

210 – BRICKLAYING, BLOCKLAYING AND CONCRETE WORK

Examination Structure

For this trade, the following is a trade-related course;

193 – Building/Engineering Drawing (CTD 11 –14)

The trade will also be examined under the following components or subject groupings offer by Carpentry and Joinery, Painting and decorating.

211 – Introduction to Building Construction (CBC II)

212 – Bricklaying and Blocklaying (CBC 12 & 13, Concreting 14 &15)

Examination Scheme

211 – Introduction to Building Construction (CBC II) paper

This examination will be made up of two: Papers consist Paper I &II as follows

211-1 Paper I: This will comprise 40 multiple choice Objective questions to be attempted in 40 minutes. The section carries a total of 40 marks.

211-2 Paper II: This section will consist of seven Essay question out of which candidates are to attempt five question in 1 hours, 40 minutes and it carries 60 marks.

212 - Bricklaying, Block laying and Concreting (CBC 12,13,14 &15)

The examination will comprise two papers as follows:

212 –1 Paper I – This will consists of two Sections:

Section A: This will comprise 40 multiple choice objective questions to be attempted in 40 mins. The section carries 40 marks

Section B: This will comprise seven essay questions out of which candidates are to attempt five questions in 2 hours. It carries 100 marks

212 – 2 Paper II – This will consist only one particular question based on workshop practice as contained in the syllabus. The candidates are to carry out the practical for 6½ hours and the paper carries 60 marks.

N.B. Candidates should not be issued with the question paper until the date of the practical examination. However, list of material and other requirements for the practical examination will be sent to the institution at least one month before the date of the practical examination.

211 INTRODUCTION TO BUILDING CONSTRUCTION CBII

S/N	Topic/Objective	Contents	Activities/Remarks
1.0.	Working and Site Safety 1. Enumerate various hazards in workshop and in construction sites, state their causes and methods of prevention	1. Various hazards in the workshop and construction sites. 2. Dangerous construction tools. 3. Dangerous gases and liquids 4. Factory Act on safety of workers. 5. first Aid. 6. Purpose of safety 7. Safety regulations	Make charts entitled “safety in workshop” and “Safety in the construction site”. Emphasize need for developing individual habits. Show film or slides on safety in the building industry.
2.0.	Hand Tools 1. Identify and state the functions of basic hand tools of various trade and Maintenance	1. Identification and uses <ul style="list-style-type: none"> - Plumbing hand tools - Bricklaying/Block laying hand tools - Carpentry and Joinery hand tools - Painting and decorating tools 2. Maintenance of tools	Select appropriate tools and carry out simple – Plumbing, Bricklaying/Block laying, Carpentry & Joinery and painting & decorating work Emphasize Safety.
3.0	Basic processes in Carpentry and Joinery 1. State the characteristics and uses of various types of timber 2. Describe the different states of timber processes	1. Types of Nigerian timber e.g. Mahogany, Iroko, Obeche, Agba, Opepe, Black Afara. 2. Location, characteristics and uses 3. Conversion and seasoning. 4. Wood preservation 5. Manufactured boards e.g. plywood, lamin-boards, hardboards, 6. Carcase construction	When using the tools, Examine specimens of Nigerian timbers and describe their properties. Collect specimens and make them available for students Carryout (test of fresh and seasoned timber). Visit timber yards Types or preservative and application of preservatives e.g. (tar, oils water borne and organic solvents).
4.0	Site Preparation Describe site preparation procedures prior to setting out.	1. Tools, equipment and machinery 2. Clearing and disposal of unwanted materials 3. Leveling techniques-cut and fill. 4. Site Investigation.	Discuss land clearing, stumping and packing. Indicate dangers in disconnection of services and demolition of old structures.

S/N	Topic/Objective	Contents	Activities/Remarks
		5. Soil Investigation. 6. Soil Classification 7. Subsoil drainage. 8. Hoarding and Hutments	Emphasize safety precautions in relation to tools, equipment and machinery.
5.0	Setting Out Explain the principles and the methods of setting out buildings.	1. Setting out methods <ul style="list-style-type: none"> - by instrument - using 3:4:5 method. - Cross staff method - Using builder's square 2. Timber Profiles <ul style="list-style-type: none"> - marking of foundation and wall widths on profile. 	1. Draw different types of foundation. 2. Make a model of each type of foundation Display sketches of different types of foundation 3. Visit sites.
6.0	Foundations 1. Describe the functions of different types of foundations 2. Explain batching and mixing concrete. 3. Describe with sketches temporary supports to side of trenches.	1. Purpose of foundation. 2. Types of foundation – strip, pile, raft, pad, etc. 3. Factors influencing choice of foundation. Nature and type of soil. <ul style="list-style-type: none"> - Types of structure. - Proximity to existing structure - equipment and methods used in concrete mixing 4. Choice and types of supports to foundation trenches. 5. Timbering to trenches <ul style="list-style-type: none"> - in firm soil - in moderately firm soil - in loose soil. 	1. Draw different types of foundation. 2. Visit to construction sites. 3. Display sketches of different types of foundations.
7.0	Floors Describe the functions of various types of floors and their methods of construction.	1. Function of floor. 2. Preparation of solid and suspended floors. 3. Floor finishes. <ul style="list-style-type: none"> - tiling - granolithic - mosaic work - wood blocks, terrazzo tiles and insitu P.V.C. tiles. 4. Laying, treatment and preservation of floor	1. Visit a building site and observe methods of laying solid ground floors. 2. Show sections through concrete floors by sketching. <ol style="list-style-type: none"> i. Without damp proof. ii. With a Membrane. 3. Collect samples of

S/N	Topic/Objective	Contents	Activities/Remarks
			floor finishes
8.0	Walls 1. List types of wall units and describe functions of walls 2. Describe procedures and precaution involved mixing concrete and mortar 3. Explain the functions and method of placing D.P.C. in walls.	1. Types of walls: Internal and external; load bearing and non-load bearing. 2. Wall materials and their characteristics-stone, sandcrete blocks, sheet metals, clay bricks. 3. Methods of constructing walls e.g. bonding, nailing, use of bolts, welding; reveting. 4. Concrete and mortar mixing 5. Damp proof course.	1. Visit a building site and observe the different types of walls 2. Show the different walling materials. 3. Demonstrate concrete and mortar mixing 4. Erect simple straight walls with lime mortar
9.0	Fixing of Openings 1. Identify Nigerian timbers suitable for window and door construction. 2. Describe various types of door and window iron mongery and state their uses 3. Explain with sketches the need for the provision of weathering structures at openings	1. Types of timber for window and door frames. 2. Timber felling and transportation. 3. Conversion and seasoning. 4. Openings and walls. 5. Functions of doors/windows. 6. Types of doors, e.g. panel, flush metal. 7. Parts of doors and frames. 8. Sizes of doors 9. Fixing doors:-method of fixing doors using hinges, fixing of hasp and staple, barrel bolts, mortise lock and using hand tools. 10. Windows i. Types; sash, louver, casement. ii. Fixing of louver frames, casement iii. Locating and fixing burglary proofing 11. Weathering structures	1. Visit timber yard to identify timber and timber products. 2. Visit building sites to observe various doors used in different buildings and sizes of doors. 3. Take part in construction activities involving fixing of doors, windows and their appropriate iron mongery. 4. visit different building projects at various stages of completion. Arrange with local builders to assist students acquire skills in fixing

