

# Blocklaying, Bricklaying and Concreting - National Technical Certificate (NTC) and Advanced National Technical Certificate (ANTC)

## Advanced National Technical Certificate Courses

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# Building Science I

<b>PROGRAMME: ADVANCED NATIONAL TECHNICAL CERTIFICATE IN BLOCKLAYING ETC</b>			
<b>MODULE: BUILDING SCIENCE – I</b>		<b>Module Code: CBC – 20</b>	<b>Contact Hours: 3hrs Theory</b>
<b>Course Specification: THEORETICAL CONTENT</b>			
<b>General Objective: 1.0: Understand The Basic Principles Of Thermal Movements In Building And Building Materials.</b>			
Week	Specific Learning Outcome:	Teachers Activities	Resources
1-7	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 the variation of the amount of heat transmitted between the surface of a slab of building material of uniform thickness and composition.	<ul style="list-style-type: none"> <li>• Compute the ‘u’ and ‘k’ values for structural units or building materials from given data.</li> <li>• Student to define and explain all the thermal terms.</li> </ul>	<ul style="list-style-type: none"> <li>• ‘U’ and ‘u’ values for structural units.</li> </ul>
<b>General Objective 2.0: Know The General Principles Of Sound Transmission And Control.</b>			
Week	Specific Learning Outcome:	Teachers Activities	Resources
3 – 4	2.1 Explain the general principles of sound transmission.  2.2 Explain the following terms. a. air born sound b. structure-born sound c. sound reflection, reverbration and reveration time. d. Impact sound  2.3 Explain the general principles and methods of sound control.	<ul style="list-style-type: none"> <li>• Measure sound transmission level (intensity) in decibels.</li> <li>• By visiting an acoustic building describe the general principles and methods of sound control (Insulation and absorption) in buildings e.g.</li> <li>• Principle of discontinuity</li> <li>• Mass law; ound reduction at source, etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Sound measuring instruments</li> <li>• Sound producing source.</li> <li>• A coustic building</li> </ul>

**PROGRAMME: ADVANCED NATIONAL TECHNICAL CERTIFICATE IN BLOCKLAYING ETC**

**MODULE: BUILDING SCIENCE – I**

**Module Code: CBC – 20**

**Contact Hours:  
3hrs Theory**

**Course Specification: THEORETICAL CONTENT**

**General Objective 3.0: Understand The Basic Principles Of Lighting**

<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teachers Activities</b>	<b>Resources</b>
5-6	<p>3.1 State the general functions of lighting.</p> <p>3.2 Define the following terms:</p> <ul style="list-style-type: none"> <li>a. illumination</li> <li>b. luminous flux</li> <li>c. illuminance</li> <li>d. luminance</li> <li>e. day light factor</li> </ul> <p>3.3 Distinguish between disability glare and discomfort glare.</p> <p>3.4 State ways by which glare is controlled in buildings.</p>	<ul style="list-style-type: none"> <li>• Explain the general functions of lighting e.g</li> <li>• To illuminate the internal envelope and contents;</li> <li>• To illuminate task (reading, working with equipment etc). to the extent appropriate to optimal functioning of the eye.</li> <li>• Emphasize the following ways of controlling glare in buildings.</li> <li>• Types, sizes, number and position of openings</li> </ul>	<ul style="list-style-type: none"> <li>• Source of light</li> <li>• Hall with good lighting system.</li> <li>• Hall with bad lighting system.</li> </ul>
	<p>3.5 Determine the intensity of illumination due to a given source of light.</p> <p>3.6 Calculation of day light factor.</p> <p>3.7 Describe the main classes of lighting.</p> <p>3.8 State the uses of the main classes of lighting.</p> <p>3.9 Explain the interdependence of color and lighting in buildings.</p>	<ul style="list-style-type: none"> <li>• Colour and texture of building surfaces.</li> <li>• Types of lighting fittings</li> <li>• Structure of internal envelope etc.</li> </ul> <p>Calculate day-light factor from given data and by direct measurement.</p> <ul style="list-style-type: none"> <li>• Emphasize the following classes of lighting.</li> <li>• Direct lighting</li> <li>• Indirect lighting</li> <li>• General lighting</li> <li>• Luminous lighting</li> </ul>	<ul style="list-style-type: none"> <li>• Data for calculating day-light factor</li> <li>• Instrument for calculating day-light factor by direct measurement.</li> </ul>

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<b>MODULE: BUILDING SCIENCE – I</b>		<b>Module Code: CBC – 20</b>	<b>Contact Hours: 3hrs Theory</b>
<b>Course Specification: THEORETICAL CONTENT</b>			
<b>General Objective 4.0: Understand The Principles Of Electricity Supply In Buildings</b>			
<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teachers Activities</b>	<b>Resources</b>
7-8	<p>4.1 State the difference between alternating current and direct current.</p> <p>4.2 Explain the construction and working principles of generators, motors and transformers.</p> <p>4.3 Explain with the aid of experiments the heating, lighting, magnetic and chemical effects of electric current.</p> <p>4.4 Calculate the power and energy consumption in simple circuits.</p> <p>4.5 Explain the function of earthing in electrical circuits.</p> <p>4.6 State the purpose and explain the functioning of circuit breakers and fuses.</p> <p>4.7 Illustrate the correct method of distributing electrical power from the mains to socket outlets and lighting points in house wiring systems.</p> <p>4.8 Compute total electrical load for a given load of a given house wiring.</p> <p>4.9 Calculate fuse capacity for house wiring system.</p> <p>Identify dangers of electricity and essential safety measures against them.</p>	<ul style="list-style-type: none"> <li>• Carry out experiments to demonstrate the heating, lighting, magnetic, and chemical effects of electric current.</li> <li>• Mathematical calculation of power and energy consumption in simple circuit.</li> <li>• Identify earthing in an electrical circuits. E.g in a bungalow.</li> <li>• Identify circuit breakers and fuses in a building.</li> <li>• Emphasize the correct method of distributing electrical power from the mains (NEPA line or stand by generator) to socket outlets and lighting points in house wiring systems.</li> <li>• Interpret electrical installation drawings of a small bungalow or two storey building.</li> <li>• Emphasis the dangers of electricity and enumerate the essential/necessary safety measures against them.</li> </ul>	<ul style="list-style-type: none"> <li>• Simple electric circuits</li> <li>• Electric heater</li> <li>• Electric bus</li> <li>• Solenoid</li> <li>• circuit breakers</li> <li>• fuses</li> <li>• NEPA line</li> <li>• Generator</li> <li>• Bungalow with complete wiring system</li> <li>• Electrical installation.</li> <li>• Drawing of a small project i.e. the bungalow.</li> </ul>

<b>PROGRAMME: ADVANCED NATIONAL TECHNICAL CERTIFICATE IN BLOCKLAYING ETC</b>			
<b>MODULE: BUILDING SCIENCE – I</b>		<b>Module Code: CBC – 20</b>	<b>Contact Hours: 3hrs Theory</b>
<b>Course Specification: THEORETICAL CONTENT</b>			
<b>General Objective 5.0: Know The Basic Principles Of Plant Installation In Buildings.:</b>			
<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teachers Activities</b>	<b>Resources</b>
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.	<ul style="list-style-type: none"> <li>• Visit a building with escalators and or lift.</li> <li>• Emphasize maintenance principles for lifts and escalators.</li> </ul>	<ul style="list-style-type: none"> <li>• Escalators</li> <li>• Air conditioners</li> </ul>
	5.4 Describe various mechanical methods of ventilation. 5.5 Explain the principle of mechanical ventilation. Outline the general installation requirements for central and room air conditioning equipment in dressings. 5.7 Define the following: <ul style="list-style-type: none"> <li>a. relative humidity</li> <li>b. dew point</li> </ul> 5.8 Explain the occurrence of condensation in buildings. 5.9 Describe methods of control of condensation.	<ul style="list-style-type: none"> <li>• Illustrate the application of turbulent and non turbulent flow in domestic water supply and drainage</li> <li>• Determine experiments the rate of flow from an orifice.</li> <li>• Calculate the velocity of flow of water from given date</li> <li>• Calculate pipe sizes for drains or water supply from given date.</li> <li>• Experimentally explain the general principles of installation of cold and hot water supply systems having water pumps.</li> </ul>	<ul style="list-style-type: none"> <li>• Orifice</li> <li>• water containers</li> <li>• water</li> <li>• data for calculating velocity of flow of water.</li> </ul>
	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 above water supply system: <ul style="list-style-type: none"> <li>a. static head of water</li> <li>b. velocity head</li> <li>c. friction head</li> <li>d. pressure head</li> <li>e. water hammer</li> <li>f. coefficient of velocity</li> <li>g. coefficient of discharge.</li> </ul>		

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<b>Course Specification: THEORETICAL CONTENT</b>			
<b>General Objective 6.0: Analyse Forces In Simple Building Structures And Structural Frame Work.</b>			
<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teachers Activities</b>	<b>Resources</b>
11-12	<p>6.1 State the laws of static equilibrium.</p> <p>6.2 Explain with illustrative examples the laws of static equilibrium e.g. <math>(\sum V) = 0</math></p> <p>6.3 Determine the magnitude and position of the resultant of a simple system of coplanar forces in.</p> <p>6.4 Analyse forces in simple pin-jointed frame work.</p>	<ul style="list-style-type: none"> <li>• Determine the magnitude and position of the resultant of a simple system of coplanar forces by: - graphical method.</li> <li>• Method of resolution experiment.</li> <li>• Experiment.</li> <li>• Analyse forces in simple pin-jointed frame-work</li> <li>• by method of resolution of force diagram method</li> <li>• method of section</li> </ul>	<ul style="list-style-type: none"> <li>• Charts</li> <li>• Model of simple pin-jointed frame work.</li> </ul>
	<p>6.5 Identify common loading systems for various building structures</p> <p>6.6 Determine beam reaction, shear force and bending moments in simply supported beams under various loading systems using.</p> <p style="padding-left: 20px;">a. Link polygon system</p> <p style="padding-left: 20px;">b. method of resolution experiments.</p> <p>6.7 Define the following properties of structural sections. centre of gravity, moments of inertia, radius of inertia, radius of gyration section modules</p>	<ul style="list-style-type: none"> <li>• Emphasize the following common loading systems concentrated load on beams, straddion and nodes in frame-works.</li> <li>• Knife –edge load on partitions or walls.</li> <li>• Uniformly distributed load such as self-weight wind load,.</li> <li>• Distributed load with linear variation such as loads against pilling retaining walls triangular load such as block-work over opening.</li> <li>• Calculate beam reactions under various loads.</li> </ul>	<ul style="list-style-type: none"> <li>• Model</li> <li>• beam</li> <li>• sections</li> </ul>
	<p><u>6.8 State the general theory of simple bending i.e.</u></p> $\frac{E}{R} = \frac{M}{F} = \frac{F}{Y}$	<ul style="list-style-type: none"> <li>• Determine he value of the following for a given section.</li> <li>• Centre of gravity</li> <li>• Moments of inertia</li> <li>• Radius of gyration</li> <li>• Section modules</li> <li>• Determine maximum bending stress and moment of resistance of beam sections.</li> </ul>	
13	<b><u>Examinations = 100% Theory</u></b>		

## Building Science II

<b>PROGRAMME: ADVANCED NATIONAL TECHNICAL CERTIFICATE IN CARPENTRY AND JOINERY.</b>			
<b>MODULE: BUILDING SCIENCE II</b>		<b>MODULE CODE: CBC 21</b>	<b>Contact Hours: 3hrs theory &amp; 1 Hr. practical</b>
<b>MODULE Specification: THEORETICAL CONTENT</b>			
<b>General Objective 1.0: Know The General Process Of Manufacture, Properties And Uses Of Different Types Of Cement.</b>			
<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teacher Activities</b>	<b>Resources</b>
1	<p>1.1 Outline the manufacturing process, basic composition properties and uses of the following types of cement:</p> <ul style="list-style-type: none"> <li>a. ordinary Portland cement</li> <li>b. rapid hardening Portland</li> <li>c. extra rapid hardening Portland</li> <li>d. low heat Portland cement</li> <li>e. blast-furnace Portland cement</li> <li>f. super-supplanted cement</li> <li>g. high alumina-cement</li> <li>h. colored Portland cement</li> <li>i. hydrophobic cement</li> <li>j. pozzolana –cement</li> </ul>	<ul style="list-style-type: none"> <li>• Describe the manufacturing process of cement.</li> <li>• Name the different types of cement and explain uses and areas of application.</li> </ul>	<ul style="list-style-type: none"> <li>• Chalk board.</li> <li>• Lesson note.</li> <li>• Specimen of cement of different types.</li> </ul>
	<p>1.2 State factors which influence setting time, strength and hardness of ordinary Portland cement.</p> <p>1.3 Describe the test procedure and carry out standard tests to determine:</p> <ul style="list-style-type: none"> <li>a. strength</li> <li>b. soundness</li> <li>c. setting time</li> <li>d. hardness; of ordinary Portland cement.</li> </ul> <p>1.4 State and justify the essential precautions in the storage and use of cements in 1.1 above.</p>	<ul style="list-style-type: none"> <li>• Explain the main features of each type of cement.</li> <li>• Explain the factors that influence the setting time, strength and hardness of Portland cement.</li> </ul>	<ul style="list-style-type: none"> <li>• Lesson note.</li> <li>• Cement specimens.</li> <li>• Chalk board.</li> </ul>

**PROGRAMME: ADVANCED NATIONAL TECHNICAL CERTIFICATE IN CARPENTRY AND JOINERY.****MODULE: BUILDING SCIENCE II****MODULE CODE: CBC 21****Contact Hours:  
3hrs theory & 1  
Hr. practical****MODULE Specification: THEORETICAL CONTENT****General Objective 2.0: Know The Manufacture, Properties And Uses Of Lime And Gypsum Plasters.**

<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teacher Activities</b>	<b>Resources</b>
2	<p>2.1 Explain the differences in the manufacture and composition of lime and gypsum plasters.</p> <p>2.2 State the classifications and uses of lime and gypsum plasters.</p> <p>2.3 Describe the method of application of lime and gypsum and state essential precautions.</p>	<ul style="list-style-type: none"> <li>• Define: "Lime"; " Gypsum" and explain their uses in building construction processes.</li> <li>• Discuss the manufacturing, properties, and uses of lime and gypsum.</li> <li>• Explain the methods of application of the materials.</li> </ul>	<ul style="list-style-type: none"> <li>• Lesson note</li> <li>• Chalk board</li> <li>Posters</li> <li>• Specimen of lime and gypsum.</li> </ul>

**General Objective: 3.0 Carry Out Sound Tests To Determine The Quality Of Aggregates.**

<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teacher Activities</b>	<b>Resources</b>
3	<p>3.1 Describe procedures of sieve analysis and determine aggregate grading by sieve analysis.</p> <p>3.2 Describe the test procedure and carry out laboratory tests to determine silt content of given sample of aggregates.</p> <p>3.3 Describe the test procedure and carry out the test to determine the crushing values of a given sample of aggregate.</p> <p>3.4 Describe the test procedure and carry out bulking test.</p>	<ul style="list-style-type: none"> <li>• Define "aggregate"</li> <li>• Explain methods of grading of aggregates</li> <li>• Conduct silt content, crushing value and bulking tests and guide the students to perform similar tests.</li> </ul>	<ul style="list-style-type: none"> <li>• Aggregates</li> <li>• Lesson notes</li> <li>• Posters</li> <li>• Samples of Aggregates</li> </ul>

**PROGRAMME: ADVANCED NATIONAL TECHNICAL CERTIFICATE IN CARPENTRY AND JOINERY.**

<b>MODULE: BUILDING SCIENCE II</b>	<b>MODULE CODE: CBC 21</b>	<b>Contact Hours: 3hrs theory &amp; 1 Hr. practical</b>
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**MODULE Specification: THEORETICAL CONTENT**

<b>General Objective: 4.0: Know Different Types Of Mortar And Their Application.</b>			
<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teacher Activities</b>	<b>Resources</b>
4	<p>4.1 Outline the general desirable properties of mortar e.g. good workability and water retentivity, adequate cohesion and adhesion, strength, durability, tolerable shrinkage, etc.</p> <p>4.2 Name different types of mortar, their properties, typical mix proportions to be taken in the proportioning and mixing of mortar.</p> <p>4.3 Explain the precautions to be taken in the proportioning and mixing of mortar.</p>	<ul style="list-style-type: none"> <li>• Define “Mortar”</li> <li>• State the properties of mortar and typical mix proportion.</li> </ul>	<ul style="list-style-type: none"> <li>• Mortar</li> <li>• Lesson notes</li> <li>• Charts</li> </ul>
	<p>4.4 State the basic considerations in the choice of mortar e.g weather characteristics, appearance, type of job, etc.</p> <p>4.5 Describe the procedure and carry out an experiment to determine the air content of plasticised mortar.</p>	<ul style="list-style-type: none"> <li>• Demonstrate the procedures for determining air content of plasticised mortar.</li> </ul>	<ul style="list-style-type: none"> <li>• Mortar.</li> <li>• Lesson notes.</li> <li>• Posters.</li> </ul>
<b>General Objective 5.0: Know The Process Of Manufacture, Properties And Uses Of Different Clay Products.</b>			
<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teacher Activities</b>	<b>Resources</b>
5	<p>5.1 Name and state the properties and uses of different clay products in the building industry. e.g. clay-bricks (engineering bricks, facing bricks, common bricks, and specials), clay blocks, clay roofing tiles, clay floor tiles and quarries, vitrified clay pipes, etc.</p> <p>5.2 Outline the process of manufacturing of the products in 5.1 above.</p> <p>5.3 Determine hardness, compressive strength, porosity and permeability of given sample of bricks by laboratory methods.</p>	<ul style="list-style-type: none"> <li>• Define “Clay” and State the properties of clay.</li> <li>• Discuss the process of manufacturing clay bricks blocks, tiles etc.</li> <li>• Demonstrate how to determine hardness, compressive, strength porosity and permeability test of bricks.</li> </ul>	<ul style="list-style-type: none"> <li>• Clay.</li> <li>• Clay Products.</li> <li>• Lesson note.</li> <li>• Chalkboard.</li> <li>• Clay bricks.</li> <li>• Test Instruments.</li> </ul>

