

220 – CARPENTRY AND JOINERY

Examination Structure

For this trade, the following are the trade related courses:

193: Building/Engineering Drawing (CTD 11-14)

The trade will also be examined under the following component or subject groupings:

211: Introduction to Building Construction (CBC11) see (Blocklaying, Bricklaying and Concreting)

221: Carpentry and Joinery CCJ 11,12, 13 & 14 & CMW 11 - 13

Examination Scheme

211-1: Introduction to Building Construction (CB11)

The examination will comprise two papers as follows:

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

211-2 Paper II: This paper will consist of seven essay questions out of which candidates are to attempt five questions in 1 hour, 40 minutes and it carries 60 marks

221 Carpentry and Joinery (CCJ 11,12, 13 & 14 & CMW 11 – 13)

The examination will comprise two papers as follows:

221-1 Paper 1 – This consists of:

Section A: This will comprise 40 multiple-choice objective questions to be attempted in 40 minutes. The paper carries a total of 40 marks.

Section B: This section will consist of six essay and drawing questions out of which candidates are to attempt five questions in 2 hours and it carries 60 marks.

221-2 Paper II – A Practical Work for 6 hours. It carries 100 marks.

Topic / Objective	Contents	Activities / Remarks
<p>1.0 General Safety</p> <p>1. List, name and identify sources of hazards, accidents and safety wears and equipment in a wood workshop.</p> <p>2. Apply the safety rules and safety measures in case of accident in a wood workshop.</p>	<p>1. Safety precautions when handling and using hand tools, power tools and machines.</p> <p>2. Sources of accidents in the workshop.</p> <p>3. Safety wears and equipment e.g. goggles, fire extinguishers etc. Materials handling, clothing, health, hazards, movement, machines operations, fire etc.</p> <p>4. First aid.</p>	<p>1. Make simple safety devices to protect the students from injury when using cutting tools, machines etc. Keep the first Aid box in the workshop. Keep a record of accidents. Show film on safety In industry. Make chart on safety procedures.</p>
<p>2.0 Wood Work Hand Tools</p> <p>1. Identify, classify and state types of hand tools and safety precautions to be observed in using the tools.</p> <p>2. State the uses and maintenance of the tools.</p> <p>3. Prepare timber to a given specification using hand tools.</p>	<p>Hand tools classification and uses</p> <p>1. Geometrical and marking – out tools:- Try square, dividers, gauges.</p> <p>2. Cutting tools:- jack, smooth, try planes. Spoke – shave etc. Chisels: Firmer, pair mortice etc. Boring: ratchet and wheel braces bits; drills and countersinks.</p> <p>3 Impelling tools; hammer, mallet etc. Maintenance of all tools. Sharpening plane cutters, chisels, drills, saw teeth set, cleaning and lubricating and storing</p> <p>4 Holding and supporting tools: G-crimp, F-crimp, bench vice etc.</p>	<p>1. Use tools in performing practical exercises.</p> <p>2. The use of oil stone to sharpen tools.</p> <p>3. Emphasize on the students' safety.</p>
<p>3.0 Timber Preparation</p> <p>1. Explain and demonstrate the principles and the sequence of cutting and plane all surfaces and edges to flatness and squareness with its mark.</p>	<p>1. Sequence of preparing timber to size.</p> <p>2. Wood work bench tools: Jack plane, hand saws, marking guage, try square, rules, smoothing plane etc.</p>	<p>1. Practical operations involved should be followed in sequence.</p>