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			windows using ongoing projects.
10.0.	Roofs 1. Identify parts of a roof and explain terms associated with roofs 2. Describe the materials, maximum allowable span and construction of various types of roofs	1. Roof types and profiles e.g. beam and slabs as in concrete flat roofs, lattice and similar girders, trusses (Home truss, double home, fan truss rafters, standard fink, French truss, Northlight truss, couple, umbrella, bow string etc.) Portal frames, shell roofs, folded plates etc. 2. Parts of a roof-hip end, hip rafter, soffit, ridge, jack-rafter, valley rafter, common rafters, purlins, verge, gable and caves, fascia board, wall plate. 3. Functional requirements of roofs, weather resistance, strength and stability, thermal insulation, sound insulations, fire resistance durability. 4. Factors affecting choice of roof structure type of building, span, loads to be imposed, lighting requirements, accommodation for services, possible alterations, speed of erection, economy and aesthetic consideration.	1. Examine various forms of roof at the construction stage and identify their parts. 2. Visit a building site and identify the relevant parts of a roof. 3. Make models of roof structures. Emphasize the importance of selection of correct materials of required sizes.
11.0	Stairs Explain with sketches different types of stairs and their basic principles of design and construction	1. Functional requirements of stairs. 2. Types of stair – straight flight, dog-leg open well, spiral etc. 3. Designing principles – rise, going. 4. Reinforced concrete stairs. 5. Parts of stairs e.g. balustrade, handrail going, rise headroom, etc.	1. Make models of stairs. 2. Visit a building site and identify the relevant parts of a stair. Emphasize the placing of reinforcement in concrete stairs.
12.0	Finishes List various types of wall, ceiling and joinery work finishes	1. External and internal finishes – facing brick tiles, use of mosaic coloured mortar, decorative precast concrete panels etc.	1. Visit a building site and identify the various external and internal finishes.

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	and explain their applications	<ol style="list-style-type: none"> 2. Rendering: preparation of wall surfaces, rendering materials mixes, additives, proportioning, effects of warm and dusty weather (Harmattan) on external rendering. 3. Tyrolean finish selection of materials advantages and disadvantages, propri-etary mixes. 4. Texcote finishes 5. Pointing and jointing 6. Spatter dash. 7. Finishes for joinery works. 8. Ceilings-parts i.e. struts, Noggings, Battens, ceiling materials, Joists hangers, Runners for suspended ceiling construction steps. 	<ol style="list-style-type: none"> 2. Demonstrate the different wall finishes. 3. Execute the painting of a small dwelling using a specified paint. Emphasize the factors to be considered before choosing the paint type. 4. Visit a site and identify the various ceiling parts. 5. Collect samples of ceiling materials e.g. Asbestos sheets, wooden boards, cellotex materials, Hardboard, bamboo, grass, mats, raffia. Emphasize the factors considered for the choice of a particular material.
13.0	Services <ol style="list-style-type: none"> 1. Use sketches to illustrate the construction details of drainage system and installation of sanitary wares. 2. Describe the different methods of supply and installation systems of electricity in dwellings. 	<ol style="list-style-type: none"> 1. Drainage – surface water drainage. Sub-soil drainage, principle of drainage, materials used, ventilation and interception. 2. Method of testing leakages <ul style="list-style-type: none"> - Ball test - Mirror test - Smoke test - Hydraulic test - Air test - Torch test 3. Water supply system – cool and hot water supply; sanitary wares and fittings. 	<p>Discuss the terms used in drainage works and illustrate some of them with sketches</p> <p>Identify various types of fittings and select appropriate fittings for different works.</p> <p>Select suitable materials used for different types of installation work.</p> <p>Discuss types of wiring.</p> <p>Indicate reasons for the choice of materials used.</p>

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	3. Identify various electrical fixtures, state principles and their functions.	4. Materials used in plumbing, solder, nails and nailing, pipes (clay, metal asbestos, concrete, pitch fibre, plastic). 5. Acoustic insulation – the need for acoustic insulation, materials used for insulating buildings. 6. Lighting design – Types of lighting design (natural lighting, artificial lighting), Lighting design procedure, types of lamps used for interior lighting (Incandescent lamps, fluorescent tubes) 7. Electrical Installation Systems – various electrical fixtures, electrical safety regulations, circuit symbols and drawings.	Visit building sites and observe types of wiring, participate in simple wiring exercise. Observe safety measures. Emphasize safety rules applied to electrical installation in accordance with the I.EE regulations.

212 BRICLAYING AND BLOCKLAYING (BC 12 & 13) BRICKLAYING (CBC1)

	Topic/Objective	Contents	Activities/Remarks
1.0.	<p>Tools and Equipment</p> <p>1. Identify, sketch, select and state the use of common bricklayer's tools and equipment and their maintenance.</p> <p>2. Identify and state the functions of basic hand tools of various trade and Maintenance</p>	<ul style="list-style-type: none"> - Types of tools and equipment e.g. trowel, tape, builders square, plumb rule, line and pin, wheelbarrow, brick-moulding machine, mixer etc. - Uses of tools and equipment. - Maintenance of tools and equipment. - Selection of tools and equipment - Characteristic of cement. <p>1. Identification and uses</p> <ul style="list-style-type: none"> - Plumbing hand tools - Bricklaying/Block laying hand tools - Carpentry and Joinery hand tools - Painting and decorating tools <p>2. Maintenance of tools</p>	<p>Show the tools and equipment.</p> <p>Demonstrate the use of tools and equipment. Emphasize the correct use of the tools and equipment sketch on the chalkboard some of the tools and equipment. Emphasize on maintenance of tools and equipment.</p> <p>Select appropriate tools and carry out simple – Plumbing, Bricklaying/Block laying, Carpentry & Joinery and painting & decorating work</p> <p>Emphasize Safety.</p>
2.0.	<p>Cements</p> <p>1. Lists the properties and uses of different types of cements.</p> <p>2. Outline the processes of manufacture of ordinary Portland cement.</p> <p>3. Explain the methods of storing cements</p>	<p>1. Types of cement</p> <p>2. Manufacture of ordinary Portland cement.</p> <p>3. Cement storage</p> <p>4. Advantages and disadvantages of storing in Silos and in bags</p> <p>5. Importance of cement hydration, setting and hardening of cement.</p> <p>6. Method of determining suitability of ordinary Portland cement.</p> <p>7. Test for setting/hardening of cement e.g. Vicat apparatus.</p> <p>8. Test for soundness e.g. lechatelier mould.</p> <p>9. Site test of cement e.g. lumpness, warmness, etc</p>	<p>Explain the characteristics and properties of ordinary Portland cement.</p> <p>Carry out a test to show setting time of ordinary Portland cement.</p> <p>Visit nearby sites to see how cement are store or visit block moulding industries.</p>
3.0.	<p>Bricks: manufacture, Properties and Application.</p> <p>1. Describe the</p>	<p>1. Composition and physical properties of clay.</p> <p>2. Types of bricks e.g. burnt clay, mud engineering, decorative,</p>	<p>Show and demonstrate the manufacturing of bricks using sand, cement and water. Manufacturing</p>