**PROGRAMME: ADVANCED NATIONAL TECHNICAL CERTIFICATE IN CARPENTRY AND JOINERY.**

<b>MODULE: BUILDING SCIENCE II</b>	<b>MODULE CODE: CBC 21</b>	<b>Contact Hours: 3hrs theory &amp; 1 Hr. practical</b>
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**MODULE Specification: THEORETICAL CONTENT**

**General Objective 6.0: Know Different Types Of Building Rocks Their Sources And Uses.**

<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teacher Activities</b>	<b>Resources</b>
6	<p>6.1 Classify natural rocks, igneous, sedimentary and metamorphic rocks.</p> <p>6.2 Describe the characteristics and uses of different types of rocks of commercial value in the construction under the classification in 6.1 above.</p> <p>6.3 Describe the sources of rocks in 6.2 and their quarrying methods. e.g., igneous rocks, sedimentary rocks, metamorphic rocks, granites, sands, limestone, marble, slate.</p>	<ul style="list-style-type: none"> <li>• Show samples of building stones and explain their characteristics.</li> <li>• Name sources of building stone.</li> </ul>	<ul style="list-style-type: none"> <li>• Lesson note.</li> <li>• Posters.</li> <li>• Chalkboard.</li> </ul>

**General Objective 7.0: Understand The Production And Use Of Concrete As Structural Material**

<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teacher Activities</b>	<b>Resources</b>
7	<p>7.1 Outline the desirable qualities of the ingredients of mass and reinforced concrete.</p> <p>7.2 Explain the effects of aggregate grading, water cement ratio compaction and curing on the compressive strength of concrete.</p> <p>7.3 Describe methods of proportioning and mixing concrete materials and placing compacting, curing and protecting green concrete.</p>	<ul style="list-style-type: none"> <li>• Define concrete and describe the composition of concrete.</li> </ul>	<ul style="list-style-type: none"> <li>• Concrete.</li> <li>• Aggregates.</li> <li>• Lesson note concrete cube.</li> <li>• Equipment.</li> </ul>
	<p>7.4 Carry out slump and cube test and interpret results.</p> <p>7.5 Carry out permeability test on given sample of concrete.</p> <p>7.6 Estate from project drawings the quantities of concrete materials required for the execution of the project.</p> <p>7.7 Compute the quantities of batch materials from prescribed or designed mix.</p> <p>7.8 Explain the general principles in the reinforcement of beams, columns, floor slabs, walls, retaining walls, concrete tanks, can designed mix.</p>	<ul style="list-style-type: none"> <li>• Guide students to carry out slump test and permeability tests on given sample of concrete.</li> </ul>	- do -

**PROGRAMME: ADVANCED NATIONAL TECHNICAL CERTIFICATE IN CARPENTRY AND JOINERY.**

<b>MODULE: BUILDING SCIENCE II</b>	<b>MODULE CODE: CBC 21</b>	<b>Contact Hours: 3hrs theory &amp; 1 Hr. practical</b>
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**MODULE Specification: THEORETICAL CONTENT**

**General Objective 8.0: Know The Characteristics, Methods Of Conversion And Uses Of Different Types Of Timber In The Building Industry.**

<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teacher Activities</b>	<b>Resources</b>
8	8.1 Classify timber as hard-wood and soft-wood and state the distinguishing characteristics. 8.2 Describe the structure of timber and state the functions of the parts. 8.3 Describe different methods of timber conversion and state the merits of each method. 8.4 Explain the purpose of seasoning, timber and describe various methods of seasoning and preserving timber, 8.5 Identify nature of defects in timber and explain their causes. 8.6 Identify various causes of deterioration in converted timber and state necessary precautions. 8.7 Explain the BS system of grading timber. 8.8 Identify various type of manufactured boards and sheet and explain their characteristics and uses. 8.9 Carry out cleavage test, static bending test and hardness test on given specimen of timber.	<ul style="list-style-type: none"> <li>• Explain the sources of timber in Nigeria.</li> <li>• Discuss the uses of timber in the building industry.</li> <li>• Explain the structure of timber.</li> <li>• Explain the process of timber production up to point of use.</li> <li>• Explain the causes of timber deterioration and how these could be controlled.</li> </ul>	<ul style="list-style-type: none"> <li>• Lesson note.</li> <li>• Specimens of different types of timber.</li> <li>• Chart.</li> </ul>

**General Objective 9.0: Understand The Characteristics Various Metals Used In The Building Industry.**

<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teacher Activities</b>	<b>Resources</b>
9	9.1 Identify various metals used as structural components in building and state their mechanical properties. E.g. brass, aluminium, mild steel, galvanized iron, copper, lead, stainless steel, wrought iron, cast iron, medium carbon steel. 9.2 Explain the process of corrosion of the metals in 9.1 above and describe the necessary preventive measures.	<ul style="list-style-type: none"> <li>• List the various kinds of metal – ferrous and non-ferrous metals.</li> <li>• Define corrosion and explain its process and effect on metal.</li> </ul>	<ul style="list-style-type: none"> <li>• Samples of metals.</li> <li>• Lesson note.</li> <li>• Charts.</li> </ul>

**PROGRAMME: ADVANCED NATIONAL TECHNICAL CERTIFICATE IN CARPENTRY AND JOINERY.**

<b>MODULE: BUILDING SCIENCE II</b>	<b>MODULE CODE: CBC 21</b>	<b>Contact Hours: 3hrs theory &amp; 1 Hr. practical</b>
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**MODULE Specification: THEORETICAL CONTENT**

**General Objective: 10.0: Know The Properties And Application Of Various Types Of Paints And Varnishes**

<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teacher Activities</b>	<b>Resources</b>
10	10.1 Describe the basic constituents of paints. 10.2 Name types of paints and explain their composition, properties and uses. 10.3 Explain the functions of primer, under-coat and finishing paints. 10.4 Identify paint schemes for various building surfaces: e.g. wood, block-work, brick-work, steel, etc. 10.5 Estimate quantity of paint required for a given house painting job. 10.6 Carry out experiments to determine spreading power, drying times and permeability of a paint sample. 10.7 Carry out experiment to demonstrate the effect of alkali on a given sample of oil paint. 10.8 Explain the occurrence of defects in painting and state the necessary precautions. 10.9 Explain the need for surface preparation before painting.	<ul style="list-style-type: none"> <li>• Define “Vanish” and “Paint”</li> <li>• Explain the basic components of paints</li> <li>• Use question and answer technique to explain the functions of primer and under-coat.</li> </ul> <p style="text-align: center;">- do -</p>	<ul style="list-style-type: none"> <li>• Specimens of Vanish and Paints.</li> <li>• Lesson note.</li> </ul>

**General Objective 11.0: Understand The Manufacture, Properties And Uses of Plastics In Building.**

<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teacher Activities</b>	<b>Resources</b>
11	11.1 Explain the basic chemical process of manufacture of plastics. 11.2 Distinguish between thermoplastics and thermosetting plastics. 11.3 Name different types of plastics in use in the building industry, describe their characteristics and uses. e.g. PVC, PVA, Polystyrene, silicones, etc.	<ul style="list-style-type: none"> <li>• Define “Plastic”.</li> <li>• Explain the use of plastic materials in the construction industry.</li> </ul>	<ul style="list-style-type: none"> <li>• Specimen of plastic materials.</li> <li>• Lesson note.</li> <li>Chalk board.</li> </ul>

**PROGRAMME: ADVANCED NATIONAL TECHNICAL CERTIFICATE IN CARPENTRY AND JOINERY.****MODULE: BUILDING SCIENCE II****MODULE CODE: CBC 21****Contact Hours:  
3hrs theory & 1  
Hr. practical****MODULE Specification: THEORETICAL CONTENT****General Objective 12.0: Understand The Properties And Uses Of Adhesives In The Building Industry.**

<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teacher Activities</b>	<b>Resources</b>
12	12.1 Name different types of adhesives in the building industry, describe their characteristics and uses. E.g. animal glue, casein glue, amino-resins, epoxy resin, etc. 12.2 Explain the action of adhesives and the need for surface preparation before application. 12.3 Explain factors to be considered in the selection of adhesive for use. 12.4 Explain with illustrative examples, the use of sealants and mastics in the building industry. 12.5 Describe the test procedure and carry out standard test to determine the dry and wet strengths of given specimen of adhesive.	<ul style="list-style-type: none"><li>• Define "Adhesive".</li><li>• Explain the use and importance of adhesives in construction work.</li><li>• Give notes for students to copy.</li></ul> <p>- do -</p>	<ul style="list-style-type: none"><li>• Samples of adhesives</li><li>• Lesson note.</li><li>• Chalk board.</li></ul> <p>- do -</p>
13	<b>Examinations: Practical = 60% Theory = 40%</b>		

## Basic Construction Management II

<b>PROGRAMME: ADVANCED NATIONAL TECHNICAL CERTIFICATE IN BRICKLAYING, BLOCKLAYING AND CONCRETING.</b>			
<b>MODULE: BASIC CONSTRUCTION MANAGEMENT II</b>		<b>Module Code: CBM 21</b>	<b>Contact Hours: 72</b>
<b>Course Specification: Practical Content</b>			
<b>General Objective: 1.0 UNDERSTAND THE BASIC PRINCIPLES ORGANISATION AND MANAGEMENT.</b>			
<b>WEEK TERM 1</b>	<b>Specific Learning Outcome:</b>	<b>Teachers Activities</b>	<b>Resources</b>
1 - 2	<p><b>BUSINESS UNITS</b></p> <p><b>1.1</b> Explain the meaning of the term 'company'.</p> <p><b>1.2</b> Distinguish between private and public company.</p> <p><b>1.3</b> Outline the principles of organisation and management of the following business units:</p> <p style="margin-left: 40px;">a. Sole proprietorship</p> <p style="margin-left: 40px;">b. Partnership</p> <p style="margin-left: 40px;">c. Limited liability Company.</p>	<ul style="list-style-type: none"> <li>• A visit to the various business units to observe the distinguishing features.</li> </ul>	<ul style="list-style-type: none"> <li>• Certificate of registration of companies</li> </ul>
	<p><b>1.4</b> Explain the legal meaning and advantages of:</p> <p style="margin-left: 40px;">a. Limited liability</p> <p style="margin-left: 40px;">b. Incorporation in reference to formation of a company.</p> <p><b>1.5</b> Define the term fixed and working various ways in which construction firm may raise capital.</p> <p><b>1.6</b> Distinguish between fixed and working capital.</p> <p><b>1.7</b> Describe various ways in which construction firm may raise capital.</p>		

**PROGRAMME: ADVANCED NATIONAL TECHNICAL CERTIFICATE IN BRICKLAYING, BLOCKLAYING AND CONCRETING.**

<b>MODULE: BASIC CONSTRUCTION MANAGEMENT II</b>	<b>Module Code: CBM 21</b>	<b>Contact Hours: 72</b>
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**Course Specification: Practical Content**

**General Objective: 1.0 UNDERSTAND THE BASIC PRINCIPLES ORGANISATION AND MANAGEMENT.**

<b>WEEK TERM</b>	<b>Specific Learning Outcome:</b>	<b>Teachers Activities</b>	<b>Resources</b>
<b>1</b>	<p><b>1.8</b> Describe the various organisation structures e.g.</p> <ul style="list-style-type: none"> <li>- line</li> <li>- line and staff</li> <li>- function staff</li> <li>- matrix</li> </ul> <p><b>1.9</b> Explain the application of organisational structures in the construction Industry.</p>	<ul style="list-style-type: none"> <li>• Illustrate the basic features of the organisation Structures by means of organisational chart.</li> </ul>	<ul style="list-style-type: none"> <li>• Organisation charts</li> </ul>
	<p><b>1.10</b> Analyse the characteristics of organisation cultures and explain the degree to which they feature in the management of construction firms.</p> <p><b>1.11</b> State the importance of clearly defined policies in an organisation construction.</p>	<ul style="list-style-type: none"> <li>• Draw the organisation chart of a typical medium size construction firm and describe the span of control and pattern of communication.</li> <li>• Identify the main area of a construction firm activities within which policy issues should be clarified by management.</li> </ul>	<ul style="list-style-type: none"> <li>• Organisation Charts</li> </ul>

**PROGRAMME: ADVANCED NATIONAL TECHNICAL CERTIFICATE IN BRICKLAYING, BLOCKLAYING AND CONCRETING.**

<b>MODULE: BASIC CONSTRUCTION MANAGEMENT II</b>	<b>Module Code: CBM 21</b>	<b>Contact Hours: 72</b>
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**Course Specification: Practical Content**

**General Objective 2.0: CONTRACTUAL RELATIONSHIP & TENDERING ARRANGEMENTS.**

<b>WEEK TERM</b>	<b>Specific Learning Outcome:</b>	<b>Teachers Activities</b>	<b>Resources</b>
1			
3 – 4	<p>2.1 Explain the legal meaning of the term 'contract'.</p> <p>2.2 State the basic elements of a valid contract e.g offer, acceptance, consideration.</p> <p>2.3 List and explain the various forms of general remedies available in the law courts for a breach of contract.</p> <ul style="list-style-type: none"> <li>- damages, order of payment of debt, specific performance</li> <li>- Injunction</li> <li>- Rescission</li> </ul>	<ul style="list-style-type: none"> <li>• Identify and explain the basic features of the followings classes of contract.</li> <li>• Speciality or sealed contract.</li> <li>• Simple contract.</li> </ul>	
	<p>2.4 Name and explain the various types of contracts in the construction industry.</p> <p>2.5 Explain the nature and uses of the following contract documents.</p> <ul style="list-style-type: none"> <li>- articles of agreement</li> <li>- conditions of contract</li> <li>- specification</li> <li>- bill of quantities</li> <li>- contract drawings</li> </ul>	<ul style="list-style-type: none"> <li>• Explain the basic features of the following types of contracts:                             <ul style="list-style-type: none"> <li>a. negotiated contracts (cost plus target cost), lump sum, schedule contracts, serial contracting etc.</li> <li>b. package deals</li> <li>c. labour contracts</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Present to learners a standard contract documents and let learners internalise with the documents.</li> </ul>

**PROGRAMME: ADVANCED NATIONAL TECHNICAL CERTIFICATE IN BRICKLAYING, BLOCKLAYING AND CONCRETING.**

**MODULE: BASIC CONSTRUCTION MANAGEMENT II**

**Module Code: CBM 21**

**Contact Hours: 72**

**Course Specification: Practical Content**

**General Objective 2.0: CONTRACTUAL RELATIONSHIP & TENDERING ARRANGEMENTS.**

<b>WEEK TERM</b>	<b>Specific Learning Outcome:</b>	<b>Teachers Activities</b>	<b>Resources</b>
<b>1</b>	<p>2.6 List the following parties involved in the building contracts i.e.</p> <ul style="list-style-type: none"> <li>- Employer or client</li> <li>- Arch</li> <li>- Engineer (structural and service)</li> <li>- Quantity surveyor</li> <li>- Contractor</li> <li>- Sub-contractors</li> <li>- Suppliers</li> <li>- Agent and foreman</li> <li>- Clerks of works</li> </ul>	<ul style="list-style-type: none"> <li>• Explain the roles and responsibilities of the various parties involved in the building contracts.</li> </ul>	<ul style="list-style-type: none"> <li>• A visit to a standard construction site where all the parties involved in the building contract can be identified.</li> </ul>
	<p>2.7 Describe the procedures for the preparation of open and selecting tendering.</p> <p>2.8 Explain the application of open and selective tendering arrangements.</p>	<ul style="list-style-type: none"> <li>• Prepare an open tender document for a light construction project e.g.</li> <li>• Garage, two/three</li> <li>• Bedroom bungalow.</li> </ul>	<ul style="list-style-type: none"> <li>• An already prepared tendering documents for the contract treated in week six.</li> </ul>

**PROGRAMME: ADVANCED NATIONAL TECHNICAL CERTIFICATE IN BRICKLAYING, BLOCKLAYING AND CONCRETING.**

<b>MODULE: BASIC CONSTRUCTION MANAGEMENT II</b>	<b>Module Code: CBM 21</b>	<b>Contact Hours: 72</b>
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**Course Specification: Practical Content**