Topic / Objective	Contents	Activities / Remarks
4.0 Marking Out 1. Interpret simple working drawings of wood work projects. 2. Identify convention of representation using on working drawings.	1. Sketching and developing of working drawing 2. Conventional representation used in woodwork.	1. Produce a working drawing for a project.
5.0 Portable Electric Tools 1. List and describe common portable hand tools. 1. Explain their operations and uses.	1. Common portable hand tools e.g.: (a) Portable saw (b) Portable planer (c) Portable drill (d) Portable sander (e) Jigsaw 2. Operations: Planing, sawing, miltreing, Drilling, sand-papering, rebating etc.	1. Practical demonstration
6.0 Wood Working Machines 1. List, state and explain Wood working machines, its purpose, working principles of each machine and observe safety precautions.	1. Basic wood-working machines: - various parts - working principles. 2. Surface planing, thicknessing, circular saw, mortising, cross cutting; drilling, simple-ended tenoning machine etc.	1. Practical demonstration 1. Operate woodworking/ machines to perform various operations.
2. Carry out various operations and maintenance of the machines.	1. Uses: of drum dust, fume and dust extractors. 2. Maintenance of machines and tools, e.g. clean lubricate all machines tools, set oil levels, replace burnt fuse, bulb and worn out drive belts etc.	
7.0 Common Wood Work Joints 1. Identify common wood work joints and their uses. 2. Construct common	Types of woodwork joints. 1. Widening joints 2. Angle joints 3. Frame joints	1. Sketch the guards, fences and other protective parts. 2. Make projects to embody joints in each group 3. Emphasise the

Topic / Objective	Contents	Activities / Remarks
wood work joints		practical application of the joints. 4. Students should not be allowed to use machines without their instructor, supervisor in the workshop.
8.0 Construct Common Woodwork joints and Frame Construction 1. Identify the various types of frame construction and state where applicable. 2. Identify the various types of carcase construction and state where each is applicable.	1. Types of frame constructions. 2. Types of carcase constructions e.g. simple framed carcase etc. 3. Construction factors to be considered e.g. rigidity, jointing method, squareness of frame e.g. Butt and dowel joint, mortice and tenon joint, mitre and feather joints.	1. Working drawing of project is needed. 1. Exercise in framed and carcase constructions.
9.0 Timber Growth and Structures 1. Describe the growth and structure of a tree 2. Explain the various methods of conversion. Seasoning 3. Describe the various methods of seasoning timber. 4. State the advantages and disadvantages of each method.	1. Timber growth and structure. 2. Felling and conversion of timber. 3. Seasoning of timber. 4. Types of Nigerian timbers and their properties e.g. Abura, Agba, Mahogany etc.	<ul style="list-style-type: none"> - Visit a sawmill. - Use charts showing various methods. - Show samples of Nigerian timber.
5. Identify the various types of Nigerian timbers and state their properties.	1. Timber defects and causes e.g. splits, warp, twist, case-hardening, collapse etc. Fungus, white ants, woodborers.	1. Show samples.
1.0 Manufactured	1. Common manufactured boards	1. Examine some

Topic / Objective	Contents	Activities / Remarks
<p>Boards</p> <p>1. Identify common manufactured boards and state their uses.</p>	<p>and their uses. Plywood, lamin-board, block-board, chip board etc.</p> <p>2. Properties e.g. grain, figure density etc.</p>	<p>samples of boards.</p> <p>2. Collect specimens.</p>
<p>12.0 Adhesives</p> <p>1. State and describe types of adhesive and their composition e.g. protein, synthetic resin etc.</p> <p>2. Prepare glue for use.</p>	<p>1. Main types of adhesive: protein, synthetic resin and contact, animal vegetable and thermoplastics glues (PVC, ponal).</p> <p>2. Properties, preparation and application of each type.</p>	<p>1. Apply the different types of adhesive to on-going projects.</p> <p>2. Show the students different types of adhesive.</p>
<p>13.0 Fittings and Fastenings</p> <p>1. List and identify various types of fittings.</p> <p>2. Explain and state the properties of the fasteners and materials used for common fitting.</p>	<p>1. Types of fitting, e.g. hinges, locks, handles, catches etc.</p> <p>2. Selection and application of fittings.</p> <p>3. Properties of materials used for common fitting e.g. brass, mild steel, aluminium, plastics etc.</p>	<p>1. Examine different types of each hardware.</p> <ul style="list-style-type: none"> - Make freehand sketches; - Make projects; using various types of fittings and fasteners. <p>2. Demonstrate correct methods of fixing fittings.</p>
<p>14.0 Wood Finishing</p> <p>1. Explain the purposes and state types of wood finishing materials.</p>	<p>1. Purposes of finishing wood.</p> <p>2. Types of wood finishes e.g. paints varnishes, pigments etc.</p>	<p>1. Prepare the surface.</p>
<p>1. Name the composition of finishing materials.</p> <p>3. Prepare wood surface for finishing.</p>	<p>3. Composition of common wood finishing materials.</p>	<p>1. Apply finishes to on-going job.</p>