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	<p>process of manufacture of bricks and identify, with sketches standard sizes of bricks</p> <p>2. Discuss the methods and procedures for carrying out tests on bricks.</p>	<p>concrete bricks.</p> <p>3. Process of brick moulding.</p> <p>4. Defects in manufactured bricks</p> <p>5. Properties of bricks</p> <p>6. Factors that influence the physical characteristics of sandcrete and clay bricks.</p> <p>7. Estimation of quantity of materials.</p> <p>8. Brick compressive strength test e.g. destructive and non-destructive methods i.e. by crushing and smith hammer.</p> <p>9. Porosity/permeability test e.g. immersion</p>	<p>processes may include; soft mut process (hand or machine made) extruded wire out process, semi-dry pressed and autoclave process. Visit brick-moulding industry. Emphasize on the curing techniques.</p> <p>Reference should be made to the Nigerian Industrial Standard 74:76”.</p>
4.0.	<p>Basic Processes in Carpentry and Joinery</p> <p>1. State the characteristics and uses of various types of timber</p> <p>2. Describe the different states of timber processes.</p>	<p>1. Types of Nigerian timber e.g. Mahogany, Iroko, Obeche, Agba, Opepe, Black Afara.</p> <p>2. Location, characteristics and uses</p> <p>3. Conversion and seasoning.</p> <p>4. Wood preservation</p> <p>5. Manufactured boards e.g. plywood, lamin-boards, hardboards,</p> <p>6. Carcase construction</p>	<p>When using the tools, Examine specimens of Nigerian timbers and describe their properties. Collect specimens and make them available for students</p> <p>Carryout (test of fresh and seasoned timber). Visit timber yards</p> <p>Types or preservative and application of preservatives e.g. (tar, oils water borne and organic solvents).</p>
5.0.	<p>Aggregates and Mortar</p> <p>1. Distinguish between the range of particulars size of coarse and fine aggregates and methods of storage.</p> <p>2. Explain the purpose of testing aggregates and procedures for carrying out the tests.</p>	<ul style="list-style-type: none"> - Types of aggregates – natural aggregates artificial aggregates. - Classification of aggregates – coarse and fine. - Grading of aggregates. - Method of carrying out tests on aggregates e.g. silt, bulking, colouremetric test, etc. - Characteristic of aggregates. - Methods of storing aggregates on site. - Qualities of a good mortar. - Types of mortar and mix ratio. - Properties and uses of mortar. - Factors that determine the workability and strength of 	<p>Show the two classifications of aggregates either natural or artificial.</p> <p>Visit construction sites to show aggregate storage.</p> <p>Sieve tests procedures should involve: aggregate sampling, quartering, sieving recording, and interpretation of result.</p> <p>Examples of storage methods may include stock</p>

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	3. Sampling of aggregates 4. Demonstrate and discuss the mixture of mortar including mix ratio, batching and mixing.	mortar e.g. water – cement ratio, etc. - Mix proportion of mortar for various classes of works e.g. channels and man holes, engineering brickwork, brickwork at basement, water exclusion course, sandcrete brick walling, burnt clay brick walling, glazed brick walling, etc. - Use of sieve analyzing quartering gauge, etc. for obtaining samples of aggregates for testing.	pilling, storage bins, rock ladder, etc. Demonstrate the mixture of mortar starting from - Mix ratio, - Batching by weight or volume. Emphasize on lime mortar, cement – sand mortar, cement-lime mortar, etc. Water-cement and cements and ratio
6.0	Basic Principles of Levelling 1. Describe the methods and processes of leveling by a. rise and fall method and b. instrument height or line of collimation. 2. Carryout booking and compute reduced level from given data.	- Definition and application of leveling - Methods and processes of leveling - Errors associated with leveling. - Methods of recording or booking levels, - Calculation of reduced level. - Methods and processes of leveling by: a. rise and fall method b. instrument height (line of collimation) method and illustrate the systems of booking.	- Show leveling instrument by using sketches - Explain and demonstrate the use of leveling instrument. - Solve problems on reduced level. Emphasize on the booking system and compute problems on reduced level.
7.0	Site Preparation and Setting Out 1. State different types of site and basic consideration for site preparation. 2. methods and procedures of	- Site preparation - Basic consideration e.g. access road, material storage, clearing, leveling, fencing, etc. - Site preparation for different types of site e.g. water-logged, alluvial soil, congested one-plot site, etc - The purpose of datum point and building line. - Methods of setting out e.g. 3:4:5,	Demonstrate, using 3:4:5 and builder's square method of a simple rectangular building. Methods to be considered may include: a. use of trammel or tape for curves or small radii; b. offset methods, where the striking point cannot be located.

	Topic/Objective	Contents	Activities/Remarks
	setting out rectangular and curved buildings.	builders square and isosceles triangle. - Methods of setting out curved buildings e.g. Trammel method. - Peg and line method, e.t.c.	Setting out procedures may involve: a. setting out of datum point and building line b. setting out the profiles, foundation and wall lines. c. Determination of datum and transfer of levels from datum using spirit level and boning rods.
8.0	Substructure and Construction 1. Describe types, properties, and method of identifying the nature of soil on site. 2. State the functions of foundation and describe with sketches different types of foundations 3. Outline the causes of collapse of trench sides and the basic consideration in the choice of timbering system during excavation. 4. Describe with sketches the timbering systems in different excavation situations. 5. set out, excavate and lay strip foundation of simple dwellings.	- Types and properties of soil e.g. rock gravel, sand, silt, peat, clay, etc. - Methods of identifying the nature of soil on site e.g. visual inspection, trial hole etc - Disposal of surface water (dewatering the site) - Purpose of foundations - Functions and functional requirements of foundations. - Bearing capacity of a soil - Type of foundations - Determining the depth and width of a strip foundation. - Safety precautions when working in trenches. a. Consideration of angle of repose. - Causes of collapse of trench sides - Timbering to trenches. a. basic consideration in the choice of timbering system. - Return, fill and Ram - Effects and control of termites in trenches - method of leveling concrete strip foundation. - Computation involving bulk increase of excavated material. - Costing of excavation based on labour or machine rate. - Timbering systems for the	- Explanation, sketching demonstration and calculation. - Visit construction site to witness excavation of trenches and foundation concreting. - Sketch timbering system to foundation trenches - Demonstrate the leveling in foundation trenches using boning rods.

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		excavation situations; <ol style="list-style-type: none"> a. Shallow trench in a moderately dry and loose soil b. Deep trench in moderately firm soil. c. Shallow trench in loose and waterlogged (sand, clay or alluvial) soil. 	
9.0	Solid Ground Floor Construction 1. Describe with sketches and carry out procedures of laying continuous and interrupted solid floors. 2. State the functions and materials of damp proof course (DPC) with reference to ground floor and basement and describe with sketches systems of damp exclusion at ground level and basement.	<ul style="list-style-type: none"> - Methods of laying continuous solid floor. - functions of damp proof course (DPC) - Damp proof course materials and their properties e.g. asphalt, copper sheet, polythene membrane, etc. - Placement of D.P.C. in solid ground floor and basement - Construction of solid ground floor. - Functions of hardcore and local materials suitable for hardcore. - Definition of the terms e.g. edge board, over site concrete, datum pegs, etc. - Curing concrete - Reasons for the following <ol style="list-style-type: none"> a. Minimum ground floor level. b. Minimum thickness of site or over site concrete. c. Position of DPC at ground floor level d. Concrete mix for over site concrete. 	Explanation, sketching demonstration and inspection during student's activities. Specification of concrete mix, minimum ground 110 or, minimum thickness for over site concrete, and position of DPC at ground floor level. Carry out the following operations; <ul style="list-style-type: none"> - Select tools and equipment for ground floor construction. - Set up and level to specified floor level profile. - Mark on edge boards positions internal walls. - Consolidate floor base by ramming - Establish hardcore datum pegs.
10.	Brickwall Construction 1. Use sketches to illustrate the features and principles of constructing brick wall	<ul style="list-style-type: none"> - Features of a brick and various forms of cut bricks e.g. ½ bat, ¾bats, king closer etc. - Bonds/principal bonds in brick work e.g. stretcher, header e.t.c. - Features and function of solid brick wall e.g. external walls parapet wall, separating wall 	Explanation, sketching, demonstration and construction of brick walls e.g. solid and cavity walls. Brick features may include: brick dimension, header face, stretcher face, frog or