**General Objective 3.0: SITE ORGANISATION AND ADMINISTRATION**

<b>WEEK TERM</b>	<b>Specific Learning Outcome:</b>	<b>Teachers Activities</b>	<b>Resources</b>
1			
5 - 6	<p>3.1 State basic consideration in the planning of construction site.</p> <p>3.2 Explain the importance of security and safety on project.</p> <p>3.3 List factors to be considered in the planning of the site offices and welfare facilities.</p> <p>3.4 State factors to be considered in the placing of order for materials, equipment and plants.</p> <p>3.5 Describe standard procedure for ordering and receiving/deliveries of materials, equipment and plant.</p>	<ul style="list-style-type: none"> <li>• Consider, access road, temporary roads, hutments, stationary plant location, materials (storage and waste disposal).</li> <li>• Draw up security and safety plans for a typical medium – sized construction project.</li> <li>• Emphasize the importance of the site office and welfare facilities.</li> <li>• Site office and welfare facilities.</li> <li>• Plan a given construction site for light construction project. e.g Bungalow.</li> </ul>	<ul style="list-style-type: none"> <li>• A visit to an organised construction site.</li> <li>• Drawings/pictures of construction sites.</li> <li>• Films and slides</li> <li>• Standard and essential site records from an organised site.</li> </ul>
	<p>3.6 State the functions of essential site records.</p> <p>3.7 Explain the purpose of site meeting.</p> <p>3.8 Describe the method of organising size meeting.</p> <p>3.9 State the purpose of inventory.</p> <p>3.10 Describe inventory system suitable for construction site.</p>	<ul style="list-style-type: none"> <li>• Attend on organised site meeting on the construction site.</li> <li>• Prepare an inventory system for a light construction project e.g Bungalow or block of flats.</li> </ul>	<ul style="list-style-type: none"> <li>• Minutes of a site meeting.</li> <li>• Inventory sheet of a small construction project.</li> </ul>
	<p>3.11 Outline the problems that are encountered in executing a project in a restricted area.</p> <p>3.12 Explain the solutions to the problems encountered in executing a project in a restricted site.</p>	<ul style="list-style-type: none"> <li>• Visit a congested site</li> <li>• Observe the problems encountered on the congested area.</li> <li>• Proper solutions to the problems identified.</li> </ul>	<ul style="list-style-type: none"> <li>• Congested construction site.</li> </ul>

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**Course Specification: Practical Content**

**General Objective 4.0: UNDERSTAND APPLICATION THE BASIC TECHNIQUES OF PLANNING CONTROL OF BUILDING PROJECTS**

<b>WEEK TERM</b>	<b>Specific Learning Outcome:</b>	<b>Teachers Activities</b>	<b>Resources</b>
1			
7 - 9	<p>4.1 Define planning in relation to building construction.</p> <p>4.2 Describe the various aspects of pre-tender and pre-contract planning.</p> <p>4.3 Describe aspects of planning during and after construction.</p> <p>4.4 Explain the use of programme and progress charts network diagram (CPM).</p> <p>4.5 Explain the use of line of balance as planning techniques in the construction industry.</p>	<ul style="list-style-type: none"> <li>• Prepare programme and progress</li> <li>• Charts for a given light construction project.</li> </ul>	<ul style="list-style-type: none"> <li>• Lesson note chalk board.</li> <li>• Programme and progress charts of a construction project.</li> </ul>
	<p>4.6 Define work study.</p> <p>4.7 Describe work study scope</p> <p>4.8 State the objectives of work study.</p> <p>4.9 Describe the basic techniques of method study e.g scale models, string diagrams, progress chart etc.</p> <p>4.10 State the objectives of work measurements and time study.</p> <p>4.11 Describe the standard procedure for carrying outwork measurement.</p> <p>4.12 Outline the general problems of work study supervisor.</p>	<ul style="list-style-type: none"> <li>• Produce the following basic techniques of method study for a light construction work e.g a bungalow.                             <ul style="list-style-type: none"> <li>- Scale models</li> <li>- String diagrams</li> <li>- Progress charts</li> <li>- Activity sampling etc.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• The various diagrams of the techniques of method study.                             <ul style="list-style-type: none"> <li>- The building plan</li> <li>- Bill of quantities</li> <li>- Contract drawings.</li> </ul> </li> </ul>
	<p>4.13 Propose solutions to problems of work study.</p> <p>Explain the various the various methods of cost control.</p>	<ul style="list-style-type: none"> <li>• Carry out method and time study using appropriate techniques.</li> <li>• Apply various methods of cost control.</li> </ul>	<ul style="list-style-type: none"> <li>• Programme and progress charts</li> <li>• Lesson notes</li> <li>• Pencil, paper and eraser.</li> </ul>

**PROGRAMME: ADVANCED NATIONAL TECHNICAL CERTIFICATE IN BRICKLAYING, BLOCKLAYING AND CONCRETING.**

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**Course Specification: Practical Content**

**General Objective 5.0: DRAFT AND INTERPRET BUILDING SPECIFICATIONS AND DETERMINE QUANTITIES FROM PROJECT DRAWINGS.**

<b>WEEK TERM</b>	<b>Specific Learning Outcome:</b>	<b>Teachers Activities</b>	<b>Resources</b>
<b>1</b>			
10 -12	5.1 Define 'specification' in relation to 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 as per standard method of measurement of building works.	<ul style="list-style-type: none"> <li>• Draft and interpret specifications, detailing.</li> <li>• Standards of workmanship, quality of materials and tests covering all trades and sections as a given project drawings e.g. a bungalow or two story building.</li> </ul>	<ul style="list-style-type: none"> <li>• Project drawings</li> <li>• Specifications of various trades</li> <li>• Standard method of measurement (SMM).</li> </ul>
	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	<ul style="list-style-type: none"> <li>• Prepare bill of quantities for a given light construction work e.g a bungalow or two story building.</li> </ul>	<ul style="list-style-type: none"> <li>• Building drawings</li> <li>• SMM</li> <li>• Abstracting sheet</li> <li>• Adding machine or calculator.</li> </ul>
<b>13</b>	<b>EXAMINATIONS</b>		

**PROGRAMME: ADVANCED NATIONAL TECHNICAL CERTIFICATE IN BRICKLAYING, BLOCKLAYING AND CONCRETING.**

<b>MODULE: BASIC CONSTRUCTION MANAGEMENT II</b>	<b>Module Code: CBM 21</b>	<b>Contact Hours: 72</b>
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**Course Specification: Practical Content**

**General Objective 6.0: UNDERSTAND THE BASIC PRINCIPLES OF COSTING AND ESTIMATING.**

<b>TERM 2 WEEK</b>	<b>Specific Learning Outcome:</b>	<b>Teachers Activities</b>	<b>Resources</b>
1-3	<p>6.1 State the principal elements of construction contracts.</p> <p>6.2 Explain the influence of the elements on construction cost e.g.</p> <ul style="list-style-type: none"> <li>- Materials and plants</li> <li>- Establishment and overhead charges and profit</li> <li>- Time allowed for work execution.</li> <li>- Quality of work expected etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Carry out market survey</li> <li>• Prepare an approximate estimates for a building project using the following methods</li> <li>• Floor area method</li> <li>• Unit method</li> <li>• Approximate quantities etc.</li> <li>• Compare the approximate estimates devised by the various methods.</li> </ul>	<ul style="list-style-type: none"> <li>• Price list of materials</li> <li>• Project drawings</li> <li>• Bill of quantities</li> <li>• Specification tables/schedule of the various trades.</li> </ul>
	<p>6.3 Describe common methods of approximate estimating e.g.</p> <ul style="list-style-type: none"> <li>- Floor area method</li> <li>- Unit method</li> <li>- Approximate quantities methods etc.</li> </ul>		
	<p>6.4 Describe the various sources of information for pricing.</p> <p>6.5 Identify constituents of rates in all trades.</p>	<ul style="list-style-type: none"> <li>• Analyse and build-up 'all in-rates' for a given simple project.</li> <li>• Prepare builder's quotation for a given simple construction contracts e.g.</li> <li>• Simple bungalow.</li> </ul>	<ul style="list-style-type: none"> <li>• Project drawings</li> <li>• Sample of quotation paper for a simple contract.</li> <li>• Adding machine or calculator.</li> </ul>

**PROGRAMME: ADVANCED NATIONAL TECHNICAL CERTIFICATE IN BRICKLAYING, BLOCKLAYING AND CONCRETING.**

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**Course Specification: Practical Content**

**General Objective 7.0: UNDERSTAND THE APPLICATION OF ORGANISATION AND USE OF CRAFT FORCE.**

<b>TERM 2 WEEK</b>	<b>Specific Learning Outcome:</b>	<b>Teachers Activities</b>	<b>Resources</b>
4 - 7	<p>7.1 Outline the personal qualities, the roles and responsibilities of the craft force supervisor in the construction industry.</p> <p>7.2 Explain the influence of leadership style on work forces performance.</p> <p>7.3 Outline basic considerations in the recruitment and selection of construction operatives</p> <p>7.4 Describe various means of controlling operatives.</p> <p>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.</p>	<ul style="list-style-type: none"> <li>• Visit a well organised construction the various craft force.</li> <li>• Determine hour- input by the operatives using                             <ul style="list-style-type: none"> <li>a. time-clock,</li> <li>b. tally board</li> <li>c. time sheets in a construction site for the various trades.</li> </ul> </li> <li>• Determine the salaries and wages of operatives on site using: - day work, job pricing, wage schedules etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Construction site</li> <li>• Craft force</li> <li>• Craft supervisor                             <ul style="list-style-type: none"> <li>- Time sheet</li> <li>- Stop clock</li> <li>- Tally board</li> <li>-</li> </ul> </li> <li>Construction site.</li> </ul>
	<p>7.6 Explain the function of motivation and team spirit in an organisation.</p> <p>7.7 Describe various means of motivating and cultivating team spirit and morals among construction craft force.</p> <p>7.8 Explain Magregor's theory X and theory Y</p> <p>7.9 Solve simple case studies involving supervisory problems.</p> <p>7.10 Plan suitable incentive schemes.</p>	<ul style="list-style-type: none"> <li>• Use case study method as a practical means of demonstrating Magregor's Theory X and theory Y.</li> <li>• Plan suitable incentive schemes for a small construction firm.</li> <li>• Solve simple case studies involving.</li> <li>• Supervisory problems.</li> </ul>	<ul style="list-style-type: none"> <li>• Construction site</li> <li>• Case file of a simple supervisory problem</li> <li>• A supervisor from an organised construction site.</li> </ul>

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**Course Specification: Practical Content**

**General Objective 8.0: UNDERSTAND THE BASIC ELEMENTS OF ACCOUNTING AND ABLE TO PREPARE AND INTERPRET TRIAL BALANCE.**

<b>TERM 2 WEEK</b>	<b>Specific Learning Outcome:</b>	<b>Teachers Activities</b>	<b>Resources</b>
8 - 10	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. 8.3 Describe the petty cash or impress system. 8.4 Classify ledgers for different purposes. 8.5 Describe the method of maintain ledger accounts.	<ul style="list-style-type: none"> <li>• Visit a medium sized construction site to observe the various books of account and how they are maintained.</li> <li>• Prepare a petty cash book for a simple construction work.</li> </ul>	<ul style="list-style-type: none"> <li>- books of account</li> <li>- petty cash or imprest book</li> <li>- ledgers</li> </ul>
11-12	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.	<ul style="list-style-type: none"> <li>• Solve problems involving trial balance.</li> <li>• Prepare a trial balance account for a simple contract job.</li> <li>• Prepare a final accounts and balance sheet for a simple contract job.</li> </ul>	<ul style="list-style-type: none"> <li>- The various books of account</li> <li>- Adding machine or calculator.</li> </ul>
	8.11 Explain the importance of efficient accounting system n a business organisation.		<ul style="list-style-type: none"> <li>- Lesson notes</li> <li>- Specimen copy of accounting books of a medium construction firm.</li> </ul>
13	<b>EXAMINATION: Examination 60%; Theory 40</b>		

<b>PROGRAMME: ADVANCED NATIONAL TECHNICAL CERTIFICATE IN BLOCKLAYING ETC</b>			
<b>MODULE: ENGINEERING DRAWING &amp; DESIGN</b>		<b>MODULE CODE: CTD 21</b>	<b>Contact Hours: 36</b>
<b>Module Specification: Practical</b>			
<b>General Objective: 1.0 Know Basic drawing Office Practice</b>			
<b>Week</b>	<b>Specific Learning Outcome</b>	<b>Teachers Activities</b>	<b>Resources</b>
<b>1</b>	1.1 Identifying with the aid of organization chart drawing office personnel, their functions and relationship, e.g. office manager, chief draftsman, section leader, checkers, tracers, printers, store keepers, etc.	Teach the students to identify basic drawing office instruments, equipment and paper specification. Demonstrate the layout of drawing on the paper and manufacturing symbols	As contain in Engineering Drawing Equipment (p.....)
	1.2 Explain the nature of interaction between the drawing office and other departments in an engineering production industry 1.3 Identify basic instruments and equipment in a standard engineering drawing office and state their functions and methods of care. 1.4 Recognise various types of drawing paper, their standard sizes and state their uses 1.5 Prepare standard layout including the blocks, materials and or/parts lists, numbering system, indication of modifications, etc, in accordance with BS 1972. 1.6 Interpret and use standard welding and surface finish symbols 1.7 Explain the importance of job planning in the drawing office and describe job planning procedure in common use. E.g. programme chart.		

<b>PROGRAMME: ADVANCED NATIONAL TECHNICAL CERTIFICATE IN BLOCKLAYING ETC</b>			
<b>MODULE: ENGINEERING DRAWING &amp; DESIGN</b>		<b>MODULE CODE: CTD 21</b>	<b>Contact Hours: 36</b>
<b>Module Specification: Practical</b>			
<b>General Objective 2.0: Know how to draw Successive Auxiliary Views of given Components</b>			
<b>Week</b>	<b>Specific Learning Outcome</b>	<b>Teachers Activities</b>	<b>Resources</b>
<b>2</b>	2.1 State and illustrate the rules of projection of successive auxiliary views 2.2 Project from the principal views 1 <sup>st</sup> , 2 <sup>nd</sup> 3 <sup>rd</sup> and 4 <sup>th</sup> auxiliary plans and elevations of components with irregular and curved surfaces 2.3 Use auxiliary projection to determine true surfaces of components and dihedral angles	Demonstrate the production of auxiliary views of lines and plains in space. Practice the production of 1 <sup>st</sup> , 2 <sup>nd</sup> , 3 <sup>rd</sup> and 4 <sup>th</sup> auxiliary elevations of simple components	As contain in engineering drawing equipment (p.....)
<b>General Objective 3.0: Know how to Project True Lengths, Angles and Surfaces From Given Views</b>			
<b>Week</b>	<b>Specific Learning Outcome</b>	<b>Teachers Activities</b>	<b>Resources</b>
<b>3-4 WKS</b>	3.1 Recognise true and foreshortened lines and surfaces in projected views.	Practice the production of true lengths of lines and plains	As contain in engineering drawing equipment (p.....)
	3.2 Project true length an and surfaces involving curves from given projected d scaled views.		
<b>General Objective 4.0: Know how to Produce Components and Assembly Drawings</b>			
<b>Week</b>	<b>Specific Learning Outcome</b>	<b>Teachers Activities</b>	<b>Resources</b>
<b>5-6 WKS</b>	4.1 Explain the needs for the following types of drawings: a) Component Drawings b) Sub-Assembly Drawings c) General Assembly Drawings d) Installations Drawings e) Exploded illustrations	Practice the preparation of assembly drawings from exploded illustrations, components drawings and physical devices	
	4.2 Recognise and represent various types of fasteners and locking devices to BSS and state their applications e.g. set screws and bolts nuts, pins, rivets, locknuts, star washers, locking wire etc.	Practice the construction of standard engineering components from given specifications	
	4.3 Illustrate various thread forms and state their applications		

<b>PROGRAMME: ADVANCED NATIONAL TECHNICAL CERTIFICATE IN BLOCKLAYING ETC</b>			
<b>MODULE: ENGINEERING DRAWING &amp; DESIGN</b>		<b>MODULE CODE: CTD 21</b>	<b>Contact Hours: 36</b>
<b>Module Specification: Practical</b>			
<b>General Objective 4.0: Know how to Produce Components and Assembly Drawings</b>			
<b>Week</b>	<b>Specific Learning Outcome</b>	<b>Teachers Activities</b>	<b>Resources</b>
	4.4 Recognise and represent various standard engineering components like bearings, gears, springs, chains etc to B.S specifications.	Practice the use of symbolic representations in assembly and schematic illustrations	
<b>7-8</b>	4.5 Recognise and apply the conventional representation of lubrication devices e.g. grease cup, nipples, grooves etc.		
<b>9</b>	4.6 Recognise and apply the conventional representations of electrical components e.g. Transformers, switches, etc		
<b>10</b>	4.7 Produce to scale the detailed drawings of complex engineering components e.g. connecting rods, machine beds, top cylinders etc.		
	4.8 Prepare assembly drawings of sub assemblies and full assemblies including sections from sketches and component drawings e.g. gate valve, water pumps, rotary pump, isolation valve, electric motors etc.	Practice the production of scaled drawings of assemblies and component parts. Prepare a well laid out illustration of a working drawings for manufacturing and assembly purposes.	
	4.9 Dimension working drawings in accordance with B.S 308 (1972)		
<b>12 WKS</b>	4.10 Recognise and apply surface finish symbols in accordance with specifications and to relevant standards	Practice the use of surface finish symbols and surface lays in manufacturing drawings	