FUNDAMENTALS OF MACHINE WOOD WORKING I (C.M.W. – 12)

Topic/Objective	Contents	Activities/Remarks
<p>1.0 Pull-Over Cross Cutting Machine</p> <p>1. Describe the main features; and working principles, metal properties, operation and safety precautions of pull-over cross cutting machine.</p> <p>2. Identify the various cutters and accessories, mount and dismount cutters, saw blades sharpen, operate the machine.</p> <p>2. Carry out some routine service and maintenance on the machine.</p>	<p>1. Features of a pull-over, cross cutting machine.</p> <p>2. Principles of operation.</p> <p>3. Safety precautions.</p> <p>4. Various cutters and accessories.</p> <p>5. Machine mounting.</p> <p>6. Routine service and maintenance.</p>	<p>Making of basic wood work joints and demonstrations.</p> <p>Cross-cutting timber to required rough length. Square and regular cutting. Strict adherence to safe working and the use of safety devices must be emphasized at all times.</p> <p>Cutting operations: straight and angular. Trenching operations.</p> <p>Clean and oil the machine.</p>
<p>2.0 Circular Saw</p> <p>1. List, identify and explain features, parts, scope and principle of operating circular saw.</p> <p>2. State safety instructions, fix and remove saw and riving knife; construct jigs, and fixtures, change speed, change, sharpen blade and lubricate the machine parts.</p>	<p>1. Main features of circular ripping saw. - Scope and operating principles.</p> <p>2. Types of saws and their uses. - Shapes of saw teeth, hook, gullet etc. guards, riving knife, push stick, safe operational technique.</p> <p>3. Jigs or fixtures.</p> <p>4. Saw speed calculation.</p> <p>5. Machine operations.</p> <p>6. Machine lubrication.</p>	<p>- Cutting to the width.</p> <p>- Adjusting of fence and guard.</p> <p>- Rise and fall table exercises in ripping, deeping, grooving, rebating, tenoning, etc.</p> <p>Emphasis on safety regulations as stipulated by Federal Ministry of Labour.</p> <p>Use jigs and fixtures for projects.</p> <p>Application of push stick while sawing.</p>