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	<p>2. Set out and construct to specification fire place and chimney stack for any class of fuel.</p> <p>3. Explain with sketches the methods of bridging window and door openings</p> <p>4. Estimate, set out and construct to specification, brick wall, fix door and window frames</p> <p>5. State the functions of pointing and joining and make sketches of decorative brickwork.</p>	<p>e.t.c.</p> <ul style="list-style-type: none"> - Function and structural features of cavity wall. - Construction of solid walls - Construction of cavity walls - Construction of wall curved on plan. - Definition of terms e.g. head of opening, jamb threshold, reveal etc. - Door openings – Threshold. - Door frames: <ul style="list-style-type: none"> a. Fixing doorframes after the wall is completed. b. Fixing door frames as the walling is being built. c. Treatment at reveals. d. Concrete lintel. - Function of lintel - Factors which influence the design of lintel - Estimation of the quantity of bricks and bonding mortar - Setting out and construction of specified external and internal brick walls. - Decorative brickwork e.g. diaper bond, basket weave bond, herring bone bond, etc. - Types of pointing on brick walls e.g. flush, recessed etc. - Jointing brick wall. 	<p>indent, arris or angle bed or underside.</p> <p>Construct:</p> <p>a. Half brick thick wall in stretcher, header English bond etc.</p> <p>Type of cut bricks may include; half bat, three-quarter bat, queen bulluos, splay (stretcher and header).</p> <p>Construct the following brick wall features:</p> <ul style="list-style-type: none"> - Detached pier. - Attached pier - Buttress capping - square jambs. <p>Project drawings may be one made by the trainee or supplied.</p>
11.0	<p>Arches</p> <p>1. Use sketches to illustrate types of arches, features of a brick arch and arch finishes</p> <p>2. Make full-scale drawing and list the operation for sequence for the construction of arches up to 3m. span.</p>	<ul style="list-style-type: none"> - Features of a brick arch e.g. abutment, voussoirs, key, intrados, span, etc - Methods of producing voussoirs for arches. - Types of arches e.g. flat, semi-circular, elliptical arch, etc. - Setting the arch - Types of arch finishes e.g. rough gauged brick arches etc. - Obtaining or types of scaffold e.g. bracket, putlog trestle, etc. - Obtaining template for 	<p>Carry out the operation for construction arches.</p>

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		<p>voussoirs</p> <ul style="list-style-type: none"> - Procedure for cutting semi-circular in gauged and rubbed work. - Operational sequence for the construction of arches - Temporary support for arches or centering. 	
12.0	<p>Scaffolds</p> <p>1. Describe with sketches and state situation most suitable for the use of different types of scaffolds, and state the two materials used for scaffolds – timber and metal (tubular)</p> <p>2. Outline common faults in scaffold construction and state necessary erection and dismantling precautions.</p>	<ul style="list-style-type: none"> - Classification or types of scaffold e.g. bracket, putlog trestle, etc. - The construction (working places) regulations No. 94. - Materials used for scaffold <p>Advantages of timber and tubular (metal) scaffold.</p> <ul style="list-style-type: none"> - Various parts of scaffold e.g. standard, putlog, base plate, etc. - Inspection of scaffolds. - Scaffolding tubes and fittings. - Faults in scaffolds. - Erection of a timber and metal scaffold - Hoisting apparatus e.g. Gin wheel and scaffold crane, hoists, clymall, builders elevator, etc. 	<p>Demonstrative sketching and visit to construction sites.</p> <p>Description should take into account component parts (fitting, working plate forms and gangways, etc), standard dimensions and materials.</p> <p>The aspects of safety and correct procedures for erection and dismantling should be emphasized.</p> <p>Erect and dismantle timber or metal scaffold.</p> <p>The aspect of safety in the use of the hoisting equipment should be emphasized.</p>
13.0	<p>Fire Place and Chimneys for Cooking Range</p> <p>1. Explain the structural materials and basic consideration in the design and construction of fireplace and chimneystack</p>	<ul style="list-style-type: none"> - The structural materials for fire place and chimney in tropical buildings. - The basic consideration in the design and construction of fireplace and chimneystack. - The working drawings of a typical fireplace and chimneystack. - Definition of terms, e.g. chimneystack, flue, class, appliance, etc. - Damp prevention in 	<p>Drawings may be accompanied with specifications.</p> <p>Demonstrating and constructing chimneystack in the school workshop</p>

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	2. Set out and construct to specification fireplace and chimneystack for any class of fuel.	<p>chimneystack</p> <ul style="list-style-type: none"> - Method of building a chimney pot. 	
14.0	<p>Rubble Walling</p> <p>Identify and describe with sketched the principles and techniques of constructing coursed and uncoursed rubble walling and specify</p>	<ul style="list-style-type: none"> - Types of rocks in Nigeria for rubble walling. - Principal and techniques of constructing rubble walling e.g. coursed and uncoursed. - Specification of mortar for rubble walling. 	<p>Carry out the operation. Work on the rubble walling may involve piers, free standing walls, external walls of dwelling including ventilation, window and door openings.</p>
15.0	<p>Drainage</p> <ol style="list-style-type: none"> 1. Describe with sketches combined and separated drainage system and state their applications. 2. Explain with sketches the principles and methods of installing sanitary wares. 3. Use sketches to illustrate and interpret from working drawing, construction details of simple drainage. 4. Compute from drawing the quantity of pipes and fittings required for a given drainage system. 	<ul style="list-style-type: none"> - Definition of drain and sewer - Description and functions of Septic tank soakaway. Inspection chamber etc. - Building regulations on the construction of Septic tank soakaway. Inspection chamber etc. - Use and size of types of drain pipes e.g. asbestos drainpipes. Plastic drain pipes and galvanized steel pipes. - Types of fitting e.g. connecting sockets, tapper pipe bends, etc. - Drain pipe joints e.g. flexible joint, hepsleve joint, Hassall's joint etc. - Method of laving drains <ol style="list-style-type: none"> a. setting out the alignment b. determination of the fall c. the invert levels d. safety precautions. <p>Construction of Septic tank soakaway. Inspection chamber.</p> <ul style="list-style-type: none"> - Installation of sanitary wares. E.g. bath, wash-hand basin, W. 	<p>Explain the terms. Describe combined and separated drainage system.</p> <p>Show the trainee different sizes of pipes and pipes made of different types of material, e.g. clay of asbestos, plastic (PVC), etc.</p> <p>Demonstrating and visit to a construction site.</p> <p>Carry out any two types of tests using simple experiment in the workshop.</p> <p>Treatment should cover construction in a variety of soil types: alluvia soil, waterlogged soil, and firm dry soil.</p>

	Topic/Objective	Contents	Activities/Remarks
		C. suite, etc. - Computation of quantity of pipes and fitting in a drainage system. - Testing drains e.g. smoke test, ball test, etc.	
16.0	Pavement and Surface Drainage 1. Sketch and describe the functions of different forms of kerbs and state materials for production. 2. Describe the methods of producing and laying precast concrete paving 3. Specify the quantity of bricks and jointing mortar suitable for the construction of channels/gutters	- Functions of kerbs - Forms of kerbs and material used in producing kerbs. - Methods of laying precast concrete kerbs - Advantages of stone, concrete and brick paving. - Reasons for battering the sides of channels/gutters. - Factors that determine battered angle gutter.	Discuss the functions, material used. Demonstrate methods of laying concrete kerbs. Emphasis on precast concrete kerbs especially in terms of formwork. State advantages. Explain the factors that determine battered angle.