<b>PROGRAMME: ADVANCED NATIONAL TECHNICAL CERTIFICATE IN BLOCKLAYING ETC</b>			
<b>MODULE: ENGINEERING DRAWING &amp; DESIGN</b>		<b>MODULE CODE: CTD 21</b>	<b>Contact Hours: 36</b>
<b>Module Specification: Practical</b>			
<b>General Objective 5.0 Know the Concept of Interchangeability, Limits &amp; Fits Systems</b>			
<b>Week</b>	<b>Specific Learning Outcome</b>	<b>Teachers Activities</b>	<b>Resources</b>
	5.1 Define and illustrate the principal terms of limits and fits	Practice the realization of fits with manufactured products	Limits & fits practical models Measuring Instruments
	5.2 Explain the concept of interchangeability		
	5.3 Explain the needs for tolerances in terms of interchangeability functions and cost		
	5.4 Explain the provisions of limits and fits tables		
<b>General Objective 6.0: Understand the use of Photographs and exploded illustration in engineering communication and be able to prepare simple exploded illustration</b>			
<b>Week</b>	<b>Specific Learning Outcome</b>	<b>Teachers Activities</b>	<b>Resources</b>
	6.1 Explain the use of photographs in engineering communication. 6.2 Extract necessary engineering information from given photographs 6.4 Explain and illustrate the procedures in the preparation of exploded illustrations: e.g. - study of blue-prints, photographs or engineering sketches - layout planning using free hand sketches - preparation of accurate illustrations tracing and paste-up	Demonstrate the procedures for the preparation of exploded and technical illustrations	Practical materials models drawings and other design aids
	6.4 Describe with illustrations the basic techniques for making technical illustrations. e.g, techniques relating to the construction of spherical surfaces, counter-sunk and counter-bore holes, bead-up or flanged out hole, irregular hydraulic lines and wires, rounded edges, intersections and sections, etc. 6.5 Demonstrate principles and techniques of shading in technical illustrations 6.6 Prepare simple exploded illustrations of sub-assembly using appropriate construction techniques		

<b>PROGRAMME: ADVANCED NATIONAL TECHNICAL CERTIFICATE IN BLOCKLAYING ETC</b>			
<b>MODULE: ENGINEERING DRAWING &amp; DESIGN</b>		<b>MODULE CODE: CTD 21</b>	<b>Contact Hours: 36</b>
<b>Module Specification: Practical</b>			
<b>General Objective 7.0: Appreciate through undertaking simple engineering design project, the process of engineering design</b>			
<b>Week</b>	<b>Specific Learning Outcome</b>	<b>Teachers Activities</b>	<b>Resources</b>
	7.1 Explain in logical sequence engineering product design process, i.e. conception, analysis, synthesis, evaluation and implementation. 7.2 Describe the specific roles of the engineering designer in a design and production firms. 7.3 Write initial specification of a desired project 7.4 Formulate possible solutions (sketches) in line with the initial specifications in 7.3 above 7.5 Evaluate all possible solutions (design sketches) in terms of basic design considerations. E.g. function, cost, safety, construction, appearance serviceability, ergonomics etc. 7.6 Select optimal initial design solution based on the evaluation in 7.5 above. 7.7 Refine and prepare final design solution of the project. 7.8 Prepare working drawings including component drawings, assembly drawings, exploded illustrations and parts lists.	Practice the design of simple domestic utilities using locally available materials	Engineering drawing models and engineering design features
<b>General Objective 8.0: Interpret and Prepare Simple Installation Drawings</b>			
<b>Week</b>	<b>Specific Learning Outcome</b>	<b>Teachers Activities</b>	<b>Resources</b>
	8.1 Extract necessary installation information from given instruction/installation manual of a machine or plant. 8.2 Modify suitably given installation drawing to meet the basic characteristics of the installation point (plant station).	Practice the presentation of installation drawings of simple mechanical appliances	

## Building Drawing and Design II

<b>PROGRAMME: ADVANCED NATIONAL TECHNICAL CERTIFICATE IN BRICKLAYING, BLOCKLAYING AND CONCRETING WORK.</b>			
<b>MODULE: BUILDING DRAWING II</b>		<b>MODULE CODE: CTD 23</b>	<b>CONTACT HOURS: 36 (3-0)</b>
<b>Course Specification Theoretical Content/Practical</b>			
<b>General Objective 1.0: UNDERSTAND THE GENERAL PRINCIPLES OF DESIGN OF A TWO STORY HOUSE.</b>			
<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teachers Activities</b>	<b>Resources</b>
<b>1 - 2</b>	<p>1.1 Explain the importance of and relationship between function, form and beauty in building design.</p> <p>1.2 Describe the basic structural differences between a bungalow and a storey building.</p> <p>1.3 Explain the principles of balance and harmony as used in the design of elevations and general exterior of buildings.</p> <p>1.4 Describe the basic considerations in the planning of a story 1 residential house.</p> <p>1.5 Describe the characteristics of a give plot plan (i.e. solar orientation, direction of prevailing winds, size of plot, access road, services, etc) and explain their influence on the pattern of design.</p> <p>1.6 Prepare a preliminary sketch design of a two story building suitable for the plot in 1.5.</p>	<ul style="list-style-type: none"> <li>• List the relationship between unction, form and beauty in building design.</li> <li>• List the basic structure differences between a bungalow and a storey building.</li> <li>• List the principles of balance and harmony used in design of elevations and exterior building.</li> <li>• Explain the basic considerations in planning of storey/residential house.</li> <li>• List characteristics of a given plot plan e.g</li> </ul>	<ul style="list-style-type: none"> <li>• Lesson plan</li> <li>• Pictures</li> <li>• Posters</li> <li>• Drawings</li> </ul>
	<p>1.7 Justify the choice of materials for the proposed house in</p>	<ol style="list-style-type: none"> <li>1. solar orientation</li> <li>2. size of plot</li> <li>3. access road</li> <li>4. services etc</li> </ol> <ul style="list-style-type: none"> <li>• Explain the influence of 1.5 above on the pattern of design.</li> <li>• Sketch design of a two storey building suitable for 1.5m plot.</li> <li>• Explain the choice of materials for the proposed house in 1.7. and give assignment.</li> </ul>	

**PROGRAMME: ADVANCED NATIONAL TECHNICAL CERTIFICATE IN BRICKLAYING, BLOCKLAYING AND CONCRETING WORK.**

<b>MODULE: BUILDING DRAWING II</b>	<b>MODULE CODE: CTD 23</b>	<b>CONTACT HOURS: 36 (3-0)</b>
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**Course Specification Theoretical Content/Practical**

**General Objective 2.0 Draw the site and floor plans, elevations and sections of a specified two story building.**

<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teachers Activities</b>	<b>Resources</b>
<b>3 - 4</b>	<p>2.1 Draw presentation floor plans. (Presentation floor plans should show furniture arrangement as well as landscaping).</p> <p>2.2 Prepare the floor plans to suitable scale (Elevations may include: front, side, left, and right).</p> <p>2.3 Determine and draw to suitable scale essential sections. (use may be made of-set and part sections)</p> <p>2.4 Draw the elevations to suitable scale (Elevations may include front, side, left, and right).</p> <p>2.5 Draw the site plan. (site plan should indicate the drainage system, building line and access, landscaping, etc.)</p>	<ul style="list-style-type: none"> <li>• Draw floor plans indicating               <ol style="list-style-type: none"> <li>1. furniture arrangement</li> <li>2. landscaping</li> </ol> </li> <li>• Draw floor plans to scale i.e ground and first floor.</li> <li>• Draw elevations to scale i.e front, side, left and right.</li> <li>• Draw site plan showing.               <ol style="list-style-type: none"> <li>1. Drainage system</li> <li>2. Building live</li> <li>3. Access road</li> <li>4. Landscaping etc</li> </ol> </li> </ul>	<ul style="list-style-type: none"> <li>• chalkboard</li> <li>• Drawing</li> <li>• Board, tee</li> <li>• Square</li> <li>• Pencil</li> <li>• Set squares</li> <li>• Scale rule</li> </ul>

**General Objective 3.0: Prepare essential detail drawing of components.**

<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teachers Activities</b>	<b>Resources</b>
<b>5 - 6</b>	<p>3.1 Draw to suitable scales, essential details of components (Details may include: floor, stairs, screen walls, boundary wall, plumbing system, floor slabs, etc.)</p> <p>3.2 Prepare working drawings of the septic tanks and soak aways suitable for the house.</p> <p>3.3 Draw the interior elevations and sections of the kitchen and utility room.</p> <p>3.4 Draw details of the kitchen and utility room cabinets workshop.</p>	<ul style="list-style-type: none"> <li>• Draw to scales details of components. I.e floor stairs, and screen walls.</li> <li>• Make a working drawing of septic tank and soak aways.</li> <li>• Draw the interior elevations.</li> <li>• Draw sections of kitchen.</li> <li>• Draw section of utility room.</li> </ul>	<ul style="list-style-type: none"> <li>• Charts</li> <li>• Posters</li> <li>• Drawing board</li> <li>• Papers</li> <li>• Tee squares</li> <li>• pencils</li> </ul>
		<ul style="list-style-type: none"> <li>• Draw details of               <ol style="list-style-type: none"> <li>1. Kitchen</li> <li>2. Utility room</li> <li>3. Cabinets workshop</li> </ol> </li> </ul>	

**PROGRAMME: ADVANCED NATIONAL TECHNICAL CERTIFICATE IN BRICKLAYING, BLOCKLAYING AND CONCRETING WORK.**

<b>MODULE: BUILDING DRAWING II</b>	<b>MODULE CODE: CTD 23</b>	<b>CONTACT HOURS: 36 (3-0)</b>
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**Course Specification Theoretical Content/Practical**

<b>General Objective 4.0: Draw detail plan of the electrical services</b>			
<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teachers Activities</b>	<b>Resources</b>
<b>7 – 8</b>	4.1 Use the presentation floor plan to determine the type and allocation of electrical services. 4.2 Draw the electrical services plan	<ul style="list-style-type: none"> <li>• Determine the type of allocation of electrical services on a floor plan.</li> <li>• Sketch electrical services plan.</li> <li>• Draw to scale the electrical services on a plan.</li> </ul>	<ul style="list-style-type: none"> <li>• Charts</li> <li>• Pictures</li> <li>• Drawing board</li> <li>• Tee square</li> <li>• Set square</li> <li>• Pencil</li> </ul>
<b>General Objective 5.0 Prepare schedules</b>			
<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teachers Activities</b>	<b>Resources</b>
<b>9 - 10</b>	5.1 Prepare the following schedules: <ul style="list-style-type: none"> <li>- doors</li> <li>- windows</li> <li>- electrical installation</li> <li>- plumbing</li> <li>- painting</li> <li>- reinforcement schedule.</li> </ul>	<ul style="list-style-type: none"> <li>• Prepare doors schedule</li> <li>• Prepare windows schedule</li> <li>• Prepare electrical installation schedule.</li> <li>• Prepare plumbing schedule</li> <li>• Prepare painting schedule</li> <li>• Prepare reinforcement schedule.</li> </ul>	<ul style="list-style-type: none"> <li>• Charts</li> <li>• Drawing papers</li> <li>• Drawing board</li> <li>• Tee square</li> <li>• Set square</li> <li>• Pencil</li> </ul>

**PROGRAMME: ADVANCED NATIONAL TECHNICAL CERTIFICATE IN BRICKLAYING, BLOCKLAYING AND CONCRETING WORK.**

<b>MODULE: BUILDING DRAWING II</b>	<b>MODULE CODE: CTD 23</b>	<b>CONTACT HOURS: 36 (3-0)</b>
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**Course Specification Theoretical Content/Practical**

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

<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teachers Activities</b>	<b>Resources</b>
<b>11 - 12</b>	<p><b>Elementary structural Draughting.</b></p> <p>6.1 Interpret and apply conventional representation of structural elements.</p> <p>6.2 Interpret simple structural design date. E.g. design date for the two story project drawing in this module.</p> <p>6.3 Prepare structural detail drawing from given design date and sketches.</p> <p>6.4 Prepare and interpret bending schedules.</p> <p>6.5 Trace and reproduce structural drawings.</p>	<ul style="list-style-type: none"> <li>• List conventional ways of representing structural elements.</li> <li>• Explain simple structural design date for two story project.</li> <li>• Prepare detail structural drawing</li> <li>• Given date and sketch</li> <li>• Prepare and interpret bending drawings</li> <li>• Trace structural drawings.</li> <li>• Reproduce structural drawings.</li> </ul>	<ul style="list-style-type: none"> <li>• Charts</li> <li>• Drawing papers</li> <li>• Drawing board</li> <li>• Tee square</li> <li>• Set square</li> <li>• Pencil</li> <li>• Reproduction equipment.</li> </ul>
<b>13</b>	<b>EXAMINATION: 100%</b>		

**PROGRAMME: ADVANCED NATIONAL TECHNICAL CERTIFICATE IN BRICKLAYING, BLOCKLAYING AND CONCRETING.**

<b>MODULE: SURVEYING IN BUILDING</b>	<b>Module Code: CBS 20</b>	<b>Contact Hours: 48 (1-3)</b>
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**Course Specification: Theoretical Content**

**General Objective 1.0: UNDERSTAND THE BASIC PRINCIPLES AND SCOPE OF SURVEYING AND GEO- INFORMATICS**

<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teachers Activities</b>	<b>Resources</b>
<b>1 - 2</b>	<p>1.1 Explain the principle of working from 'whole to part' in survey/Geo-data works</p> <p>1.2 State the importance of 'scientific honesty' made on observations.</p> <p>1.3 Explain with examples the various 'checks' made on field observations and during computation.</p> <p>1.4 Define errors or disclosure in surveys and describe methods of 'balancing' these.</p>	<ul style="list-style-type: none"> <li>• Run the scope of surveying working from whole to part implication of error checks during computing sources of error.</li> </ul>	
	<p>1.5 Describe the various classes of survey/Geo-data and their order of accuracy.</p> <p>1.6 Explain the principles of 'economy of accuracy' and its influence on choice of equipment and methods.</p> <p>1.7 Explain the principles of 'consistency' in surveys/Geo-data.</p> <p>1.8 Distinguish between accuracy and precision.</p> <p>1.9 Describe the procedure of entrusting 'custody' of survey/Geo-data monuments to local officials and the instructions for their 'preservation'.</p>		

**PROGRAMME: ADVANCED NATIONAL TECHNICAL CERTIFICATE IN BRICKLAYING, BLOCKLAYING AND CONCRETING.**

<b>MODULE: SURVEYING IN BUILDING</b>	<b>Module Code: CBS 20</b>	<b>Contact Hours: 48 (1-3)</b>
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**Course Specification: Theoretical Content**

**General Objective 2.0: Understand the use and method of using Linen and steel tapes in making linear measurements.**

<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teachers Activities</b>	<b>Resources</b>
<b>3 - 4</b>	<p>2.1 Explain the effect of (a) misalignment (b) slope temperature (d) tension and (e)m standardization error on measured distances.</p> <p>2.1 Apply the corrections listed in 2.1 above.</p> <p>2.2 Identify chain surveying instruments e.g. Linen tapes, steel tapes, ranging rods.</p> <p>2.3 State the necessary precautions in the use of above instruments.</p>	<p>• Show the various measuring equipments in use – steel tape leather and chains of accuracy attached to each equipment choose a location and organize to the execution of the chain survey.</p>	<ul style="list-style-type: none"> <li>• Steel tape</li> <li>• Leather</li> <li>• chain.</li> </ul>
	<p>2.4 State the criteria for selection of survey lines and off sets and the limitations on lengths.</p> <p>2.5 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.</p> <p>2.6 Explain common errors in chain surveying and their sources – e.g. squaring of building corners, wrong booking of values.</p>		
	<p>2.7 Explain with sketches the basic methods of check or proof lines, and the use of control frame work for position and orientation.</p> <p>2.8 Describe the general procedure for carrying out a chain survey.</p> <p>2.9 Illustrate the method of booking field measurements in chain surveys.</p>	<p>• Discuss the steps involved in chain surveying.</p>	<ul style="list-style-type: none"> <li>• Lesson note</li> <li>• charts</li> <li>• chalk board</li> </ul>
	<p>2.10 Enumerate field problems and methods of overcoming them.</p> <p>2.11 Identify errors in simple chain surveys.</p>	<p>• List and discuss possible problems to be encountered in chain surveying.</p>	

**PROGRAMME: ADVANCED NATIONAL TECHNICAL CERTIFICATE IN BRICKLAYING, BLOCKLAYING AND CONCRETING.**

<b>MODULE: SURVEYING IN BUILDING</b>	<b>Module Code: CBS 20</b>	<b>Contact Hours: 48 (1-3)</b>
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**Course Specification: Theoretical Content**

**General Objective 3.0: UNDERSTANDING THE PRINCIPLES OF MEASUREMENT OF ANGLES WITH THEODOLITES AND BEARINGS WITH A MAGNETIC COMPASS AND PERFORM SUCH MEASUREMENT.**

<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teachers Activities</b>	<b>Resources</b>
<b>5-6</b>	3.1 Describe the various units of angular measure e.g. grads and radian measures, working out their conversion factors.	<ul style="list-style-type: none"> <li>• Identify equipment used in measuring angles i.e. theodolite prismatic compass.</li> <li>• Explain to units degree a radian.</li> <li>• Illustrate the setting up of equipment correctly.</li> <li>• From no placement.</li> </ul>	<ul style="list-style-type: none"> <li>• Prismatic compass</li> <li>• Theodolite</li> <li>• Staff</li> </ul>
	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.		
	3.5 Explain the difference in the reading procedure of a theodolites. 3.6 Carry out angular measurements with prismatic compass and theodolite.		