Topic/Objective	Contents	Activities/Remarks
<p>3.0 Dimension Saw Bench</p> <p>1. State the features and working principles of saw bench, its operation, state safety precautions and identify the metal/materials used in the manufacture of components parts.</p> <p>2. Calculate spindle speed and peripheral speed of saw, mount the saw blades, and lubricate the machine parts.</p>	<p>1. Features of dimension saw.</p> <ul style="list-style-type: none"> - Principles of operation. - Necessary safety precautions. - Metal/materials used in the manufacture of components. <p>2. Set the blade into spindle and tighten it.</p> <ul style="list-style-type: none"> - cross-cutting to length mitring. - mitring - tongue and groove. - rebating, ripping etc. <p>3. Maintenance, cleaning etc.</p> <p>4. Calculation of spindle and peripheral speed of the saw blade.</p>	<p>Instruction and demonstration for correct and safe use.</p> <p>Sawing exercise to cover straight and angular work.</p> <p>Any adjustment should be done before switching on the machine.</p> <p>Safety precautions and regulations to be observed.</p> <p>Routine service as given by the manufacturer.</p>
<p>4.0 Surface Planer</p> <p>1. State and list some of the precautions and common materials used in manufacturing the machine and explain the scope and principles of operation of the surface planer.</p> <p>2. Observe the safety precautions involved while operating the machine, explain the purpose of devices and calculate the speed of the cutter.</p>	<p>1. The surface planer – materials used in the manufacture of the components e.g. cutters, table, block, etc.</p> <p>2. Arrangement and functions of various parts and methods of adjusting tables and fence. Methods used and patent devices for resetting cutters.</p> <p>3. Necessary safety precautions.</p> <p>4. Planing ‘out of wind’, squaring, bevelling, rebating, use of back stops, push blocks and springs for safe working and to reduce accident risk.</p> <p>5. Mount and dismount the cutters.</p> <p>6. Maintenance.</p>	<p>Demonstration the safe operation of the machine.</p> <p>Exercises on surfacing and squaring stock.</p> <p>Exercises to include bevelling and tapering with the use of back stop.</p> <p>Correct adjustment and setting of guard.</p> <p>Setting of cutter in machine sharpening etc. Planing, the surface and edge of timber, tapering and stopped rebating, etc.</p> <p>Sketch the machine lubricate machine.</p>
<p>3. Explain the cutting action of the blades,</p>		

Topic/Objective	Contents	Activities/Remarks
operate the surface planer, replace and remove cutters – routine service of the surface planer.		
<p>5.0 Thicknessing and Combination Planing Machines</p> <p>1. Describe and identify the features, functions of component and hazards of the machines.</p> <p>2. Explain and outline the safety and the principles of operating the machines.</p> <p>2. Identify operating faults, calculate the speed of cutter block and feed rollers, sharpen and set cutter and perform routine service.</p>	<p>1. Working principles of thickness and combination planing machine.</p> <p>2. Types of cutter blocks used and methods of sharpening and resetting cutters, power source etc, use of jigs.</p> <p>3. Causes of accidents and remedies.</p> <p>4. Operational faults.</p> <p>5. Calculation of the number of cutter mark per 25cm, high or low cutter speed.</p> <p>6. Maintenance work.</p>	<p>Features of design. Sectional and solid feed tools and pressure. Correct adjustment of feed rollers and pressure bars.</p> <p>Demonstrate the uses of the machine.</p> <p>Sharpening, honing, whetting etc.</p> <p>Demonstration on knife grinding and balancing to be emphasized.</p> <p>Mount and dismount cutters correctly. Lubricate cutters.</p>
<p>1.0 Rods, Route Sheet and Cutting List</p> <p>1. List and explain types of rods, route sheets, the purposes and limitations and prepare setting out rod.</p> <p>2. Explain set-out rods, the purposes of a cutting list and type of cutting list.</p>	<p>1. Types of rods, route sheet and cutting lists – purposes.</p> <p>2. Workshop use of rods, route sheet etc. for production.</p> <p>2. Differentiate between height and width rods – door, steel kitchen units, bookshelves etc.</p> <p>4. Determining the cost of job.</p> <p>5. Exploded orthographic and pictorial view and sketching.</p> <p>6. Route sheet preparation.</p>	<p>Full-size rods of the job, pattern or boards, scale and detailed drawing to conform with joinery and furniture produced with correct form of cutting lists.</p> <p>Differentiate between a rod and route sheet by making them on board. Selection of materials, consideration must be given to design and safety in all forms of machine exercise.</p>
3. Draw and sketch exploded orthographic		