CONCRETING (CBC 13)

S/N	Topic/Objective	Content	Activities/Remarks
1.0	<p>Tools and Equipment</p> <p>Identify, sketch and state the use of the block-layer's tools and equipment and their maintenance</p>	<ul style="list-style-type: none"> - Types of tools and equipment e.g. trowel tape, builder's square, plumb rule, etc. - Maintenance of tools and equipment. - Selection of tools and equipment - Use of tools and equipment. 	<p>Show the tools and equipment.</p> <p>Demonstrate the use of tools and equipment.</p> <p>Sketch the tools and equipment. Carryout maintenance work on the tools and equipment e.g. washing the trowel after use.</p> <p>Emphasize the correct use of the tools and equipment.</p>
2.0	<p>Cement</p> <ol style="list-style-type: none"> 1. List the properties and uses of different types of cements. 2. Outline the process of manufacture of ordinary Portland cement 3. Explain the methods of storing cements. 	<ul style="list-style-type: none"> - Types of cements - Characteristic of cements - The process of manufacture of ordinary Portland cement e.g. fineness, soundness - Importance of hydration. - Methods of cement storage. - Advantages and disadvantages of storing in silos and in bags - Methods of determining suitability of - Test for setting time/hardening of cement e.g. Vicat apparatus. - Test for soundness e.g. Le-chlelier mould. - Site test of cement e.g. lumpness, warmness e.t.c. 	<ul style="list-style-type: none"> - Explain the characteristics and properties and properties of ordinary Portland cement. - Carry out a test to show setting time. - Visit sites or building industries. - Organize operation e.g. Vicat apparatus and Le-chalelier mould.
3.0.	<p>Blocks: Manufacture and Application</p> <ol style="list-style-type: none"> 1. Describe the process of manufacture of blocks and identify with sketches standard sizes of blocks 2. Discuss the methods of procedures for the 	<ul style="list-style-type: none"> - Types of blocks, e.g. hollow, solid, glass, fancy blocks, etc. - Methods of manufacturing blocks - Defects in manufactured blocks - Estimation of the quantity materials (sand and cement) - Block test e.g. compressive strength, porosity, permeability etc. - Advantages of vibrated blocks over non vibrated blocks. - Factors that affect the 	<ul style="list-style-type: none"> - Explain and demonstrate the manufacturing processes of blocks, etc. - Manufacturing processes may include, hand moulding or machine moulding. - Emphasis on the curing techniques. - Visit block moulding industries

S/N	Topic/Objective	Content	Activities/Remarks
	carrying out tests on blocks.	characteristics of sandcrete blocks. - Sources of aggregate e.g. natural and artificial.	- Carry out destructive test on strength of block - Carry out immersion test for porosity.
4.0.	Aggregates and Mortars 1. Distinguish between the range of particles size of coarse and fine aggregates and procedures for carry out the tests. 2. Demonstrate and discuss the mixture of mortar including mix ration, batching and mixing.	<ul style="list-style-type: none"> - Classification of aggregates e.g. fine and coarse aggregates - Grading of aggregates. - Testing aggregates e.g. soil test, moisture content test, etc. - Methods of storing aggregates. - Qualities of a good mortar. - Types of mortar and mix ratio for different jobs - Properties and uses of mortar. - Factors that determine the workability and strength of mortar, e.g. water cement ratio. - Mix proportions of mortar for various class of work. - Site testing of aggregates. 	Show the two classes of aggregates, e.g. fine and coarse aggregates. Sieve test procedure should involve aggregated sampling, quota quartering, sieving. Recording, and interpretation of results. Visit construction sites to show aggregates storage on site. Demonstrate the mixture of mortar e.g. mix ratio, batching by weight or volume etc. Example may include lime mortar, cement sand mortar, cement-lime mortar, air entrained (plasticised) mortar, mortar containing special cement refractory mortar, etc. Examples of storage methods may include: stock piling, storage bins, rock ladder, etc.
5.0.	Basic Principles of Leveling 1. Describe the methods and processes of leveling by: <ol style="list-style-type: none"> a. rise and fall method and b. instrument height or line of collimation. 	<ul style="list-style-type: none"> - Definition and application of leveling - Methods and processes of leveling: <ol style="list-style-type: none"> a. rise and fall method b. instrument height (line of collimation). - Errors associated with leveling . - Method of recording or booking. - Calculation of reduce level. 	<ul style="list-style-type: none"> - Show leveling instrument by use of sketches. - Explain and demonstrate the use of leveling instrument. - Solve problems on reduced level.

S/N	Topic/Objective	Content	Activities/Remarks
	2. Carry out booking and compute reduced level from a given date.		
6.0	<p>Site Preparation and Setting out</p> <p>1. State different types of site and basic considerations for site preparation.</p> <p>2. Methods and procedures of setting out rectangular and curved buildings.</p>	<ul style="list-style-type: none"> - Site preparation basic considerations e.g. access road, material storage, clearing - Site preparation for different types of site e.g. waterlogged, alluvial soil, etc. - Purpose of datum point and building line - Methods of setting out e.g. builders square. 3:4:5, etc. - Methods of setting out curved buildings e.g. trammel method. - Problems associated with various site conditions - Site clearing or removal of top soil. 	<p>Demonstrate, using builder's square and 3,4,5 method of setting out a simple rectangular buildings.</p> <p>Demonstrate the trammel method for curved walls.</p> <ul style="list-style-type: none"> - Methods to be considered may include: <ul style="list-style-type: none"> i. Use of trammel or tape for curves of small radii. ii. Offset methods, where the striking point cannot be located. <p>Setting out procedures may involve:</p> <ul style="list-style-type: none"> i. Setting out of datum points and building lines. ii. Setting out of profiles, foundations and wall lines. iii. Determinations of datum and transfer levels from datum using spirit level and boning rods.
7.0	<p>Substructure Construction</p> <p>1. Describe types properties and methods identifying the nature of soil on site</p> <p>2. State the functions of</p>	<ul style="list-style-type: none"> - Types and properties of soil - Methods of identifying the nature of soil on site. - Disposal of surface water (dewatering the site). - Purpose of foundations - Functions of foundations - Bearing capacity of soil. - Types of foundations. - Determining the depth and 	<p>Explain, sketch demonstrate and calculate.</p> <p>Visit construction site to see excavation of trenches and foundation concreting.</p> <ul style="list-style-type: none"> - Sketch various methods of timbering to trenches. - Calculation of bearing

S/N	Topic/Objective	Content	Activities/Remarks
	<p>foundation and describe with sketches different types of foundations.</p> <p>3. Outline the causes of collapse of trench sides in the choice of timbering system during excavation.</p> <p>4. Describe with sketches the timbering systems in different excavation situations.</p> <p>5. Set out, excavate and lay strip foundation of simple dwellings.</p>	<p>width of foundation.</p> <ul style="list-style-type: none"> - Safety precautions when working in trenches - Consideration of angle of repose. - Causes of collapse of trench sides - Timbering to trenches. - Choice of timbering system. - Return, fill and Ram. - Effects and control of termites in trenches. - Methods of leveling concrete strip foundation. - Computation involving bulk increase of excavated material. - Costing of excavation based on labour or machine rate. 	<p>capacity and width of foundation trench.</p> <p>Level bottom of foundation trench using boning rods.</p>
8.0	<p>Solid Ground Floor Construction</p> <p>1. Describe with sketches and carry out procedures of laying continuous and interrupted solid floors.</p> <p>2. State the functions and materials of damp proof course (D.P.C) with reference to ground floor and basement and describe with sketches systems of damp exclusion at ground level and basement.</p>	<ul style="list-style-type: none"> - Methods of laying continuous and interrupted solid floor. - Functions of damp proof course (D.P.C). - Damp proof course materials and their properties. - Placement of D.P.C. in solid ground floor and basement. - Construction of solid ground floor. - Functions of hardcore - Local materials suitable for hardcore. - Definition of the terms e.g. edge board, oversite, concrete, datum pegs. - Curing concrete. 	<p>Explain, sketch, demonstrate and inspect students activities.</p> <p>Visit a construction site to see basement construction. Participate in the construction of an interrupted solid ground floor.</p> <p>Specification of concrete mix, minimum ground thickness for oversite concrete; position of DPC at ground floor level should be emphasized.</p>