**General Objective 4.0: UNDERSTAND THE BASIC PRINCIPLES AND METHODS OF USING TOTAL STATION AND GPS EQUIPMENT.**

<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teachers Activities</b>	<b>Resources</b>
<b>7 - 8</b>	4.1 Describe a total station and its accessories. 4.2 Compare total station with a theodolite 4.3 Explain the working principles of a total station. 4.4 Describe the procedures of observation with total station.	<ul style="list-style-type: none"> <li>• Train students to use total station on and plot readings.</li> <li>• Use question and answer.</li> </ul>	<ul style="list-style-type: none"> <li>* Total station target, how held</li> <li>GPS Theodolity, poles</li> </ul>
	4.5 Explain the working principles of GPS. Carry out GPS observations on selected points with hand held GPS.		

**PROGRAMME: ADVANCED NATIONAL TECHNICAL CERTIFICATE IN BRICKLAYING, BLOCKLAYING AND CONCRETING.**

<b>MODULE: SURVEYING IN BUILDING</b>	<b>Module Code: CBS 20</b>	<b>Contact Hours: 48 (1-3)</b>
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**Course Specification: Theoretical Content**

**General Objective 5.0 UNDERSTAND THE METHODS OF HEIGHTING AND LEVELLING.**

<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teachers Activities</b>	<b>Resources</b>
<b>9 - 10</b>	5.1 List the specifications of leveling. 5.2 Explain the (optimum) observing procedure. 5.3 Describe the use of and criteria for selection of leveling datum. 5.4 Adjust collimation error in level 5.5 Adjust collimation error in level. 5.6 Describe the construction and use of semi-permanent and permanent tertiary bench-marks. 5.7 Enumerate the uses of tertiary level.	<ul style="list-style-type: none"> <li>• Explain to basic principle of leveling.</li> <li>• Define datum level and its relevance.</li> <li>• Identify various equipment used.</li> <li>• Compute the different methods instrument height rise and fall.</li> </ul>	<ul style="list-style-type: none"> <li>• Dumpy level</li> <li>• Tilting level</li> <li>• Burning rolls</li> <li>• Computing table.</li> </ul>

**General Objective 6.0: UNDERSTAND SETTING OUT PROCEDURE FOR A MEDIUM SIZED BUILDING INCLUDING.**

<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teachers Activities</b>	<b>Resources</b>
<b>11 - 12</b>	1.1 Identify the equipment required to set-out a building with accompanying access roads. 1.2 Explain how to set-out a building and the accompanying constraints. 1.3 Construct profiles and datum for a building. 1.4 Explain how profiles are used to control excavation and foundation levels. 1.5 Identify the instruments used for taking internal and external dimensions.	<ul style="list-style-type: none"> <li>• Define the building line.</li> <li>• Identify methods of setting out e.g. builders square, 3.4.5 and Instrument or various kinds e.g. theodolite,</li> <li>• Organise practical exercises.</li> </ul>	<ul style="list-style-type: none"> <li>• Site square</li> <li>• Theodolite</li> <li>• Total station</li> </ul>

**PROGRAMME: ADVANCED NATIONAL TECHNICAL CERTIFICATE IN BRICKLAYING, BLOCKLAYING AND CONCRETING.**

<b>MODULE: SURVEYING IN BUILDING</b>	<b>Module Code: CBS 20</b>	<b>Contact Hours: 48 (1-3)</b>
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**Course Specification: Theoretical Content**

**General Objective 6.0: UNDERSTAND SETTING OUT PROCEDURE FOR A MEDIUM SIZED BUILDING INCLUDING.**

<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teachers Activities</b>	<b>Resources</b>
	<p>1.6 Determine the areas of a building and its site.</p> <p>1.7 Explain how running internal and external measurements are taken horizontally and vertically.</p> <p>1.8 State the procedure for checking verticality of building using Theodolite, optical plumb, and plum-Bulb.</p> <p>1.9 Describe the invert of a drain, a sight rail and a traveler.</p> <p>1.10 Calculate suitable length of a traveler and reduced levels of sight rails from given drawings.</p>		
	<p>1.11 Establish sight rails for horizontal and depth control of a straight drain between manholes.</p> <p>1.12 Explain the survey terms used in road construction.</p> <p>1.13 Describe methods of route surveying</p> <p>1.14 Describe the types of control used for Embankments, Cuttings and Levels.</p> <p>1.15 Calculate volumes of cut and fill on a given straight road with transverse sloping ground.</p>		
13	EXAMINATION		

**PROGRAMME: ADVANCED NATIONAL TECHNICAL CERTIFICATE IN BRICKLAYING, BLOCKLAYING AND CONCRETING.**

<b>MODULE: SURVEYING IN BUILDING</b>	<b>Module Code: CBC 20</b>	<b>Contact Hours: 48 (1-3)</b>
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**Course Specification: PRACTICAL CONTENT**

**General Objective: 1.0 UNDERSTAND THE BASIC PRINCIPLES OF THERMAL MOVEMENTS IN BUILDING AND BUILDING MATERIALS.**

<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teachers Activities</b>	<b>Resources</b>
<b>1-7</b>	<ul style="list-style-type: none"> <li>* Carry out surveying exercise of an area of at least one hectre.</li> <li>* Book all field measurement.</li> <li>* Plot survey in a suitable scale.</li> <li>* Draw to field standard using conventional signs and hand lettering.</li> </ul>	<ul style="list-style-type: none"> <li>• Guide the students to carry out survey of an area and plot the survey using a given scale.</li> </ul>	<ul style="list-style-type: none"> <li>• Survey equipment</li> </ul>

**General Objective 2.0: Carry out angular measurement with prismatic compass and theodolite.**

<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teachers Activities</b>	<b>Resources</b>
<b>8-12</b>	Carry out a simple survey using a total station. Retrieve the measured from a total station field data from the PC. <ul style="list-style-type: none"> <li>* Process the data from the PC.</li> <li>* Plot the plan of the surveyed area manually.</li> <li>* Describe the various types of GPS equipment e.g. hand held and tripod types.</li> </ul>	- Do -	- do-
	<ul style="list-style-type: none"> <li>* Book field observations.</li> <li>* Reduce level</li> <li>* Explain arithmetical checks in level reduction.</li> <li>* Carry out tertiary leveling, reduction of all permanent stations along a circuit of about 2km using ordinary and digital levels.</li> <li>* Enumerate the uses of tertiary leveling.</li> </ul>		
<b>13</b>	Examination:		

**PRACTICAL CONTENT**

**PROGRAMME: ADVANCED NATIONAL TECHNICAL CERTIFICATE IN BRICKLAYING, BLOCKLAYING AND CONCRETING.**

<b>MODULE: SURVEYING IN BUILDING</b>	<b>Module Code: CBC 20</b>	<b>Contact Hours: 48 (1-3)</b>
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**Course Specification: PRACTICAL CONTENT**

**General Objective 1.0: UNDERSTAND THE BASIC PRINCIPLES OF THERMAL MOVEMENTS IN BUILDING AND BUILDING MATERIALS.**

<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teachers Activities</b>	<b>Resources</b>
<b>1-2</b>	<p>1.1 Define the following terms:</p> <ul style="list-style-type: none"> <li>a. thermal conductivity</li> <li>b. thermal resistivity</li> <li>c. heat transmittance coefficient or “U” value.</li> <li>d. Thermal emissivity</li> <li>e. Thermal absorptivity.</li> </ul> <p>1.2 State the factors which determine the magnitude of the above terms for a structural unit or building materials.</p> <p>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.</p>	<ul style="list-style-type: none"> <li>• Compute the ‘u’ and ‘k’ values for structural units or building materials from given data.</li> <li>• Student define and explain all the thermal terms.</li> </ul>	

**PROGRAMME: ADVANCED NATIONAL TECHNICAL CERTIFICATE IN BRICKLAYING, BLOCKLAYING AND CONCRETING.**

<b>MODULE: SURVEYING IN BUILDING</b>	<b>Module Code: CBC 20</b>	<b>Contact Hours: 48 (1-3)</b>
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**Course Specification: PRACTICAL CONTENT**

**General Objective 2.0: SOUND TRANSMISSION AND CONTROL: KNOW THE GENERAL PRINCIPLES OF SOUND TRANSMISSION AND CONTROL.**

<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teachers Activities</b>	<b>Resources</b>
<b>3 – 4</b>	2.1 Explain the general principles of sound transmission. 2.2 Explain the following terms. a. air born sound b. structure-born sound c. sound reflection, reverberation and reverberation time. d. Impact sound  2.3 Explain the general principles and methods of sound control.	<ul style="list-style-type: none"> <li>• Measure sound transmission level (intensity) in decibels.</li> <li>• By visiting an acoustic building describe the general principles and methods of sound control (Insulation and absorption) in buildings e.g.</li> <li>• Principle of discontinuity</li> <li>• Mass law</li> <li>• Sound reduction at source, etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Sound measuring instruments</li> <li>• Sound producing source.</li> <li>• Acoustic building</li> </ul>

**General Objective 3.0: UNDERSTAND THE BASIC PRINCIPLES OF LIGHTING**

<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teachers Activities</b>	<b>Resources</b>
<b>5-6</b>	3.1 State the general functions of lighting. 3.2 Define the following terms: a. illumination b. luminous flux 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.	<ul style="list-style-type: none"> <li>• Explain the general functions of lighting e.g</li> <li>• To illuminate the internal envelope and contents;</li> <li>• To illuminate task (reading, working with equipment etc). to the extent appropriate to optimal functioning of the eye.</li> <li>• Emphasize the following ways of controlling glare in buildings.</li> <li>• Types, sizes, number and position of openings</li> </ul>	Source of light Hall with good lighting system. Hall with bad lighting system.

**PROGRAMME: ADVANCED NATIONAL TECHNICAL CERTIFICATE IN BRICKLAYING, BLOCKLAYING AND CONCRETING.**

<b>MODULE: SURVEYING IN BUILDING</b>	<b>Module Code: CBC 20</b>	<b>Contact Hours: 48 (1-3)</b>
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**Course Specification: PRACTICAL CONTENT**

<b>General Objective 3.0: UNDERSTAND THE BASIC PRINCIPLES OF LIGHTING</b>			
<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teachers Activities</b>	<b>Resources</b>
	3.5 Determine the intensity of illumination due to a given source of light. 3.6 Calculation of day light factor. 3.7 Describer 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.	<ul style="list-style-type: none"> <li>• Colour and texture of building surfaces.</li> <li>• Types of lighting fittings</li> <li>• Structure of internal envelope etc.</li> <li>• Calculate day-light factor from given date and buy direct measurement.</li> <li>• Emphasize the following classes of lighting.</li> <li>• Direct lighting</li> <li>• Indirect lighting</li> <li>• General lighting</li> <li>• Luminous lighting</li> </ul>	<ul style="list-style-type: none"> <li>• Data for calculating day-light factor</li> <li>• Instrument for calculating day-light factor by direct measurement.</li> </ul>
<b>General Objective 4.0: UNDERSTAND THE PRINCIPLES OF ELECTRICITY SUPPLY IN BUILDINGS</b>			
<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teachers Activities</b>	<b>Resources</b>
<b>7 - 8</b>	<b>PRINCIPLES OF ELECTRICITY SUPPLY</b> 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.	<ul style="list-style-type: none"> <li>• Carry out experiments to demonstrate the heating, lighting, magnetic, and chemical effects of electric current.</li> <li>• Mathematical calculation of power and energy consumption in simple circuit.</li> <li>• Identify earthing in an electrical circuits. E.g in a bungalow.</li> </ul>	<ul style="list-style-type: none"> <li>• Simple electric circuits</li> <li>• Electric heater</li> <li>• Electric busy</li> <li>• Solenoid</li> </ul>

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<b>MODULE: SURVEYING IN BUILDING</b>	<b>Module Code: CBC 20</b>	<b>Contact Hours: 48 (1-3)</b>
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**Course Specification: PRACTICAL CONTENT**

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

<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teachers Activities</b>	<b>Resources</b>
	<p>4.4 Calculate the power and energy consumption in simple circuits.</p> <p>4.5 Explain the function of earthing in electrical circuits.</p> <p>4.6 State the purpose and explain the functioning of circuit breakers and fuses.</p> <p>4.7 Illustrate the correct method of distributing electrical power from the mains to socket outlets and lighting points in house wiring systems.</p> <p>4.8 Compute total electrical load for a given load for a given house wiring.</p>	<ul style="list-style-type: none"> <li>• Identify circuit breakers and fuses in a building.</li> <li>• Emphasize the correct method of distributing electrical power from the mains (NEPA line or stand by generator) to socket outlets and lighting points in house wiring systems.</li> <li>• Interpret electrical installation drawings of a small bungalow or two storey building.</li> </ul>	<ul style="list-style-type: none"> <li>• circuit breakers</li> <li>• fuses</li> <li>• NEPA line</li> <li>• Generator</li> <li>• Bungalow with complete wiring system</li> <li>• Electrical installation.</li> <li>• Drawing of a small project i.e. the bungalow.</li> </ul>
	<p>4.9 Calculate fuse capacity for house wiring system.</p> <p>4.10 Identify dangers of electricity and essential safety measures against them.</p>	<ul style="list-style-type: none"> <li>• Emphasize the dangers of electricity and enumerate the essential/necessary safety measures against them.</li> </ul>	

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<b>MODULE: SURVEYING IN BUILDING</b>	<b>Module Code: CBC 20</b>	<b>Contact Hours: 48 (1-3)</b>
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**Course Specification: PRACTICAL CONTENT**

**General Objective 5.0: Know the basic principles of plant installation in buildings.:**

<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teachers Activities</b>	<b>Resources</b>
<b>9-10</b>	<p>5.1 Explain the working principles of lift and escalators.</p> <p>5.2 Outline safety, principles for lifts and escalators.</p> <p>5.3 Explain the general principles of air-conditioning.</p> <p>5.4 Describe various mechanical methods of ventilation.</p> <p>5.5 Explain the principle of mechanical ventilation.</p> <p>5.6 Outline the general installation requirements for central and room air conditioning equipment in dressings.</p> <p>5.7 Define the following: relative humidity dew point</p> <p>5.8 Explain the occurrence of condensation in buildings.</p> <p>5.9 Describe methods of control of condensation.</p>	<ul style="list-style-type: none"> <li>• Visit a building with escalators and or lift.</li> <li>• Emphasize maintenance principles for lifts and escalators.</li> <li>• Illustrate the application of turbulent and non turbulent flow in domestic water supply and drainage</li> <li>• Determine experiments the rate of flow from an orifice.</li> <li>• Calculate the velocity of flow of water from given date</li> <li>• Calculate pipe sizes for drains or water supply from given date.</li> <li>• Experimentally explain the general principles of installation of cold and hot water supply systems having water pumps.</li> </ul>	<ul style="list-style-type: none"> <li>• Escalators</li> <li>• Air conditioners</li> <li>• Orifice</li> <li>• water containers</li> <li>• water</li> <li>• data for calculating velocity of flow of water.</li> </ul>
	<p>5.10 Explain the principle of turbulent and non-turbulent flow.</p> <p>5.11 Explain the followings terms and state their importance in the design and installation of piped water supply system.</p> <ol style="list-style-type: none"> <li>a. static head of water</li> <li>b. velocity head</li> <li>c. friction head</li> <li>d. pressure head</li> <li>e. water hammer</li> <li>f. coefficient of velocity</li> <li>g. coefficient of discharge.</li> </ol>		

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<b>MODULE: SURVEYING IN BUILDING</b>	<b>Module Code: CBC 20</b>	<b>Contact Hours: 48 (1-3)</b>
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**Course Specification: PRACTICAL CONTENT**

