry out renderings as one method of finishing in the workshop.	• Define renderings. • List the materials used in rendering • State the functions of rendering in buildings. • List the factors, affecting the choice of different types of finishings.

	General Objective 3.0: KNOW THE VARIOUS CLADDING MATEIRALS IN BUILDINGS, AND THEIR IMPORTANCE.					
2	**3.1** Explain the reasons for the development of cladding panels. **3.2** State the objectives of standardizing sizes for cladding panels. **3.3** Enumerate the advantages of cladding panels e.g. fire protection, insulation. **3.4** Describe the various types of cladding panels eg infill panels. c. acoustic panels etc. **3.5** Discuss the various materials used in making the cladding panels in 3.4 above and explain how they are manufactured.	• Explain the reasons for the development of cladding panels. • List the objectives of standardizing sizes for cladding panels. • Enumerate the advantages of cladding panels e.g. fire protection, insulation.	• Samples cladding panels	**3.1** Identify the various materials used in making the cladding panels. **3.2** Demonstrates how various types of cladding panels are fixed and jointed.	• Identify the various materials used in making the cladding panels • Guide to demonstrates how various types of cladding panels are fixed and jointed.	• What are the reasons for the development of cladding panels. • List the advantages and disadvantages of cladding panels.

	General Objective 4.0: UNDERSTAND THE PURPOSE AND APPLICATION OF CURTAIN WALLING IN BUILDING CONSTRUCTION.

3	**4.1** Define curtain walling. **4.2** Enumerate the information required by the manufacturers for producing curtain walls. **4.3** Explain the important factors required for a checklist as to the quantify of any curtain wall.	• Discuss curtain walling. • Enumerate the information required by the manufacturers for producing curtain walls. • Discuss the important factors required for a checklist as to the quantify of any curtain wall.	• Charts showing • Produced curtain walls.	**4.1** Identify curtain walling. **4.2** Sketch curtain walling.	• Guide to Identify curtain walling. • Sketch curtain walling.	• Define curtain walling.

	General Objective 5.0: UNDERSTAND THE MANUFACTURE, PROPERTIES AND APPLICATION OF CLADDING SHEET/BOARD CONSTRUCTION.

4-5	**5.1** Explain the functions of sheet cladding materials. **5.2** List the types of sheet cladding materials, their standard forms and properties. **5.3** Describe the manufacture of plaster board, fiber board, asbestos cement sheets, wood-wool slabs etc. **5.4** State the general used of the materials in 5.3 above. **5.5** Explain with illustrations the various methods of fixing sheet cladding.	• Describe the functions of sheet cladding materials. • List the various types of sheet cladding materials, their standard forms and properties. • Describe the manufacture of plaster board, fiber board, asbestos cement sheets, wood-wool slabs etc. • State the general used of the materials in 5.3 above. • Explain with illustrations the various methods of fixing sheet cladding.	• Charts cladding materials • Fiber board • Asbestos cement. • Plywood • Aluminum cladding	**5.1** Identify sheet cladding materials. **5.2** demonstrates to the students the various methods of fixing sheet cladding.	• Identify sheet cladding materials. • Guide to demonstrates to the students the various methods of fixing sheet cladding	• List the types of sheet cladding materials.
	General Objective 6.0: KNOW HOW TO PREPARE ROOF FLASHING IN SHEET METAL					

6-7	**6.1** Sketch the lassie shape of flashings. **6.2** Discuss with illustration, methods of setting out sheet metal prior to forming shaped flashing **6.3** Enumerate the various kinds of metals used for roof flashing and the type factors affecting their choice. **6.4** Discuss the and illustrate with demonstrations the methods of forming flash shapes by: a. bonding b. dressing c. folding d. jointed insertions	• Sketch the lassie shape of flashings. • Describe with illustration, methods of setting out sheet metal prior to forming shaped flashing • Enumerate the various kinds of metals used for roof flashing and the type factors affecting their choice. • Describe the and illustrate with demonstrations the methods of forming flash shapes by: e. bonding f. dressing g. folding • jointed insertions	• Charts • Metals • Flashing	**6.1** Sketch the lassie shape of flashings.	• Guide to Sketch the leasie shape of flashings.	• List the various kinds of metals used for roof flashing. • State the factors affecting roof flashing.

	General Objective 7.0: KNOW THE PROPERTIES OF VARIOUS INSULATION AND WATER PROOFING MATEIRALS AND METHODS OF FIXING.

8-9	**7.1** Explain the importance of non-structural insulation in building. **7.2** State the types of insulation materials used in building industries, eg building boards, building papers, finish flooring materials, wool, blankets rubber, glass, acoustic tile, wood, cement mortar, bricks, cement plaster, asbestos-cement, partitioning. **7.3** Enumerate the properties of the insulation materials in 7.2 above. **7.4** Describe the relative used of the insulation materials in 7.2 above. **7.5** List the housing requirements of insulating a building. **7.6** State the effect of insulation in a building	• Describe the importance of non-structural insulation in building. • State the various types of insulation materials used in building industries, eg building boards, building papers, finish flooring materials, wool, blankets rubber, glass, acoustic tile, wood, cement mortar, bricks, cement plaster, asbestos-cement, partitioning. • Enumerate the properties of the insulation materials in 7.2 above. • Describe the various relative used of the insulation materials in 7.2 above. • List the housing requirements of insulating a building. • State the effect of insulation in a building. • Explain how to fix insulation materials in a	• Charts • Building papers • Wood • Blankets • Acoustical tile • Cement mortar etc. • Charts on groundwater level and run-off on building structure. • Water-proofing materials e.g. • Asphalt • Bituminous fibre • Engineering bricks etc. 264	**7.1** Identify Water-proofing materials e.g. -Asphalt -Bituminous fiber etc. **7.2** demonstrates the installation of the insulation materials to the students.	• Guide to identify Water-proofing materials e.g. -Asphalt -Bituminous fiber etc. • Guide to demonstrates the installation of the insulation materials to the students.	• List the types of insulation materials used in building industries. • List the properties of the insulation materials. • What are the effects of ground water level. And run-off on building structure? • List the various water proofing materials in common use. • Enumerate various preventive measures of protecting building structures from dampening. • What are the various ways of correcting leaked foundations,