S/N	Topic/Objective	Content	Activities/Remarks
9.0	<p>Block-Wall Construction</p> <ol style="list-style-type: none"> 1. Use sketches to illustrate the features and principles of constructing block wall. 2. Describe the function and construct types of solid walls. 3. Explain with sketches the method of bridging window and door opening. 4. Estimate set out and constructs to specification block wall, fix door and window frame 5. State types an functions of pointing and jointing. 	<ul style="list-style-type: none"> - Features of a block and various forms of cut bricks. - Bonds/Principal bonds blockwork e.g. stretcher, header, etc. - Features and functions of solid blockwall. - Lintels for window and door openings - Setting out blockwall from foundation. - Definition of terms e.g. head of openings. - Function of wall plate and methods of fixing it. - Construction of attached and detached block pier. - Calculation of materials e.g. number of blocks, quantity of mortar etc. - Fixing of doors and window frames - Advantages of built-in-timber or metal frames. - Purpose of pointing and jointing. - Construction of external and internal walls. 	<p>Explain sketch, demonstrate and construct block walls e.g. stretcher, header with stopped ends.</p> <p>Block features may include half, three-quarter</p> <ul style="list-style-type: none"> - Interpret working drawings. - Carry out the operation of fixing door and window frames to specifications. <p>Project drawings may be made by the trainee or supplied.</p>
10.0	<p>Scaffolds</p> <ol style="list-style-type: none"> 1. Describe with sketches and state situation most suitable for the use of different types of scaffolds; and state the two materials used for scaffolds timber and metal (tubular). 2. Outline common faults scaffold construction and state necessary 	<ul style="list-style-type: none"> - Classification of scaffolds, e.g. bracket, putlog, trestle. Etc. - The construction regulation of scaffold. - Materials used for scaffolds. - Advantages of timber and tubular (metal) scaffold. - Various parts of scaffold e.g. standard putlog, base plate, etc. - Inspection of scaffolds. - Scaffolding tubes and fittings. - Faults in scaffolding. - Erection of a timber and metal scaffold. - Hoisting apparatus e.g. gin wheel, scaffold crane, hoists, 	<p>Identify types of scaffold. Explain the regulations and advantages of timber and tubular scaffold.</p> <p>Description should take into account component parts (fittings, working platform and gangways, and materials. The aspects of safety in the use of the hoisting equipment should be emphasized.</p> <p>Erect and dismantle timber or metal scaffold.</p> <p>The aspects of safety and correct procedures for</p>

S/N	Topic/Objective	Content	Activities/Remarks
	erection and dismantling precautions.	clymall etc.	erection and dismantling should be emphasized.
11.0	Fire Place and Chimney for cooking range 1. Explain the structural materials and basic considerations in the design and construction of fireplace and chimney stage. 2. Set out and construct to specification fireplace and chimneystack for any class of fuel.	<ul style="list-style-type: none"> - The structural materials for lire place and chimney in tropical buildings. - Basic considerations in the design and construction of lire place and chimney stack - Working drawings of a typical lire place and chimney stack - Definition of terms e.g. chimney flue appliance - Damp prevention in chimney stack. 	<ul style="list-style-type: none"> - Explain the basic design principles. - Draw a typical fire place and chimney stack - Drawings may be accompanied with specifications. - Define terms.
12.0	Rubble Walling Identify, describe with sketches the principles and techniques of constructing coursed and uncoursed rubble walling and specify mortar mix	<ul style="list-style-type: none"> - Types of rock for rubble walling - Principles and techniques of constructing rubble walling - Coursed and uncoursed rubblework. - Specification of mortar for rubble walling. 	<ul style="list-style-type: none"> - Show types of rock. - Draw coursed and uncoursed work. Work on rubble walling may involve piers. Free standing walls. External walls of dwelling including ventilation window and door openings. Carry out operation.
13.0	Drainage 1. Describe with sketches, combined and separated drainage system and state their applications. 2. Explain with	<ul style="list-style-type: none"> - Definition of drain and sewer - Description of combined and separate drainage system - Functions of septic tank, soak-away inspection chamber etc - Construction regulations of septic tank, soak-away. - Uses and sizes of drain pipes e.g., asbestos, plastic and 	<ul style="list-style-type: none"> - Define the terms. - Show different sizes of drain pipes. - Identity pipe fittings. - Carryout any two tests in a drainage system. - Construct soak away pit to specification. - Interpret working

S/N	Topic/Objective	Content	Activities/Remarks
	<p>sketches the principle and methods of installing sanitary wares.</p> <p>3. Use sketches to illustrate and interpret from working drawings construction details, of simple drainage system.</p> <p>4. Computer from drawing the quantity of pipes and fitting required for a given drainage system.</p>	<p>galvanized steel pipes.</p> <ul style="list-style-type: none"> - Types of pipes fitting e.g. connecting sockets, taper pipe, bends etc. - Drain pipe joints e.g. flexible joint hepsleve join etc. - Method of laying drains. <ul style="list-style-type: none"> a. Setting out the alignment b. Determination of the fall c. The invert levels d. Safety precautions - Difference between septic tank and soakaway pit - Difference between inspection chamber and manhole. - Installation of sanitary wares, e.g. bath, wah-hand-basin, W.C. suite, etc. - Computation of quantity of pipes and fittings in a drainage system. - Testing drains e.g. smoke test, ball test. Etc. 	<p>drawings and demonstrate the laying of draining pipes</p> <ul style="list-style-type: none"> - Treatment should cover construction in a variety of soil in varieties logged soil and firm dry soil.
14.0	<p>Pavement and Surface Drainage</p> <p>1. Sketch and describe the functions of different forms of kerbs and state materials for production.</p> <p>2. Describe the methods of producing and laying precast concrete paving slabs.</p> <p>3. Specify the quantify of blocks and jointing mortars suitable for the construction of channel/gutters.</p>	<ul style="list-style-type: none"> - Function of kerbs - Forms of kerbs. - Materials used in producing kerbs - Method of laying precast concrete kerbs - Advantages of stone, concrete and brick paving - Reasons for battering the sides of channels/gutters. - Factors that determine battered angle of gutter. 	<ul style="list-style-type: none"> - Discuss the functions, materials used - Demonstrate method of laying precast concrete, kerbs and slabs - Emphasis on cast insitu concrete kerbs also emphasis on the formwork for cast insitu - State advantages of laying precast concrete kerbs and slabs - Explain the factors that determine bated angle - Make samples of precast concrete kerbs and slabs.

CONCRETING (CBC 14)

S/N	Topic/Objective	Contents	Activities/Remarks
1.0	Tool and Equipment 1. Describe the functions of various concreter's tools. 2. Explain methods of caring for the tools and equipment	<ul style="list-style-type: none"> - Common tools and equipment used for concreting. - Functions of tools and equipment - Care and maintenance of tools and equipment. - Selecting of appropriate tools and equipment e.g. trowel, club, hammer, wood float, tapping rod, wheel barrow, head pan, tamper, mixing board, spirit level, manual block making machine, etc. 	<ul style="list-style-type: none"> - Sketch tools and equipment. - Explain functions, care and maintenance of tools. - Demonstrate correct use of tools and equipment.
2.0	Aggregates 1. Distinguish between the range of particles size of coarse and fine aggregates and method of storing aggregates on site. 2. Explain the purpose of testing aggregates and methods of carrying out the tests.	<ul style="list-style-type: none"> - Definition of aggregates. - Classification of aggregates e.g. natural and artificial. - Difference between coarse and fine aggregates - Consideration for particles size. - Testing aggregates e.g. sieve test, combine grading test, moisture content, bulking test etc. - Sample of aggregates - Method of storing aggregates e.g. stock piling, storage bin and rock ladder. 	<ul style="list-style-type: none"> - Identify natural and artificial aggregates. - Explain factors to consider for size particles. - Carry out various test e.g. sieve, silt, moisture content, bulking test etc.
3.0	1. List the properties and uses of different types of cements. 2. Outline the process of manufacture of ordinary Portland cement 3. Explain the methods of storing cements.	<ul style="list-style-type: none"> - Definition of cement. - Properties and uses of different types of cement e.g. ordinary Portland cement, rapid hardening etc. - Manufacture of Portland cement. - Importance of cement properties e.g. fineness, soundness, etc. - Definition of hydration. - Setting and hardening of 	<ul style="list-style-type: none"> - Discuss the properties and uses. - State the process of manufacture. - Explain fineness, soundness, etc. - Definition of hydration. - Show methods of storing cements. - Carry out tests in the laboratory or on site.