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

<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teachers Activities</b>	<b>Resources</b>
<b>11-12</b>	<p>6.1 State the laws of static equilibrium.</p> <p>6.2 Explain with illustrative examples the laws of static equilibrium e.g.  <math>(V) = 0</math>  <math>(H) = 0</math>  <math>(M) = 0</math></p> <p>6.3 Determine the magnitude and position of the resultant of a simple system of coplanar forces in.</p> <p>6.4 Analyse forces in simple pin-jointed frame work.</p>	<ul style="list-style-type: none"> <li>• Determine the magnitude and position of the resultant of a simple system of coplanar forces by: - graphical method.</li> <li>• Method of resolution experiment.</li> <li>• Experiment.</li> <li>• Analyse forces in simple pin-jointed frame-work</li> <li>• by method of resolution of force diagram method</li> <li>• method of section</li> </ul>	<ul style="list-style-type: none"> <li>• Charts</li> <li>• Model of simple pin-jointed frame work.</li> </ul>
	<p>6.5 Identify common loading systems for various building structures</p> <p>6.6 Determine beam reaction, shear force and bending moments in simply supported beams under various loading systems using.</p> <ol style="list-style-type: none"> <li>a. Link polygon system</li> <li>b. method of resolution</li> <li>c. experiments.</li> </ol> <p>6.7 Define the following properties of structural sections.</p>	<ul style="list-style-type: none"> <li>• Emphasize the following common loading systems concentrated load on beams, straddles and nodes in frame-works.</li> <li>• Knife –edge load on partitions or walls.</li> <li>• Uniformly distributed load such as self-weight wind load,.</li> <li>• Distributed load with linear variation such as loads against piling retaining walls triangular load such as block-work over opening.</li> <li>• Calculate beam reactions under various loads.</li> </ul>	<ul style="list-style-type: none"> <li>* Model</li> <li>• beam</li> <li>• sections</li> </ul>
	<ol style="list-style-type: none"> <li>a. centre of gravity</li> <li>b. moments of inertia</li> <li>c. radius of inertia</li> <li>d. radius of gyration</li> <li>e. section modules</li> </ol> <p>6.8 State the general theory of simple bending i.e.  <math>E/R = M/F = F/Y</math></p>	<ul style="list-style-type: none"> <li>• Determine the value of the following for a given section.</li> <li>• Centre of gravity</li> <li>• Moments of inertia</li> <li>• Radius of gyration</li> <li>• Section modules</li> <li>• Determine maximum bending stress and moment of resistance of beam sections.</li> </ul>	
<b>13</b>	<b>EXAMINATIONS</b>		

## Advanced Brick and Blocklaying

<b>PROGRAMME: ADVANCED NATIONAL TECHNICAL CERTIFICATE IN BRICKLAYING, BLOCKLAYING AND CONCRETING WORK.</b>			
<b>MODULE: ADVANCED BRICK AND BLOCKLAYING</b>		<b>MODULE CODE: CBC 23</b>	<b>CONTACT HOURS: 288 (2-10)</b>
<b>Module Specification: Theoretical Content</b>			
<b>General Objective 1.0: UNDERSTAND THE GENERAL PRINCIPLES AND METHODS USED IN CHAIN SURVEYING AND BE ABLE TO CARRY OUT HAIN SURVEY.</b>			
<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teacher Activities</b>	<b>Resources</b>
<b>1-2</b>	1.1 Explain the metric system of linear measurement as applied in survey. 1.2 Describe the construction of chain, bands, and tapes. 1.3 Explain the use of construction chain, bands, and tapes. 1.4 Describe the care of construction chair, bands and tapes. 1.5 Explain the effect of the following on measurement: a. Misalignment b. Slope c. Temperature d. Tension e. Standardization error	<ul style="list-style-type: none"> <li>• Use tape measure, chain etc. to demonstrate the system of linear measurement.</li> <li>• Show how to construct chain, bands and tapes.</li> <li>• Demonstrate the use of construction chain bands and tapes.</li> <li>• Explain the care of construction chain, bands and tapes.</li> <li>• Show the effect of the various factors by practically introducing the impediments to accurate measurement.</li> </ul>	<ul style="list-style-type: none"> <li>• Chain, tape measure mechanical tape etc.</li> <li>• Tape measure, line etc.</li> </ul>
	1.6 Prepare tables for making correction for slope, temperature and standardization error. 1.7 Describe the construction of Abney level. 1.8 Explain the working principles of Abney level. 1.9 Use the (Abney level) instrument to measure slope. 1.10 List various chain surveying equipments.	<ul style="list-style-type: none"> <li>• Give example of a table showing correction for slope, temperature and standardization error.</li> <li>• Using a sketch, explain the construction of an Abney level.</li> </ul>	<ul style="list-style-type: none"> <li>• Pen, pencil, ruler, sheets of paper or graph paper etc.</li> <li>• Pictorial sketch of an Abney level.</li> <li>• Sope, Abney level.</li> </ul>

**PROGRAMME: ADVANCED NATIONAL TECHNICAL CERTIFICATE IN BRICKLAYING, BLOCKLAYING AND CONCRETING WORK.**

<b>MODULE: ADVANCED BRICK AND BLOCKLAYING</b>	<b>MODULE CODE: CBC 23</b>	<b>CONTACT HOURS: 288 (2-10)</b>
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**Module Specification: Theoretical Content**

**General Objective 1.0: UNDERSTAND THE GENERAL PRINCIPLES AND METHODS USED IN CHAIN SURVEYING AND BE ABLE TO CARRY OUT HAIN SURVEY.**

<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teacher Activities</b>	<b>Resources</b>
<b>3-4</b>	<p>1.11 State necessary precautions to be taken in the use of chain surveying equipments e.g. chains, bands, liner tapes, ranging rods, optical square etc.</p> <p>1.12 State the criteria for the selection of survey lines and off-sets and limitations on lengths.</p>	<ul style="list-style-type: none"> <li>• Bring various chain surveying equipment to the classroom and make the students to identify each as they are being listed.</li> <li>• Show vivid example of the proper ways to handle the different types of chain surveying equipments.</li> <li>• List the criteria in the other of preference on the chalkboard.</li> </ul>	<ul style="list-style-type: none"> <li>• Chain, tape, liner tape survey tape, survey rod dumpy level etc.</li> <li>• Chains, bands, liner tapes, ranging rods, optical square etc.</li> </ul>
	<p>1.13 Describe the methods of making linear measurements in chain surveys-both along the survey line and along offsets.</p> <p>1.14 State their sources e.g. squaring of building corners, wrong booking, rounding off values.</p> <p>1.15 List the common errors in chain surveying.</p> <p>1.16 Explain the common errors in chain surveying.</p>	<ul style="list-style-type: none"> <li>• Practically the methods before the students and thereafter ask them to group and repeat the exercise.</li> <li>• Ditto</li> <li>• After listing on the chalkboard, explain the process of common errors and the causes in chain surveying.</li> </ul>	<p>* Chalkboard, chalk etc.</p>
	<p>1.17 State the sources of the common errors in chain surveying e.g. squaring of building corners, wrong booking, rounding off values.</p> <p>1.18 Explain with sketches, the basic methods of chain surveying in e.g. offsets and use of check or proof lines.</p>	<ul style="list-style-type: none"> <li>• State the sources on the chalkboard and quire the students as to how to recognise them and avoid such errors.</li> <li>• Sketch on the chalkboard the subject matter and describe the process in detail.</li> </ul>	<ul style="list-style-type: none"> <li>• Ditto</li> <li>• Sketch, chalkboard, chalk etc.</li> </ul>

**PROGRAMME: ADVANCED NATIONAL TECHNICAL CERTIFICATE IN BRICKLAYING, BLOCKLAYING AND CONCRETING WORK.**

<b>MODULE: ADVANCED BRICK AND BLOCKLAYING</b>	<b>MODULE CODE: CBC 23</b>	<b>CONTACT HOURS: 288 (2-10)</b>
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**Module Specification: Theoretical Content**

**General Objective 1.0: UNDERSTAND THE GENERAL PRINCIPLES AND METHODS USED IN CHAIN SURVEYING AND BE ABLE TO CARRY OUT HAIN SURVEY.**

<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teacher Activities</b>	<b>Resources</b>
	1.19 Using sketches, explain the use of control frame-work for position and orientation. 1.20 Describe the general procedure for carrying out a chain survey. 1.21 Describe the method of booking fields measurement in chain surveys.	<ul style="list-style-type: none"> <li>• Sketch the subject matter on the chalkboard and explain the process to the students.</li> <li>• After verbally describing the subject, explain further using questions and answer technique.</li> <li>• Ditto</li> </ul>	<ul style="list-style-type: none"> <li>• Sketch, etc.</li> </ul>
	1.22 List field problems encountered in chain survey. 1.23 Explain the methods of overcoming such field problems. 1.24 Identify field work errors in simple chain surveys. 1.25 State how to correct field work errors in simple chain surveys.	<ul style="list-style-type: none"> <li>• List the problems in the classroom and ask the student to repeat the list.</li> <li>• Ditto.</li> <li>• Guide the students in the classroom to identify along with you the subject matter. Give example and ask them to work on simple examples given in the classroom.</li> </ul>	<ul style="list-style-type: none"> <li>• Paper, pencil, ruler, etc.</li> </ul>

**General Objective 2.0: EXPLAIN THE WORKING PRINCIPLES OF LEVELLING INSTRUMENTS AND APPLICATIONS.**

<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teacher Activities</b>	<b>Resources</b>
<b>5-6 7 - 8</b>	2.1 Describe the construction of leveling instruments e.g. the dumpy level, the tilting level, etc. 2.2 Explain the working principles of leveling instruments e.g. the dumpy level, the tilting level, etc. 2.3 Describe methods of care of leveling instrument e.g. dumpy level, tilting level etc.	<ul style="list-style-type: none"> <li>• Sketch the dumpy level and tilting level and show how it is constructed.</li> <li>• Demonstrate how the dumpy and tilting levels work.</li> <li>• With the aid of a dumpy level or tilting level, show how to care for such instruments.</li> </ul>	<ul style="list-style-type: none"> <li>• Photograph, sketch etc.</li> <li>• Dumpy level, tilting level.</li> <li>• Dumpy level, tilting level etc.</li> </ul>

**PROGRAMME: ADVANCED NATIONAL TECHNICAL CERTIFICATE IN BRICKLAYING, BLOCKLAYING AND CONCRETING WORK.**

<b>MODULE: ADVANCED BRICK AND BLOCKLAYING</b>	<b>MODULE CODE: CBC 23</b>	<b>CONTACT HOURS: 288 (2-10)</b>
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**Module Specification: Theoretical Content**

**General Objective 3.0: KNOW THE METHODS AND BE ABLE TO SET OUT SIMPLE FRAMED STRUCTURES AND DRAINS.**

<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teacher Activities</b>	<b>Resources</b>
<b>9 - 10</b>	<p>3.1 Describe with sketches various methods of setting out, suitable setting out, suitable for the following:</p> <p>a. Standard block and brick building.</p> <p>b. Framed structures (steel and reinforced concrete)</p> <p>c. Drain, septic tank, soak etc.</p>	<ul style="list-style-type: none"> <li>• Describe what is meant by preliminary site work thereby identify the temporary services and importance.</li> <li>• Discuss the method setting block/brick work.</li> <li>• Describe process of fixing framed structures.</li> <li>• Describe the methods with sketches, how drain, septic tanks and soakways etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Chart/Pictures</li> <li>• Block</li> <li>• Brick</li> <li>• Visit site</li> <li>• Setting equipment</li> </ul>
<b>11- 12</b>	<p>4.1 Explain the construction problems associated with various types of subsoils e.g.</p> <ul style="list-style-type: none"> <li>- water logged</li> <li>- clay (alluvial) subsoil</li> <li>- running sand</li> <li>- made up ground.</li> </ul> <p>4.2 Estimate the dead load per square metre on subsoil due to the walls of a simple structure e.g. 2 story buildings:</p>	<ul style="list-style-type: none"> <li>• Identify various ways of site drainage.</li> <li>• Sump hole</li> <li>• Dewatering with</li> <li>• The drawing</li> <li>• Laying of perforated pipes.</li> <li>• Loading test should be carried out in a laboratory setting.</li> </ul> <p>Give example to the students on the chalkboard, there after, give assignment.</p>	<ul style="list-style-type: none"> <li>• Charts/pictures</li> <li>• Equipment.</li> <li>• Soil to be tested, loading test machine &amp; Equipments.</li> </ul>
<b>13</b>	<b>EXAMINATIONS</b>		

**PROGRAMME: ADVANCED NATIONAL TECHNICAL CERTIFICATE IN BRICKLAYING, BLOCKLAYING AND CONCRETING WORK.**

<b>MODULE: ADVANCED BRICK AND BLOCKLAYING</b>	<b>MODULE CODE: CBC 23</b>	<b>CONTACT HOURS: 288 (2-10)</b>
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**Module Specification: Theoretical Content**

**General Objective 3.0: KNOW THE METHODS AND BE ABLE TO SET OUT SIMPLE FRAMED STRUCTURES AND DRAINS.**

<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teacher Activities</b>	<b>Resources</b>
<b>1-2</b>	<p>4.3 Determine graphically the width of strip foundation for a given structure:</p> <p>4.4 Describe methods of constructing the following types of foundations:</p> <ul style="list-style-type: none"> <li>- Steel grillage</li> <li>- Deep pile</li> <li>- Reinforced concrete</li> </ul>	<ul style="list-style-type: none"> <li>• Work to be submitted on a subsequent day.</li> <li>• Give example to the student s and assign how work.</li> <li>• Describe the process to the students in the classroom and give examples.</li> <li>• A take home test could also be given pictorial representation of tractor trench digger etc should be presented.</li> </ul>	<p>* Films, video tapes, computer simulation etc of trench digger backwater, trench hoes.</p>
	<ul style="list-style-type: none"> <li>- base for columns and</li> <li>- piers.</li> </ul> <p>4.5 Explain the effect of ground formation and general contour of site on choice of foundation.</p> <p>4.6 Identify common machines used for deep excavation e.g. trench digger, trench how, back cater etc.</p> <p>4.7 Describe with sketches methods of controlling water table in deep excavation.</p> <p>4.8 Describe with sketches timbering systems for trenches in various subsoils.</p>	<ul style="list-style-type: none"> <li>• Sketch deep excavation use sketch to describe and explain the methods of control.</li> <li>• Give examples and assist the students to try their hands in carrying out assignments.</li> </ul>	

**PROGRAMME: ADVANCED NATIONAL TECHNICAL CERTIFICATE IN BRICKLAYING, BLOCKLAYING AND CONCRETING WORK.**

<b>MODULE: ADVANCED BRICK AND BLOCKLAYING</b>	<b>MODULE CODE: CBC 23</b>	<b>CONTACT HOURS: 288 (2-10)</b>
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**Module Specification: Theoretical Content**

**General Objective 5.0: UNDERSTAND THE PRINCIPLES AND TECHNIQUES OF CONSTRUCTING VARIOUS TYPES OF WALLS.**

<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teacher Activities</b>	<b>Resources</b>
<b>3-4</b>	5.1 Interpret building plans for walling details. 5.2 Transfer levels and set out simple structure e.g 2 – story building. 5.3 Describe methods of transferring wall line from profile to the surface of foundation.	<ul style="list-style-type: none"> <li>• Use building plan to explain details.</li> <li>• Recitalist the setting out and level transfer for 2-storey building.</li> <li>• The use of lime as a method should be reinforced.</li> </ul>	<ul style="list-style-type: none"> <li>• Detailed building plan.</li> <li>• Dumpy level, wood-pegs, wood profile, line, rails, hammer etc.</li> <li>• Line, digger, wood-profiles, wood pegs, hammer nail, angle etc.</li> </ul>
<b>5 - 6</b>	5.4 Describe the characteristics in the use of various damp proof materials in common materials in common use e.g asphalt, cement mortar (1.1) felt, P.C. membrane etc.	<ul style="list-style-type: none"> <li>• Arrange to lay blocks from foundation to D P C level.</li> <li>• Carryout a little project on the built DPC level block wall as n above.</li> </ul>	<ul style="list-style-type: none"> <li>• Block, cement; sand, water, trowel line etc.</li> <li>• Felt, asphalt cement mortar (1.1) PVV membrane etc.</li> </ul>
	5.5 Describe the suitability in the use of various damp proof materials as in above (5.5.a). 5.6 Describe the precautions to be taken in the use of various damp proof materials as in (5.7) above. 5.7 Describe with sketches methods of laying damp proof materials in the following structures:	<ul style="list-style-type: none"> <li>• Provide different damp proof materials introduce them to the students and describe each suitability in terms of usage.</li> <li>• Explain the handling method and care to be taken to get maximum performance.</li> <li>• Practicalise laying by identifying a damp surface around your school and applying a chosen material.</li> </ul>	<ul style="list-style-type: none"> <li>• Damp proof materials of all shade.</li> <li>• Damp proof material of different maker.</li> <li>• Damp proof material of your choice.</li> </ul>

**PROGRAMME: ADVANCED NATIONAL TECHNICAL CERTIFICATE IN BRICKLAYING, BLOCKLAYING AND CONCRETING WORK.**

<b>MODULE: ADVANCED BRICK AND BLOCKLAYING</b>	<b>MODULE CODE: CBC 23</b>	<b>CONTACT HOURS: 288 (2-10)</b>
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**Module Specification: Theoretical Content**