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<p>and pictorial view and working drawing and prepare route sheets for the production of joinery and furniture items.</p>		
<p>7.0 Narrow Band Saw</p> <ol style="list-style-type: none"> 1. Identify and explain the parts and working principles of narrow band saw, safety precautions, method of straining the saw blade and principles involved. 2. Set up and use the machine for various operations, jigs, calculate the length of the blades, braze or butt weld the blades and perform routine service of the narrow band sawing machine. 	<ol style="list-style-type: none"> 1. Narrow band saw machine. <ul style="list-style-type: none"> - functions, the materials and uses of each of the part. <p>Ensure that wheels are clean. Both top and bottom wheels are covered before operation.</p> 2. Application of safety precaution e.g. isolate power before fixing the saw blades. 3. Straining of the saw blade. 4. Care of wheels, guides and guard, adjustment for efficient and safe working condition, making and setting of temporary fences. 5. Mounting of saw blade and tracking, setting of guides and guard. 6. Production of simple jigs. 	<p>Care of wheels and guide adjustment for efficient and safe working.</p> <p>Use of jigs.</p> <p>Exercise of sawings to straight lines and simple curves marked from item plate.</p> <p>Demonstration of safe operation of the machine.</p>

FUNDAMENTALS OF MACHINE WOODWORK II (C.M.W. – 13)

Topic / Objective	Contents	Activities / Remarks
<p>1.0 The Mortising Machine</p> <p>1. State and describe the working principles, layout, types of job each machine cutter performs and type of clamping devices.</p> <p>2. Install, set up cutters, for mortising operations, safety and operational precautions related to the use of the machine.</p> <p>3. Grind and sharpen mortise chisels and chains.</p>	<p>1. Working principles of a mortising machine.</p> <p>2. Types of cutters: (i) Hallow chisels. (ii) Chain cutter, method of driving single head and combined chain, pitch of chains, correct combination of sprocket wheel, guide and chain for accurate work.</p> <p>3. Different sizes of chisels. Use of stop bars for repetitive work.</p> <p>4. Grinding and sharpening of chisels.</p>	<p>Safety instruction.</p> <p>Fitting and using chisels, correct mortising procedure and chisel maintenance. Making of jigs for repetitive work. Practice in the use of various pitches of chains, carrying out mortising operation.</p> <p>Emphasize safe working rules and adjustment of cutting tools.</p>
<p>2.0 Tenoning Machine</p> <p>1. Explain the working principles of cutter blocks, state the types of job of each cutter, the spur cutters and state the relationship of tenoning – to mortising.</p> <p>2. Apply safety and operational precaution.</p> <p>3. Set up machine to produce tenons, backing piece, sharpen and cut off and balancing cutters.</p>	<p>1. Single-end tenoning machine. - Mount cutter on the machine. - Split tapered cutter block. - Circular cutter block. - Scribing cutter block. Spur cutters and its functions. Set vertical and horizontal adjustment. Setting of head and accurate set ups.</p> <p>2. Produce template for setting tenoning cutter.</p> <p>3. Shape of scribing cutter for moulding operation. Trenching square tenoning. Forked tenon and comb joints. - produce jig for safe and accurate production of angle tenon. Sharpening and setting saw. - purpose of balancing of cutters, oiling, lubrication and cleaning periodically.</p>	<p>Setting for tenons, square and stopped – shoulders, single and double scribes. Cutter making. Use of cut off saw. Saw and tenon cutter. Sharpening: Use of backing the fences for square.</p> <p>Method of trenching. Edge moulding and joints. Exercises on square tenoning. Make templates. Mortise and tenon joints on the machines. Set scribing cutter to produce mould. Instructions on safety and use of machine.</p> <p>Design the jig. Apply backing piece and stops fence.</p>