	General Objective 8.0: UNDERSTAND THE COMPOSITION, PROPERTIES AND APPLICATION OF PAINT TO BUILDINGS AND VARIOUS MATERIALS.

10-12	**8.1** Explain the importance of painting in buildings eg aesthetic, weather protection. **8.2** State the main constituents of oil paints, emulsion paint, varnish and enamel, fire resistant paints etc. **8.3** Enumerate the various characteristics of the types of paint referred to in 8.2 above. **8.4** State the procedures for preparing paints for use. **8.5** Describe the drying processes of paints. **8.6** Outline the function of the following paint systems:- a. primer b. undercoat and c. finishing coat **8.7** Explain the selection and application of paint,	• Explain the importance of painting in buildings eg aesthetic, weather protection. • State the main constituents of oil paints, emulsion paint, varnish and enamel, fire resistant paints etc. • Enumerate the various characteristics of the types of paint referred to in 8.2 above. • State the procedures for preparing paints for use. • Describe the drying processes of paints. • Outline the function of the following paint systems: - a. primer b. undercoat and c. finishing coat • Explain the selection and application of -paint, to ferrous metals -nonferrous metals	-Samples of some paints eg. Oil paint, Emulsion paint, -Color chart. -Ferrous metal -Non-ferrous metal • Charts • Roller • Brushes etc	**8.1** Demonstrates to the students the procedures for preparing paints for use. Identify the fol **8.2** lowing. a) primer b) undercoat c) finish coat.	• Demonstrates to the students the procedures for preparing paints for use. • Identify the following. 1.primer 2.Undercoat. 3.Finishing coat.	• State the functions of the three main constituents of paint. • Explain the processes in painting to finished surfaces. • List and explain the main causes of paint failure. • Carry out painting operation.

13	EXAMINATIONS: Practical = 70%; Theory = 40%

LIST OF MATERIALS AND EQUIPMENT

Block laying, Bricklaying and Concreting

1. Block making machine
2. Brick making machine
3. Trowel
4. Shovel
5. Wheel barrow
6. Plumb
7. Line
8. Mixer
9. Dumper
10. Compactor
11. Poker vibrator
12. Ion cutting machine
13. Ion binding machine
14. Roofing sheet bending machine
15. Rebound hammer
16. Weighting balance
17. Measuring tapes (Steel, fabric and digital)
18. Water storage facility
19. Cutting machine

20. Portable power jig saw
21. Portable power drilling machine
22. Cutting machine
23. Cutting disk for (Concrete, Reinforcements and Block/Brick work)

Cont….

24. Block making machine
25. Brick making machine
26. Trowel
27. Shovel
28. Wheel barrow
29. Plumb
30. Line
31. Mixer
32. Dumper
33. Compactor
34. Poker vibrator
35. Ion cutting machine
36. Ion bending machine
37. Roofing sheet bending machine
38. Rebound hammer
39. Weighting balance
40. Measuring tapes (Steel, fabric and digital)
41. Water storage facility
42. Cutting machine
43. Portable power jig saw
44. Portable power drilling machine
45. Cutting machine
46. Cutting disk for (Concrete, Reinforcements and Block/Brick work)

47. Compression Testing Machine
48. Vicat Apparatus
49. Le Chateller Molds
50. British Standard Sieves (to BS 410)
51. Measuring Cylinder
52. Standard Hardened Steel Test Cylinder
53. Cube Molds
54. Air-meter
55. Compacting Factor Apparatus
56. Slump Test Apparatus
57. Brogues Mold
58. Shurys Test Apparatus
59. Vee-Bee Apparatus.
60. CBR Machine
61. Compaction Machine
62. Specific gravity testing machine
63. Attenberg Limit testing machine
64. Moisture Content testing machine
65. Soil hydrometer
66. Stop watch

Engineering Drawing

67. Drawing Board (size A2)
68. T-square (size 700m)
69. Set square (300-60o and 45o x 300)
70. Scale rule (metric)
71. Instrument set
72. Templates/French curves
73. Overhead projector
74. Film strip and sine projector

75. Chalk board with track machine
76. Models of solids
77. Tracing papers
78. Drawing pens (Repidographs)
79. Storing cabinets
80. Projector screen
81. Digital board
82. 3D printer
83. Artificial intelligence equipment's
84. Stationaries
85. Printers and Plotters
86. Computers
87. Computer software

Surveying

88. Total station
89. Theodolite
90. Dumpy level
91. Hand held GPS
92. Measuring tapes (Steel, fabric and digital)
93. Ranging pole
94. Staff
95. Optical plumb
96. Plumb bulb
97. Tilting level
98. Burning rolls
99. Target
100. Prismatic compass
101. Angular measuring tools

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