**General Objective 5.0: UNDERSTAND THE PRINCIPLES AND TECHNIQUES OF CONSTRUCTING VARIOUS TYPES OF WALLS.**

<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teacher Activities</b>	<b>Resources</b>
	<ul style="list-style-type: none"> <li>- basement</li> <li>- ground floor</li> <li>- wall above ground level</li> <li>- cavity wall opening</li> <li>- parapet wall of gutter.</li> </ul> <p>5.8 Apply suitable damp proof materials in given situations.</p> <p>5.9 Describe with sketches various types of retaining walls and piers.</p>	<ul style="list-style-type: none"> <li>• Ditto.</li> <li>• Sketch retaining wall on the chalkboard and describe the different types sketch.</li> <li>• Use the sketch to state its suitability.</li> </ul>	<ul style="list-style-type: none"> <li>• Ditto</li> <li>• Retaining walls sketch.</li> </ul>
	<p>5.10 State situations in which they are suitable which they are suitable for the use prescribed.</p> <p>5.11 Interpret a given drawing and construct brick retaining wall to specification.</p> <p>5.12 Interpret given drawing and construct attach and detached piers to specification in sand cress blocks and in bricks.</p> <p>5.13 Construct brick walls up to 2B thick and above in the following bonds:</p>	<ul style="list-style-type: none"> <li>• Give a drawing to be used (in real life situation) in constructing a brick retaining wall to specification.</li> <li>• Draw the picture of a pier use the sketch to specify and interpret the sketch.</li> <li>• Draw the picture of a pier use the sketch to specify and interpret the sketch.</li> </ul>	<ul style="list-style-type: none"> <li>• Detailed drawing bricks, cement, sand (sharp) etc.</li> <li>• Drawing sketch etc.</li> <li>• Bricks, cement sand etc..</li> </ul>
	<ul style="list-style-type: none"> <li>- garden and wall bond.</li> <li>- English bond</li> <li>- Flurench bond</li> </ul> <p>5.14 Construct corbels and plinths to walls up to 2.2 thick.</p> <p>5.15 State the purposes of cobles and plinths in wall construction.</p> <p>5.16 Build a decorative panels in brick walls up to 2.2 thick in any bony e.g. herring bone pattern, basket weaves, dog-leg etc.</p>	<ul style="list-style-type: none"> <li>• Part in the entire process. Thereafter, assign another brick-wall to them for construction using the 1<sup>st</sup> one as an example.</li> <li>• Ditto</li> <li>• Ditto</li> </ul>	<ul style="list-style-type: none"> <li>• Bricks, sand, cement etc.</li> <li>• Ditto.</li> </ul>
	<p>5.17 Set instructing decorative courses, cornices and chases to specification:</p> <p>5.18 State the purposes of glass blocks in building construction and build glass block walls.</p>	<ul style="list-style-type: none"> <li>• Do the setting with the students assisting thereafter assign same work to chain.</li> <li>• Demonstrate the building of glass block wall.</li> </ul>	<ul style="list-style-type: none"> <li>• Glass blocks, adhesive, etc.</li> </ul>

**PROGRAMME: ADVANCED NATIONAL TECHNICAL CERTIFICATE IN BRICKLAYING, BLOCKLAYING AND CONCRETING WORK.**

<b>MODULE: ADVANCED BRICK AND BLOCKLAYING</b>	<b>MODULE CODE: CBC 23</b>	<b>CONTACT HOURS: 288 (2-10)</b>
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**Module Specification: Theoretical Content**

<b>General Objective 6.0: CARRY OUT UNDERPINNING AND STRENGTHENING OF EXISTING WALLS.</b>			
<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teacher Activities</b>	<b>Resources</b>
<b>9-10</b>	6.1 Define under pinning. 6.2 State its purposed. 6.3 Describe with sketches methods of underpinning e.g shoring and alternate methods. 6.4 Describe with sketches systems of shoring walls e.g <ul style="list-style-type: none"> <li>- dead shore</li> <li>- flying shore</li> <li>- rating shore</li> </ul>	<ul style="list-style-type: none"> <li>• Define underpinning on the chalkboard.</li> <li>• State its purposes and assign home work to the students on the same subject matter.</li> <li>• Sketch the different types of shoring system and explain on the chalkboard.</li> <li>• Carry out this exercise in the class room using the chalkboard.</li> </ul>	<ul style="list-style-type: none"> <li>• Chalkboard, chalk etc.</li> <li>• Chalkboard, sketches, chalk etc.</li> </ul>
	6.5 State their applications. 6.6 Explain the purpose of thickening an existing wall. 6.7 Describe methods of thickening existing walls. 6.8 List problems that may b encountered in the process of thickening existing walls.	<ul style="list-style-type: none"> <li>• Ditto</li> </ul>	<ul style="list-style-type: none"> <li>• Ditto</li> </ul>
	6.9 State necessary precautions to be taken note: problems to be treated may include. Bonding new to existing bricks, existing foundation extension etc. 6.10Underpin, extend foundation and thicken existing wall to specification.	<ul style="list-style-type: none"> <li>• After explaining in the classroom: search for a building around you that needs under pinning and carry out the exercise.</li> </ul>	<ul style="list-style-type: none"> <li>• All under pinning equipment and materials.</li> </ul>

**PROGRAMME: ADVANCED NATIONAL TECHNICAL CERTIFICATE IN BRICKLAYING, BLOCKLAYING AND CONCRETING WORK.**

**MODULE: ADVANCED BRICK AND BLOCKLAYING**

**MODULE CODE: CBC 23**

**CONTACT HOURS: 288 (2-10)**

**Module Specification: Theoretical Content**

**General Objective 7.0: KNOW THE TECHNIQUES AND BE ABLE TO CONSTRUCT ALL TYPES OF BRICK ARCHES.**

<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teacher Activities</b>	<b>Resources</b>
<b>11-12</b>	<p>7.1 Make full scale drawings, cut templates for visors and produce brick volissoils for:</p> <ul style="list-style-type: none"> <li>- gothic arches</li> <li>- elliptical arches</li> <li>- any type of arches up to 3 metres</li> <li>- span and two brick and above thick.</li> </ul>	<ul style="list-style-type: none"> <li>• Prepare the drawing and cut templates from it to show the students.</li> <li>• Given them the same assign exercise.</li> </ul>	<ul style="list-style-type: none"> <li>• Provide materials as required..</li> <li>• Sketch etc.</li> </ul>
	<p>7.2 Describe with sketches the construction and erection of centres suitable for the constructing of gothic, elliptical and any other types of arches up to a span of three metres:</p> <p>7.3 Set up centers and construct any types of gothic, of a specified span using the prepared voussoirs in 7.1 above.</p>	<ul style="list-style-type: none"> <li>• Use a sketch to explain the construction centres.</li> <li>• Ditto.</li> </ul>	<ul style="list-style-type: none"> <li>• Sketch etc.</li> <li>• Ditto.</li> </ul>
<b>13</b>	<b>EXAMINATION: Practical 60%; Theory 40%.</b>		

**PROGRAMME: ADVANCED NATIONAL TECHNICAL CERTIFICATE IN BRICKLAYING, BLOCKLAYING AND CONCRETING WORK.**

<b>MODULE: ADVANCED BRICK AND BLOCKLAYING</b>	<b>MODULE CODE: CBC 23</b>	<b>CONTACT HOURS: 288 (2-10)</b>
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**Module Specification: PRACTICAL CONTENT**

**GENERAL OBJECTIVE: CARY OUT SURVEYING, LEVELLING AND THE CONSTRUCTION OF ALL TYPES OF BRICK AND BLOCK WORK TO SPECIFICATION.**

<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teacher Activities</b>	<b>Resources</b>
<b>1-3</b>	<p><b>Chain Surveying</b></p> <p>1.1 Carry out survey of an area of at least one lecture, book all field measurements.</p> <p>1.2 Plot the survey of the area to a suitable scale.</p> <p>1.3 Complete all measurement and calculations to the nearest figure, drawing to field standard using conventional signs and hand lettering.</p>	<ul style="list-style-type: none"> <li>Decide which area of your vicinity to be surveyed, then take the students on a field trip to survey the area with your assistance and presence.</li> <li>Ditto.</li> </ul>	<ul style="list-style-type: none"> <li>Survey equipment etc.</li> <li>Ditto.</li> </ul>
<b>4-7</b>	<p><b>Levelling</b></p> <p>1.4 Carry out necessary adjustment on a given levelling instrument.</p> <p>1.5 Carry out a closed serial levelling of about half a kilometer</p> <p>1.6 Plot and complete the survey to suitable scale</p> <p>1.7 Plot the ground profile of a given section of a contour map.</p>	<ul style="list-style-type: none"> <li>Guide the students to carry out a given leveling project to specification</li> </ul>	<p>Levelling instrument.</p> <ul style="list-style-type: none"> <li>Field map, etc.</li> </ul>
	<p>1.8 Set out a simple framed structure and a drainage system</p>	<ul style="list-style-type: none"> <li>Use as field work to show how setting out is carried out.</li> </ul>	<ul style="list-style-type: none"> <li>Setting out equipments.</li> </ul>
	<p>1.9 Carry out simple test to determine the bearing capacity of soil.</p>	<ul style="list-style-type: none"> <li>Guide the students to conduct load bearing capacity test of given soil.</li> </ul>	<ul style="list-style-type: none"> <li>Equipment.</li> <li>Soil. Etc.</li> </ul>

**PROGRAMME: ADVANCED NATIONAL TECHNICAL CERTIFICATE IN BRICKLAYING, BLOCKLAYING AND CONCRETING WORK.**

<b>MODULE: ADVANCED BRICK AND BLOCKLAYING</b>	<b>MODULE CODE: CBC 23</b>	<b>CONTACT HOURS: 288 (2-10)</b>
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**Module Specification: PRACTICAL CONTENT**

**GENERAL OBJECTIVE: CARY OUT SURVEYING, LEVELLING AND THE CONSTRUCTION OF ALL TYPES OF BRICK AND BLOCK WORK TO SPECIFICATION.**

<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teacher Activities</b>	<b>Resources</b>
<b>8-10</b>	<p><b>Brick and Block Work</b></p> <p>2.1 Transfer wall line from profile to foundation surface. Set up wall to DPC level</p> <p>2.2 Construct brick wall up to 2B thick and above the following bonds:</p> <ul style="list-style-type: none"> <li>- garden and wall bond</li> <li>- English bond</li> <li>- Fletching bond, etc</li> </ul> <p>2.3 Construct corbels and plinth in wall up to 2.2mm thick.</p> <p>2.4 Build in decorative panels in brick wall up to 2.2mm thick in any bond.</p>	<ul style="list-style-type: none"> <li>• Guide students to transfer wall line from profile e.g herring bone pattern, basket weaves, etc. and set up wall to DPC level..</li> </ul>	<ul style="list-style-type: none"> <li>• Materials</li> <li>• Tools</li> </ul>
	<p>2.5 Underpin, extend foundation and thicken existing wall to specification.</p>	<ul style="list-style-type: none"> <li>• Guide the students on the underpinning project.</li> </ul>	<ul style="list-style-type: none"> <li>• All under pinning equipment and materials.</li> </ul>
<b>11-12</b>	<p><b>ARCES</b></p> <p>3.1 Make full scale drawings, cut templates for visors and produce brick volissoils for:</p> <ul style="list-style-type: none"> <li>- gothic arches</li> <li>- elliptical arches</li> <li>- any type of arches up to 3 metres</li> <li>- span and two brick and above thick.</li> </ul>	<ul style="list-style-type: none"> <li>• Guide the students to perform the given task to specification..</li> </ul>	<ul style="list-style-type: none"> <li>• Provide materials as required the project.</li> </ul>

**PROGRAMME: ADVANCED NATIONAL TECHNICAL CERTIFICATE IN BRICKLAYING, BLOCKLAYING AND CONCRETING WORK.**

<b>MODULE: ADVANCED BRICK AND BLOCKLAYING</b>	<b>MODULE CODE: CBC 23</b>	<b>CONTACT HOURS: 288 (2-10)</b>
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**Module Specification: PRACTICAL CONTENT**

**GENERAL OBJECTIVE: CARY OUT SURVEYING, LEVELLING AND THE CONSTRUCTION OF ALL TYPES OF BRICK AND BLOCK WORK TO SPECIFICATION.**

<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teacher Activities</b>	<b>Resources</b>
	3.2 Set up centers and construct any types of gothic, of a specified span using the prepared voussoirs in 7.1 above.		• Sketch etc.
<b>13</b>	<b>Examination: Practical 60% Theory 40%</b>		

## Advanced Concrete Work

PROGRAMME: 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.			
General Objective 1.0: KNOW THE EFFECTS OF THE PHYSICAL PROPERTIES OF CONCRETE MATERIALS ON QUALITY OF WET AND HARDENED CONCRETE.			
Week	Specific Learning Outcome:	Teacher Activities	Learning Resources
1	<p><b>Properties of Concrete &amp; Concrete Materials</b></p> <p>1.1 State the effects of the used of 'state' or deteriorated cement on concrete e.g.</p> <ul style="list-style-type: none"> <li>- loss in strength</li> <li>- loss of adequate setting</li> <li>- susceptibility to chemical attack.</li> </ul> <p>1.2 State the effect of surface texture of. Aggregate on workability bond strength and quantity of water required in the mix.</p>	<ul style="list-style-type: none"> <li>• Use the chalkboard to explain the process of state and deteriorated cement. Then practicalise it by using state or deteriorated cement to show loss in strength loss of adequate setting etc.</li> <li>• The subject should be taught in the classroom, thereafter, it should be practicalised.</li> </ul>	<ul style="list-style-type: none"> <li>• Cement, etc.</li> <li>• Aggregates, cement, water etc.</li> </ul>
	<p>1.3 Describe the effect of particle shape on workability and strength e.g.</p> <ul style="list-style-type: none"> <li>- cubical aggregates</li> <li>- produce stronger concrete</li> <li>- partly aggregates produce poor concrete.</li> </ul>	<ul style="list-style-type: none"> <li>• Use the classroom setting to teach the subject.</li> <li>• Try as much as possible to sketch and explain the process to the students. Use various shapes of aggregates to show and prove the raised questions.</li> <li>• This should first be taught in the classroom then taken to the workshop for practice.</li> </ul>	<ul style="list-style-type: none"> <li>• different shapes of aggregates, cement, water, mixer etc.</li> <li>• all types of impurities, chemicals e.g HCL, mixed with aggregate.</li> </ul>
	<p>1.4 State the effects of impurities (mud, chemicals etc) on the quality of wet and hardened concrete e.g.</p> <ul style="list-style-type: none"> <li>- Impurities may delay setting, reduce bond strength, cause discolouration and straining and reduce strength.</li> </ul>	<ul style="list-style-type: none"> <li>• Use the method in the method in the above to teach and show students the effect of impurities in the delay of concrete hardening.</li> </ul>	<ul style="list-style-type: none"> <li>• Impure aggregate cement, sand water etc.</li> </ul>

<b>PROGRAMME: ADVANCED NATIONAL TECHNICAL CERTIFICATE IN BRICKLAYING ETC</b>			
<b>MODULE: ADVANCED CONCRETE WORK</b>		<b>Module Code: CBC 24</b>	<b>Contact Hours 96 (2-6)</b>
<b>Module Specification: Theoretical/Practical Contents.</b>			
<b>General Objective 2.0: UNDERSTAND THE NEED FOR MIX DESIGN AND METHODS OF CONTROLLING QUALITY OF CONCRETE ON SITE.</b>			
<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teacher Activities</b>	<b>Learning Resources</b>
<b>2</b>	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. 2.4 State 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.	<ul style="list-style-type: none"> <li>On completion of the module, students should be able to define and state what 'mix design' is and reasons for using mix design to achieve workability in concrete. This can be achieved by the teacher giving examples and teaching the subject effectively on the chalkboard.</li> </ul>	<ul style="list-style-type: none"> <li>Teaching aids, chalkboard etc.</li> <li>Ditto.</li> </ul>
	<ul style="list-style-type: none"> <li>Control of material storage.</li> <li>Control of batching</li> <li>Testing and checking of quality of cement and water at adequate intervals.</li> <li>Testing of cubes of concrete batches.</li> </ul> 2.6 Describe the various stage in quality control of concrete produced on site e.g. <ul style="list-style-type: none"> <li>Control of material storage.</li> </ul>	<ul style="list-style-type: none"> <li>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.</li> <li>Cubes should be tested from concrete batches for compression test.</li> <li>This can be prepared in the workshop for crushing test. See 2.4 above</li> </ul>	<ul style="list-style-type: none"> <li>Concrete cubes, compression test machine etc.</li> </ul>
	<ul style="list-style-type: none"> <li>Control of batching</li> <li>Testing and checking of equality</li> <li>Of cement and water at adequate intervals.</li> <li>Testing of cubes of concrete batches.</li> </ul>	<ul style="list-style-type: none"> <li>After theoretical explanation, the teacher should carry out workshop test on the various subject matter.</li> </ul>	<ul style="list-style-type: none"> <li>Test materials as required.</li> </ul>