Topic / Objective	Contents	Activities / Remarks
		<p>Grind tenon, cutter scribing and spur cutters to the required profile.</p> <p>Put the cutters into the balancing machine, cleaning, oiling etc.</p>
<p>3.0 The Boring, Machine</p> <p>1. State the principles of boring machine. Identify major components, explain the scope of operation and safety precautions.</p> <p>2. Choose the suitable bits mount and remove it, mark out the work pieces with simple jigs and fixtures.</p> <p>3. Set the machine for various boring, sharpen bits, and replace worn belts and routine services.</p>	<p>1. Principles of operations of boring machine.</p> <p>2. Major components e.g. motor, chuck, spindle, pulleys, table, leverage clamping device etc.</p> <p>3. Selecting the bits in chuck. Check the work, make patterns, jigs and fixtures single and double hole.</p> <p>4. Maintenance.</p>	<p>Demonstrate the operations of the boring machine.</p> <p>Check the power before switch-on. Check the correct bits for sizes.</p> <p>Make simple jigs and fixtures.</p> <p>Carry out boring operation to given specification.</p>
<p>2. Apply safety precautions, adjust the work-table to working height and explain the working principles.</p> <p>4. Describe and explain main features of a dust extractors and safety operational techniques.</p> <p>4. Perform the routine service of sanding machines.</p>	<p>3. Apply the belt to the face of the job using hand pad, travelling pressure pad, spiral contact mechanism, features etc.</p> <p>4. State functions: floating pressure rollers, drum etc, dust extractors with the factory regulations.</p>	<p>Select the grade of sand paper for each drum, fit for sand paper on the drum.</p> <p>- observe safety regulations.</p> <p>- undertake service, oiling, cleaning etc.</p>

221 – CARPENTRY AND JOINERY (CC 11, 12, 13 & 14)

S/N	Topic/Objective	Contents	Activities/Remark
1.	<p>Hand Tools</p> <p>1. Describe two types of hand tools used in Carpentry and Joinery</p> <p>2. List various portable electric powered tools and their uses; prepare timber to sizes using the hand and portable tools.</p> <p>3. Explain safety precautions and use various wood items of the tools.</p> <p>4. Sharpen saws, planes and chisels cutters to a give angles.</p>	<p>1. Types of hand tools e.g. Hammers, saw, planes, chisels etc.</p> <p>2. Use of the hand tools in Carpentry and joinery e.g. planing saws, drillings etc.</p> <p>3. Portable electric hand tools e.g. power supply-handling selection of jobs, care and maintenance earthing and safety practices.</p> <p>4. Manual Hand Tools. – Planes, - jack planes-smoothing planes, trying planes, rebate, grooving, router, combination plane, shoulder, bullnose, spokeshave etc</p> <p>5. Saws – rip saws, tenon, dovetail, keyhole, compass, bow saw.</p> <p>6. chisels – firmer, paring mortise, gauges etc.</p> <p>7. Pneumatic tools nailers, staples, screw drivers etc.</p> <p>8. Impelling tools – hammers, screw drivers, gimlet, punches.</p> <p>9. Boring tools – brace ratchet brace, drill, hand drills, twist drills, and other drilling, bits bradawl gimlets etc.</p> <p>10. Cramping tools, sash cramps. G cramps, bench hold fast, vice, hand screw.</p> <p>11. Potable electric powder tools.</p> <p style="padding-left: 20px;">a. Cross cut saw</p> <p style="padding-left: 20px;">b. The portable drill</p> <p style="padding-left: 20px;">c. The planer</p> <p style="padding-left: 20px;">d. The portable jig saw</p> <p style="padding-left: 20px;">e. The router.</p> <p>Uses and maintenance of above listed tools.</p> <p>12. Use of manual hand tools to prepare timber to sizes.</p> <p>13. Use portable electric power tools to prepare timber to definite sizes.</p> <p>14. Safety precautions in relation in relation to the use of each of the tools e.g.</p>	<p>Discuss safety and maintenance. Apply both the manual hand tools and portable electric hand tools to perform simple tasks in Carpentry and Joinery.</p> <p>Classify hand tools into groups.</p> <p>Treat each of the portable electric tools commonly used in carpentry and joinery by naming the parts, uses, maintenance and safety regulations in relation to each of them.</p> <p>The safety precautions and regulations in relations to each of the machines should be emphasized.</p> <p>Learn how to dismantle and assemble tools that have removable parts.</p> <p>Learn adjustment of parts and cutters, practice the use of manual hand tools and portable electric powered tools to prepare timber to definite sizes.</p> <p>Study the safety regulations, manufacturer’s specifications and regulations as it relates to each of the tools under consideration.</p> <p>Inspect all portable electric powered machines for proper earthing and fusing before use.</p>