S/N	Topic/Objective	Contents	Activities/Remarks
		cement. - Cement handling. - Safety precautions. - Site testing of cement	
4.0	Concrete as Construction Materials. Outline the properties that make concrete an important construction material and explain the elements of concrete mix design.	- Definition of concrete - Functions of materials used for concrete. - Properties of concrete e.g. strength, durability, fire resistance etc. - Uses of mass and light-weight concrete. - Elements of concrete mix design. - The water/cement ratio - The aggregate/cement ration - Specification of the quality of water and mix ratios.	- Explain the functions and uses of concrete. - Discuss the properties of concrete - Organize and demonstrate mixing operation.
5.0	Proportioning and Mixing. 1. Distinguish between designed mix and prescribed mix and state the factors that determine mix ration. 2. Describe methods of batching and mixing, state mix ratios for common range of jobs. 3. outline and explain the different types of concrete test.	- Batching (Definition of method) - Methods of mixing concrete e.g. by manual and by machine mixer. - Working principles and uses of different types of mixers e.g. continuous mixer, batch mixer, tilting and non-tilting. - Uses of other mixers e.g. central batch mixing plant, truck mixer, etc. - Operation and maintenance of light duty mixer e.g. 3½ T Mixer. - Application of common admixtures. - Calculation of quantity of concrete ingredient e.g. aggregates, water etc - Factors affecting workability of concrete. - Testing concrete e.g. slump test, compacting factor test.	- Carry out batching by volume and by weight. - Mix concrete by hand and by the use of mixer. - Carry out slump test on concrete - Operate and maintain light duty batch mixer - Admixture may include pudlo, calcium chloride, air-entraining agents, fly-ash retarders imperious, etc
6.0	Handling Concrete 1. Explain the use and safety	- Use of equipment for transporting and placing concrete e.g. wheel barrow,	- Show and sketch the equipment. - Explain the safety and

S/N	Topic/Objective	Contents	Activities/Remarks
	<p>precautions of various equipment in transporting and placing wet concrete.</p> <p>2. List factors to be considered in the choice of methods of transporting wet concrete to placing point.</p>	<p>power barrow, crane skip, truck mixer, etc</p> <ul style="list-style-type: none"> - Operational and safety precautions in the use of the equipment - Use of pumped and ready mixed concrete. - Consideration in the choice of transporting wet concrete e.g. quantity to be handled 	operational precautions.
7.0	<p>Placing Concrete</p> <p>1. Outline the safety and operational precautions when placing wet concrete</p> <p>2. state reasons and identify common tools for compacting wet concrete.</p> <p>3. Describe the method of concreting under different weather conditions</p>	<ul style="list-style-type: none"> - Safety and operational precautions when placing wet concrete - Compacting the wet concrete - Common tools for compacting concrete e.g. beam, surface, poker vibrators etc. - Safety and operational uses of mechanical vibrators. - Selection of appropriate compacting tools for various concrete structures, e.g. foundations, lintels, column, floor etc. - Concreting under different weather conditions. 	<ul style="list-style-type: none"> - Explain precautions and state reasons for compacting wet concrete - Show common tools for compacting. - Select appropriate compacting tools. - Compacting tools may include, poker vibrators clamp on vibrators, rammer/tamper, etc.
8.0	<p>Curing</p> <p>State reasons for curing concrete and describe common curing method and where they are suitable</p>	<ul style="list-style-type: none"> - Definition of curing - Common curing methods e.g. ponding, wet sacks, heissan, wet sand etc. - Curing methods for different situations e.g. wet sacks are for columns. 	<ul style="list-style-type: none"> - State reasons for curing. - Demonstrate different methods of curing and where suitable
9.0	<p>Testing concrete</p> <p>Describe different testing procedures on concrete.</p>	<ul style="list-style-type: none"> - Making and testing concrete cubes - Compressive strength of concrete e.g. using crushing machine. 	<ul style="list-style-type: none"> - State the procedures for different concrete tests.
10.0	<p>Joints in Concrete</p> <p>1. Sketch and explain the purpose of joints</p>	<ul style="list-style-type: none"> - Joints in concrete structures e.g. in water tanks, construction joint, etc. - Common jointing materials e.g. 	<ul style="list-style-type: none"> - Sketch and explain the purpose of joints. - Specify application of materials and

S/N	Topic/Objective	Contents	Activities/Remarks
	in concrete structures. 2. Name common jointing materials and state their applications to specification.	bitumen, asphalt, safe board, etc. - Method of making construction joints in structures such as floors, beams etc. - Shear stress distribution - Definition of joints - Construction joints.	precautions. - Construct various joints in concrete structures.
11.0	Form-work 1. Outline and explain the functions and basic requirements of form-work 2. Explain the advantages of steel and timber formwork and procedures in striking. 3. State types and functions of mould oil.	- Definition of formwork - Functions of formwork - Basic requirements of form-work e.g. adequate support, rigidity, leak proof. Etc. - Advantages of steel and timber form - Construction of form for different structures such as column, slab, lintel, concrete, arch, stairs, window hoods, etc. - Procedures and precautions in striking formwork. - Functions of mould oil. - Types of mould oil. - Types of mould oil e.g. soft soap solution, grease, etc.	- Explain functions and basic requirements of form. - State advantages of both steel and timber form - Sketch form-work for concrete structure. - Name and explain the functions of mould oil.
12.0	Reinforced Concrete Basic Principles. 1. Describe the effects of stress in concrete structure. 2. Sketch methods of reinforcing concrete structure.	- Effects of stress in concrete structure e.g. bending, buckling, twisting, shearing, etc. - Methods of reinforcing concrete structure e.g. beams, lintels, column, etc.	- Visit construction site. Identifying reinforcement members
13.0	Structural Detailing 1. Interpret with aid of sketches common representations and symbols in	- Common representations and symbols in structural drawing. e.g. R, Y, X,B,T, alt, stg, a. b. r. etc. - Conventional rule in structural detailing e.g. calling up bars	- Interpret structural drawings - Define terms e.g. kicker, blinding, etc. - Use structural drawings to make reinforcement

S/N	Topic/Objective	Contents	Activities/Remarks
	structural drawing 2. Use a structural drawing to produce reinforcement schedule.	26R1011- 200. - Production of reinforcement schedule. - Definition of terms, e.g. kicker, blinding, concrete cover, concrete spacers etc.	schedule.
14.0	Reinforced Concrete Production 1. Identify common reinforcing steels and state reasons for using good quality steel for concrete structures in wet or hot and dry weather. 2. Fix to specification steel reinforcements in simple concrete structures. 3. Describe methods of producing the integral finishes on in-situ concrete.	- Common reinforcing steels - Quality of steel for concrete - Reasons for the use of hardcore, blinding foundation, spacer blocks etc. - Casting and curing in-situ concrete structures - Precast concrete units - Finishes on in-situ concrete e.g. exposed aggregate (honey combing) board marked surface, etc. - Method of casting and curing in-situ concrete under the following: wet or hot weather e.g. strip foundation, lintels, beams columns etc.	- Identify common steels - Specify reasons for quality - Describe methods of casting. - Organise and execute production of in-situ reinforced concrete structure. - Reinforcing steels should include: plain square bars, twisted bars, steel fabrics.
15.0	Prestressed Concrete 1. State the meaning of prestressed concrete and advantages and methods of production. 2. State with example the use of prestressed concrete in Nigeria construction scene and safety precautions in the production.	- Definition of Prestressed concrete. Advantages of prestressed concrete e.g. reduced tendency of cracking, reduction in size and weight, etc. - Materials in the production of prestressed concrete, e.g. medium and high tensile wires or rods, high strength concrete. - Methods of producing prestressed concrete; a. Pre-tensioning b. Post-tensioning	- Explain the meaning of pre-tensioning and post-tensioning. - State example of prestressed concrete. - State safety precautions.