<b>PROGRAMME: ADVANCED NATIONAL TECHNICAL CERTIFICATE IN BRICKLAYING ETC</b>			
<b>MODULE: ADVANCED CONCRETE WORK</b>		<b>Module Code: CBC 24</b>	<b>Contact Hours 96 (2-6)</b>
<b>Module Specification: Theoretical/Practical Contents.</b>			
<b>General Objective 3.0: UNDERSTAND THE BASIC PRINCIPLES OF DESIGN OF FORM WORK FOR VARIOUS STRUCTURES.</b>			
<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teacher Activities</b>	<b>Learning Resources</b>
<b>3-4</b>	3.1 State the requirements for forms for pre-cast and structures. 3.2 List factors to be considered in the design and construction of formwork for various structures e.g. - rate of pour ; surface furnish - method of compaction; Cost; Shape and size structures; Support etc.	<ul style="list-style-type: none"> <li>• Use the chalkboard to teach the subject matter after, practical should be carried out in the presence of the students.</li> <li>• Same as above.</li> </ul>	<ul style="list-style-type: none"> <li>• Planks, hammer, nails, etc.</li> </ul>
<b>General Objective 4.0: UNDERSTAND THE BASIC PRINCIPLES OF REINFORCING VARIOUS CONCRETE STRUCTURES.</b>			
<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teacher Activities</b>	<b>Learning Resources</b>
<b>5-6</b>	4.1 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 cantilever - Water tank and reservoirs - Electric polis - Concrete walls.	<ul style="list-style-type: none"> <li>• Use detailed, designed structural drawing to describe subject.</li> <li>• Design a simple, slab stair case etc. to teach the students simple design methods.</li> </ul>	<ul style="list-style-type: none"> <li>• Detailed designed engineering drawing etc.</li> </ul>
	- Channels and - Concrete rings.  4.2 State the precautions to be taken to ensure the production of sound insitu concrete structures.	<ul style="list-style-type: none"> <li>• State precautions on the chalkboard and allow students to practice. Give home work to reinforce the learning process.</li> </ul>	<ul style="list-style-type: none"> <li>• Chalkboard, design notes, chalk etc.</li> </ul>

PROGRAMME: 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.			
General Objective 5.0: KNOW THE BASIC METHODS OF PRODUCING PRECAST CONCRETE UNITS.			
Week	Specific Learning Outcome:	Teacher Activities	Learning Resources
7 - 8	<p>5.1 Describe methods of producing precast units e.g.</p> <ul style="list-style-type: none"> <li>- electric poles</li> <li>- culvert rings</li> <li>- box culvert units</li> <li>- panel walls.</li> <li>- Specify material and mix ratio for producing the precast as in 5.1 (a).</li> </ul> <p>5.2 Produce pre-cast units listed in 5.1 above.</p>	<ul style="list-style-type: none"> <li>• Prepare simple formwork of the different components at different mix ratio cast same and use the out come to explain the methods of producing pre-cast units to the students.</li> <li>Ditto</li> </ul>	<ul style="list-style-type: none"> <li>• Plank for form work, nails hammer etc.</li> <li>• Ditto.</li> </ul>
	<p>5.2 Name various machines and plants used in the making and bonding of pre-cast units in 5.1 above e.g.</p> <ul style="list-style-type: none"> <li>- spring machine</li> <li>- vibrators</li> <li>- hydraulic press</li> <li>- cranes, etc.</li> </ul> <p>5.3 Describe various machines and plants used in the making and handling of pre-cast units in 5.1 above e.g.</p>	<ul style="list-style-type: none"> <li>• Use pictorial method to show the students different plants used in making and handling pre-cast units.</li> <li>• Ditto.</li> </ul>	<ul style="list-style-type: none"> <li>• Video films. Television monitor, computer, slide etc.</li> <li>• Ditto.</li> </ul>
	<ul style="list-style-type: none"> <li>- spring machine</li> <li>- vibrators</li> <li>- hydraulic press</li> <li>- cranes etc</li> </ul>	<ul style="list-style-type: none"> <li>• Show examples of a spiring machine vibrator etc to the students.</li> </ul>	<ul style="list-style-type: none"> <li>• Spiring machine vibrator, hydraulics press, cranes etc.</li> </ul>

PROGRAMME: 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.			
General Objective 6.0: UNDERSTAND THE PRINCIPLES OF CONSTRUCTION OF VARIOUS CONCRETE STRUCTURE FRAMES.			
Week	Specific Learning Outcome:	Teacher Activities	Learning Resources
9 -10	<p>6.1 List the work sequence in the construction of in-situ concrete framed buildings up to form storey high.</p> <p>6.2 Describe the work sequence in the construction of in-situ concrete framed buildings up to four storeys high.</p> <p>6.3 Out line factors to be considered in the erection of profile boards for setting out in-situ concrete framed buildings.</p>	<ul style="list-style-type: none"> <li>• Explain on the chalkboard and with the aid of sketches.</li> <li>• Describe on the chalkboard and encourage the students to carry out assignments on the subject area.</li> <li>• Ditto.</li> </ul>	<ul style="list-style-type: none"> <li>• Sketch, chalkboard etc.</li> <li>• Setting out equipments.</li> <li>• Sketch etc.</li> <li>• Setting out equipments.</li> <li>• Sketch etc.</li> </ul>
	<p>6.4 Describe with sketches methods of maintaining vertical and horizontal control in the construction of in-situ concrete framed buildings.</p> <p>Note: Treatment may cover use of reference frame for setting out of columns and centre lines axes, plum-bob and optical plumbing methods to ensure vertical alignment.</p> <p>6.5 Explain the need for close supervision of concreting operations.</p> <p>6.6 Explain the need for close supervision of concreting operations,</p> <p>6.7 Identify critical areas of work supervision with reference to framed building construction.</p>	<ul style="list-style-type: none"> <li>• Practicise this method to the students by actually setting out a framed building after exhausting the subject matter in the classroom.</li> <li>• Sketch the method and present the sketch to the students in a classroom setting.</li> <li>• 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.</li> </ul>	<ul style="list-style-type: none"> <li>• Setting out materials etc.</li> </ul>

<b>PROGRAMME: ADVANCED NATIONAL TECHNICAL CERTIFICATE IN BRICKLAYING ETC</b>			
<b>MODULE: ADVANCED CONCRETE WORK</b>		<b>Module Code: CBC 24</b>	<b>Contact Hours 96 (2-6)</b>
<b>Module Specification: Theoretical/Practical Contents.</b>			
<b>General Objective 7.0: KNOW THE MAIN TYPES OF CONCRETE FLOOR, METHODS OF CONSTRUCTION AND THEIR APPLICATION.</b>			
<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teacher Activities</b>	<b>Learning Resources</b>
<b>11-12</b>	<p>1.1 Describe the following types of floor construction:</p> <ul style="list-style-type: none"> <li>- bean and slab</li> <li>- drop bean slab</li> <li>- waffle grid slab</li> <li>- flush slab.</li> </ul>	<ul style="list-style-type: none"> <li>• Explain the process of floor construction to the students using sketches and drawings on the chalkboard.</li> <li>• State why different types floors are used for different purposes.</li> <li>• Allow students to attempt designing and constructing a given type of floor.</li> </ul>	<ul style="list-style-type: none"> <li>• Sketch chalk, chalkboard etc.</li> <li>• Ditto.</li> </ul>
	<p>1.2 Distinguish between.</p> <ul style="list-style-type: none"> <li>- Self-centering and</li> <li>- Non-self centering floors</li> </ul> <p>1.3 State their relative advantages and disadvantages.</p> <p>1.4 Describe with sketches various types of self centering floors e.g.</p> <ul style="list-style-type: none"> <li>- hollow and ribbed pre-cast reinforced concrete slabs.</li> <li>- Solid light concrete slabs</li> <li>- Pre-cast reinforced beans which laid between.</li> </ul>	<ul style="list-style-type: none"> <li>• Use the method as above.</li> </ul>	<ul style="list-style-type: none"> <li>• Chalkboard, chalk, etc.</li> </ul>
	<p>7.5 Construct models of self-centering floors.</p>	<ul style="list-style-type: none"> <li>• Prepare models and use as an aid to describe self-centering of floors to the students.</li> </ul>	<ul style="list-style-type: none"> <li>• Model, etc.</li> </ul>
<b>13</b>	<b>EXAMINATION: Practical 60%, Theory 40%</b>		

## Components and Finishes

<b>PROGRAMME: ADVANCED NATIONAL TECHNICAL CERTIFICATE IN BRICKLAYING, BLOCKLAYING AND CONCRETING.</b>			
<b>MODULE: COMPONENTS AND FINISHES</b>		<b>MODULE CODE: CBC 25</b>	<b>Contact Hours: 96 (2-6)</b>
<b>Module Specification Theoretical/ Practical Content</b>			
<b>General Objective 1.0: UNDERSTAND THE PURPOSES AND USES OF FINISHES IN BUILDING.</b>			
<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teachers Activities</b>	<b>Resources</b>
1	1.1 Explain with illustrations the functions of finishing in buildings eg. Aesthetics, services, protection etc. 1.2 State and explain the factors affecting the choice of various types of finishing. 1.3 Materials e.g. structural requirements.	<ul style="list-style-type: none"> <li>• The teacher illustrates the effect of finishing on floor, wall and roof construction to the students.</li> <li>• Allow questions from the students or the teacher ask or the teacher ask them.</li> </ul>	<ul style="list-style-type: none"> <li>• Charts</li> <li>• Showing</li> <li>• Finishing</li> <li>• Applied to wall, floor and ceiling.</li> </ul>
	1.4 Environmental requirements, cost dimensional requirements, statutory regulations, durability, workability etc.		
<b>General Objective 2.0: Know the functions of rendering sand facing and how they are selected for use.</b>			
<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teachers Activities</b>	<b>Resources</b>
	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. <ul style="list-style-type: none"> <li>a. Appearance required</li> <li>b. Type of background its</li> </ul>	<ul style="list-style-type: none"> <li>• The teacher organises the students to do renderings as one method of finishing in the workshop.</li> </ul>	<ul style="list-style-type: none"> <li>• Charts showing</li> <li>• Smooth floated finish</li> <li>• Pebble dash</li> </ul>
	2.4 Enumerate the characteristics, suitability and methods of application of various types of renderings e.g <ul style="list-style-type: none"> <li>a. smooth floated finish</li> <li>b. pebble dash</li> <li>c. scraped finished etc.</li> </ul> 2.5 Enumerate the properties of the various background materials, and their effects on the choice of rendering.		<ul style="list-style-type: none"> <li>• Charts showing types of facings.</li> </ul>

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**Module Specification Theoretical/ Practical Content**

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

<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teachers Activities</b>	<b>Resources</b>
	2.6 Explain the factors, affecting the choice of different types of facings. 2.7 Describe the types of background required for facing. 2.8 Enumerate the various fixing materials used for facings, their properties and factors affecting their choice.		

**General Objective 3.0: KNOW THE VARIOUS CLADDING MATERIALS IN BUILDINGS, AND THEIR IMPORTANCE.**

<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teachers Activities</b>	<b>Resources</b>
2	3.1 Explain the reasons for the development of cladding panels. 3.2 State the objectives of standardising sizes for cladding panels. 3.3 Enumerate the advantages of cladding panels eg fire protection, insulation.	<ul style="list-style-type: none"> <li>• The teacher narrates and demonstrates how various types of cladding panels are fixed and jointed.</li> <li>• Students should be called one after the other to do the demonstration.</li> </ul>	<ul style="list-style-type: none"> <li>• Samples cladding panels</li> </ul>
	3.4 Describe the various types of cladding panels eg infill panels. c. acoustic panels etc. 3.5 Illustrate the various materials used in making the cladding panels in 3.4 above and explain how they are manufactured.		

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

<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teachers Activities</b>	<b>Resources</b>
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.	<ul style="list-style-type: none"> <li>• Demonstrate the production of curtain walls with the students.</li> </ul>	<ul style="list-style-type: none"> <li>• Charts showing</li> <li>• Produced curtain walls.</li> </ul>

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

<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teachers Activities</b>	<b>Resources</b>
4-5	5.1 Explain the functions of sheet cladding materials. 5.2 List the various types of sheet cladding materials, their standard forms and properties. 5.3 Describe the manufacture of plaster board, fibre 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 claddings.	<ul style="list-style-type: none"> <li>• Teacher demonstrates to the students the various methods of fixing sheet claddings.</li> </ul>	<ul style="list-style-type: none"> <li>• Charts cladding materials</li> <li>• Fibre board</li> <li>• Asbestos cement.</li> </ul>

**General Objective 6.0: KNOW HOW TO PREPARE ROOF FLASHINGS IN SHEET METAL**

<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teachers Activities</b>	<b>Resources</b>
6-7	6.1 Sketch the leaseie shape of flashings. 6.2 Describe 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.	<ul style="list-style-type: none"> <li>• The teacher draws the basic shape of flashings on the chalkboard and instructs the students to draw them into their notebooks.</li> </ul>	<ul style="list-style-type: none"> <li>• Charts</li> <li>• Metals</li> <li>• Flashing</li> </ul>
	6.4 Describe the and illustrate with demonstrations the methods of forming flash shapes by: <ol style="list-style-type: none"> <li>a. bonding</li> <li>b. dressing</li> <li>c. folding</li> <li>d. jointed insertions</li> </ol>		

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**Module Specification Theoretical/ Practical Content**

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

<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teachers Activities</b>	<b>Resources</b>
8-9	<p>7.1 Explain the importance of non-structural insulation in building.</p> <p>7.2 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.</p> <p>7.3 Enumerate the properties of the insulation materials in 7.2 above.</p> <p>7.4 Describe the various relative used of the insulation materials in 7.2 above.</p>	<p>The teacher demonstrates the installation of the insulation materials to the students.</p>	<ul style="list-style-type: none"> <li>• Charts</li> <li>• Building papers</li> <li>• Wood</li> <li>• Blankets</li> <li>• Acoustical tile</li> <li>• Cement mortar etc.</li> </ul>
	<p>7.5 List the housing requirements of insulating a building.</p> <p>7.6 State the effect of insulation in a building.</p> <p>7.7 Explain how to fix insulation materials in a building.</p> <p>7.8 Explain with illustrations the effects of ground water level. And run-off on building structure.</p> <p>7.9 List the various water proofing materials in common use e.g. asphalt, bituminous fibre, polyethylene etc.</p>		<ul style="list-style-type: none"> <li>• Charts on groundwater level and run-off on building structure.</li> <li>• Water-proofing materials e.g.</li> <li>• Asphalt</li> <li>• Bituminous fibre etc.</li> </ul>
	<p>7.10 Explain the conditions under which buildings are dampened.</p> <p>7.11 Enumerate various preventive measures of protecting building structures from dampening e.g. permeability of concrete, cracks and joints in masonry, hydrostatic pressure, integral water-proofing cement-base water-proofing coating bricks, coating with asphalt and bituminous emulsion.</p>	<ul style="list-style-type: none"> <li>• The laying of water-proofing materials.</li> <li>• The teacher gives the students chance to practice the laying themselves.</li> </ul>	
	<p>7.12 Describe with illustrations the various methods of laying waterproofing materials listed in 7.11 above and explain the factors influencing the choice of each of the materials.</p> <p>7.13 Describe the various ways of correcting leaked foundations, walls, slabs, and roofs.</p>		

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**Module Specification Theoretical/ Practical Content**

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

<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teachers Activities</b>	<b>Resources</b>
10-12	1.1 Explain the importance of painting in buildings eg aesthetic, weather protection. 1.2 State the main constituents of oil paints, emulsion paint, varnish and enamel, fire resistant paints etc. 1.3 Enumerate the various characteristics of the types of paint referred to in 8.2 above. 1.4 State the procedures for preparing paints for use. 1.5 Describe the drying processes of paints.	<ul style="list-style-type: none"> <li>The teacher demonstrates to the students the procedures for preparing paints for use.</li> </ul>	<ul style="list-style-type: none"> <li>Samples of some paints eg.</li> <li>Oil paint</li> <li>Emulsion paint</li> <li>Colour chart.</li> </ul>
	1.6 Outline the function of the following paint systems:- <ul style="list-style-type: none"> <li>a. primer</li> <li>b. undercoat and</li> <li>c. finishing coat</li> </ul>	<ul style="list-style-type: none"> <li>The teacher assembles the items listed in 8.7 above for the students to identify.</li> </ul>	<ul style="list-style-type: none"> <li>Ferrous metal</li> <li>Non-ferrous metal</li> <li>Charts</li> </ul>
	1.7 Explain the selection and application of paint, to ferrous metals, <ul style="list-style-type: none"> <li>- nonferrous metals,</li> <li>- brick</li> <li>- stone</li> <li>- concrete</li> <li>- gypsum</li> <li>- lime,</li> <li>- timber and</li> <li>- building boards.</li> </ul> 8.8 List and explain the main causes of pain failure.		
13	<b>EXAMINATIONS: Practical = 70%; Theory = 40%</b>		