S/N	Topic/Objective	Contents	Activities/Remark
		<ul style="list-style-type: none"> a. Keeping all sharp edged tools away b. Earthing of all electric tools. c. Use of fuse to check overflow of current into the equipment. Study the manufacturer specifications and regulations. <p>15. Uses and application of various manual hand tools and uses and application of electric powered tools to make items. Selection from the following:</p> <ul style="list-style-type: none"> a. Oil stone box b. Bench hook c. Mitre box/block d. Straight edges e. Shooting boards f. Trinket g. Dest tidy h. Pencil and open box i. Stool <p>16. Maintenance: e.g. sharpening, storage of wood working tools, manual and electric powered</p> <p>17. Grinding and sharpening angles in plane cutters and chisel</p> <p>18. Use the grinding and sharpening stones in maintenance of hand tools cutters.</p> <p>19. The use of oil stone and files in sharpening saws of various types.</p>	<p>Use the various manual hand tools and the portable electric powered tools to make selected wood items e.g bench hook, Mitre box/block, Straight edges, Shooting boards, Trinket box, stool e.tc.</p> <p>Carry out grinding and sharpening of plane cutters, & chisels maintaining the recommended grinding-angles. Sharpen plane cutter and chisels on oilstone and oil ships maintaining the sharpening angles. Select appropriate files to sharpen saws of various types. Carry out regular maintenance on portable electric powered machines.</p>
2	<p>Wood Joint</p> <ul style="list-style-type: none"> 1. Explain the basic requirements of wood joint, classify the joints and state their applications 2. Construct and apply the joints by using hand 	<ul style="list-style-type: none"> 1. Basic requirement of a good wood joints e.g. <ul style="list-style-type: none"> a. Rigidity b. Structural stability, c. Ease of construction d. Good fitting parts e. Use of glue to increase strength of joint 2. Classification of joints e.g. <ul style="list-style-type: none"> i. widening: butt, dowel, slot 	<p>Discuss the basic requirements of a good wood joint in terms of rigidity, structural stability, ease of construction good fitting parts and use of glue to increase strength of joints.</p>

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	and machine tools in the construction of joinery furniture	screw, tongue and groove and loose tongue ii. Angle/framing:- mortise and tenon joint, dowel, half lap, bridle joint. iii. Carcase joint: dovetail, butt and housing joint.	
3	Carcase Construction 1. Describe and sketch joints used in carcase construction and construct the various joints 2. Explain the merits and demerits and sketch alternative details of treatment to drawer construction joints. 3. Sketch methods of supporting cabinet and drawer, describe the plinth and produce various joinery and carpentry items.	1. Application of each type of joint in carpentry and joinery work e.g. Tenon, dovetails mortise etc. 2. Application if the construction of joinery furniture e.g. boxes, pictures, cupboard/door frames stools. 3. Carcase construction e.g. bookcase, free standing wardrobes and kitchen units 4. Sketches and applications of the joints e.g. a. Dovetails – through lap secret b. Butt and nailed c. Tonque and grooved d. Secret nailed 5. Construction of various joints: dovetails, butt and nailed, tongue and grooved using manual and machine tools. 6. Merits and demerits of using dovetails joint e.g. a. traditional/customary construction b. mass production 7. Other methods of joining drawer fronts to eliminate end grain e.g. end grain of drawer sides to trenches made on the inside of the drawer fronts, dovetailed housing between side and the drawer fronts. Veneering was applied to drawers fronts and cabinets. 8. Methods of supporting shelves in a cabinet e.g. rails. 9. Methods of supporting drawers in	<ul style="list-style-type: none"> - Use machine or hand tools construct all joints listed above where applicable - Apply the joints to construct joinery furniture such as boxes, pictures, cupboard/doors frames stools. - Give examples of construction in carpentry and joinery which fall under this classification e.g. book cases, free standing wardrobes, kitchen units, cupboards filing cabinets etc. - Make sketches of dovetail joints: Make sketches of but and nailed joints. - Make sketches of tongued and grooved joints. - Show where each type of joint is applied in carcase construction. - Using appropriate and machine tools construct through, lap and secret dovetails, but the and nailed joints,