WALL, FLOORS AND CEILING FINISHING (CBC 15)

S/N	Topic/Objective	Contents	Activities/Remarks
1.0	<p>Finishing Tools and Equipment</p> <p>1. Describe the functions and methods of caring for finishing tools and equipment.</p>	<ol style="list-style-type: none"> 1. Common finishing tools and equipment. 2. Functions of tools and equipment. 3. Care and maintenance of finishing tools and equipment 	<ul style="list-style-type: none"> - Identify and sketch finishing tools. - Examples of tools, and equipment should include; plastering trowel, pointing trowel, gauge rod, Frenchman, Tyrolean machine, masonry tile cutter, polishing machine.
2.0.	<p>Properties and uses of finishes</p> <p>Explain the characteristics and application of various finishing materials.</p>	<ol style="list-style-type: none"> 1. Types of finishing materials. 2. Common floor finishes e.g. terrazzo, granolithic concrete, ceramic tiles, stones, etc 	<ul style="list-style-type: none"> - Discuss the finishing materials - Discuss the floor finishes (in-situ floor).
3.0	<p>Principles and Techniques of Application of In-Situ Finishes</p> <ol style="list-style-type: none"> 1. Name and distinguish different types of in-situ floor finishes. 2. Outline the procedures and precautions to be taken in mixing, laying, compacting, curing and protecting in-situ floor finishes 3. Estimate and specify the quantities of in-situ finishing materials 	<ol style="list-style-type: none"> 1. Types of in-situ floor finish. E.g. screeds, terrazzo, etc 2. Estimation of finishing materials. 3. Causes and precautions against defects in in-situ floor finishes, e.g. laitance, cracking, dusting, etc 4. Functions of floor screed and methods of bonding e.g. monolithic (unbonded and bonded). 5. Floor screed mix ration e.g. 1:3: 1½ 6. Procedure for laying floor screed, 7. Procedure for laying terrazzo. 	<ul style="list-style-type: none"> - Discuss (in-situ floor finishes. - Calculating finishing materials - Discuss the defects. - Carry out the procedure of laying screed. - Specify floor screed mix ratios. - Carry out the operation involved in laying terrazzo. - Emphasize on the base suitable for laying screed, terrazzo, etc. - Distinguish between methods of having in-situ floor finishes, e.g. monolithic bonded, unbonded.
4.0	<p>Principles and Techniques of Laying Precast floor.</p>	<ol style="list-style-type: none"> 1. Properties of precast floor finish. 2. Procedure and precautions for laying precast floor e.g. 	<ul style="list-style-type: none"> - Explain the properties. - Carry out the procedures - Defects include: lifting, uneven surface,

S/N	Topic/Objective	Contents	Activities/Remarks
	<ol style="list-style-type: none"> Describe the procedures and precautions to be taken in laying precast floor finishes. Organise and demonstrate precast floor tiling operations 	<p>concrete slab, mosaic tiles:</p> <ol style="list-style-type: none"> Method of laying floor tiles: <ol style="list-style-type: none"> Solid bedding operation Common laying defects in precast flooring and their causes. 	<p>misalignment of tile units, cracking etc.</p>
5.0	<p>Principles and Techniques of Laying Synthetic Floor Tiles.</p> <ol style="list-style-type: none"> Identify and describe common synthetic floor tiles and methods of application. Estimate quantity of tile units required for a specified floor area from working drawing 	<ol style="list-style-type: none"> Common synthetic floor tiles <ol style="list-style-type: none"> Thermosplastic tiles Vinyl asbestos tiles P.V.C. tiles Lirolemn tiles Estimation of quantity of tiles from working drawings. Procedures in the application of synthetic floor tiles. Defects in P.V.C. tiling and their 	<ul style="list-style-type: none"> - Identify floor tiles - Calculating the quantity of tiles. - Carry out the procedures
6.0	<p>External and Internal Rendering</p> <ol style="list-style-type: none"> Describe the principles of various types of rendering and specify the qualities of a good rendering. Organise and execute external and internal rendering on walls and slab to fits to specification. 	<ol style="list-style-type: none"> Definition of rendering. Functions of rendering. Types of rendering <ol style="list-style-type: none"> Smooth Roughcast Pebble dash Rendering different wall background e.g. sandcrete block wall, concrete wall, brickwall, etc. Procedures for wall rendering. Procedures for slob soffit rendering Mix proportions for external and internal rendering. 	<ul style="list-style-type: none"> - Explain types of rendering. - Carry out the procedures - Keys may be provided by haking, spatter dash or cheselling.
7.0	<p>Wall Tiles and Mosaics</p> <ol style="list-style-type: none"> Specify and estimate the 	<ol style="list-style-type: none"> Fixing glazed tiles <ol style="list-style-type: none"> Fixing with mortar and Fixing with adhesive. Calculation of quantity of wall 	<ul style="list-style-type: none"> - Carry out operations - Emphasize on the background suitable for

S/N	Topic/Objective	Contents	Activities/Remarks
	<p>properties and quantities of wall and ceiling tiles.</p> <p>2. Organise and execute various walls and ceiling tiling operations through their principles and application.</p>	<p>tiles.</p> <p>3. Mix ratios for fixing tiles.</p>	<p>fixing wall tiles.</p>
8.0	<p>Cladding</p> <p>1. Identify types of materials used in cladding.</p> <p>2. Explain the methods of fixing cladding; state the operational and safety precautions to be observed when fixing claddings.</p> <p>3. Specify mortar for fixing claddings and methods of handling claddings on site</p>	<p>1. Definition of claddings.</p> <p>2. important points for the designer.</p> <p>3. Important points for the cladding fixer.</p> <p>4. Cramps and other fittings</p> <p>5. Bonder courses or supports.</p> <p>6. Concrete cladding</p> <p>7. Slate claddings</p> <p>8. Granite cladding.</p> <p>9. Stone cladding</p> <p>10. Protection of the cladding after faxing</p> <p>11. Expansion joints</p> <p>12. Construction joints</p> <p>13. Stacking and storing slabs</p> <p>14. Handling large slabs</p>	<ul style="list-style-type: none"> - Explain what is cladding. - Discuss the important points - Discuss the cramps and other fittings - Organise and execute the operations of fixing cladding. - Emphasize on the mortar for fixing cladding. - Emphasize also weathering
9.0	<p>Premixed Renderings</p> <p>1. Describe the composition, properties and methods of applying Tyrolean and sandtex..</p> <p>2. Explain causes of failure in Tyrolean finish and different dandtex finishes and estimate the quantity required for a specified job</p>	<p>1. Composition of Tyrolean</p> <p>2. Estimation of quantity of Tyrolean</p> <p>3. Procedures for applying Tyrolean.</p> <p>4. Causes of failure in Tyrolean finishes</p> <p>5. composition of sandtex</p> <p>6. Application of sandtex</p>	<ul style="list-style-type: none"> - Discuss the Composition of Tyrolean and Sandtex - Describe the procedures of applying Tyrolean and Sandtex - Calculate the quantity required form a given specification. - Describe the properties of the base suit able for sandtex finishes. - Emphasize on peeling, discoloration, cracking and crazing e.t.c.