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		cabinet:-fillets, guides etc. 10. a. Construction of carcass e.g. cabinet with drawers, shelves and a plinth. b. Construction of pelmets: e.g. box like construction.	tongued and grooved joints. - Sketch housing joints between drawer sides and drawer fronts. - Sketch dovetailed housing joint between the side and drawer front. - Sketch a method of applying vincer to drawer fronts and as a decorative feature in a cabinet. - Sketch the various methods of supporting shelves and drawer in a cabinet - Construct a wooden cabinet with drawers shelves and a plinth. - Construct other box like items like pelmets ready for installation
4	Materials used in Joinery and Carpentry 1. Describe the source of timber and its products. 2. Explain the main differences in structure and name species of wood classification.	The source of timber: a. Forest:- locally from trees grown in the forests in the Southern States. b. Imports from Ghana, Cameroon etc. The main differences in structure are: soft wood and hard wood e.g. - Botanical classification. - Shape of leaves, fruits, - Cells, vessels and pores - Parenchyma. c. Wood classified: two classes hard and soft wood, e.g. softwood, pine etc, hardwood:- Obeche, Mahogany, Walnut, Iroko, Apa, Opepe etc.	- List trees that grow in the forests. - Identity the trees, by names. - Show with sketches, the structures of hard and soft wood - Sample timber and study their characteristic, hardwood and softwood timber. - Classification of wood: softwood and hardwood. - Study locations of soft woods in

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			different parts of the world.
5	<p>Conversion</p> <ol style="list-style-type: none"> 1. Define conversions, explains the purpose and describe the various methods in use. 2. Explain the main characteristics and methods of timber conversion and list the standard sizes. 	<p>Conversion: Breaking of log into sizes</p> <p>The purpose:</p> <ol style="list-style-type: none"> a. obtain correct size of timber for use b. ease of seasoning c. ease of transportation d. marketing <p>Methods of conversion:</p> <ol style="list-style-type: none"> a. Rift sawing/quarter sawing b. Slab sawing/through and through sawing. c. Back or tangential sawing. <p>The characteristics and effect on their strength, aesthetics and stability.</p> <ol style="list-style-type: none"> a. shrinkage, b. cup effect c. ring effect on the stability d. reduce in sizes e. wearing. <p>Standard sizes of timber:</p> <ol style="list-style-type: none"> a. 25 x 150mm b. 50 x 300mm c. 50 x 75mm d. 100 x 300mm e. 50 x 100mm f. 50 x 150mm g. 50 x 300mm h. 75 x 300mm <ul style="list-style-type: none"> - Purling, 50 x 50mm - Ceiling joist 75 x 100mm and - Rafter 50 150mm 	<ul style="list-style-type: none"> - Show with sketches, methods of conversion. - Test for strength, wearing and rate of shrinkage, in converted timber. <p>Visit the marketing or shipping department of the sawmill.</p>
6	<p>Seasoning</p> <ol style="list-style-type: none"> 1. Define seasoning. 2. List the basic types of seasoning and describe the processes. 3. Explain the defects in seasoning and state how they 	<p>Types of Seasoning</p> <ol style="list-style-type: none"> a. Natural/air seasoning b. Kiln/artificial seasoning c. Chemical seasoning <p>The process of seasoning:</p> <ol style="list-style-type: none"> a. Stacking in an open shed b. Stacking in kiln c. Use chemical in the cell <p>The defects:</p> <ol style="list-style-type: none"> a. Collapse b. Case-hardening c. End and surface checks. 	<p>The prevention:</p> <ol style="list-style-type: none"> a. Allow air to circulate b. Chemical etc. <p>Explanation of natural and kiln seasoning, advantages of each method.</p> <p>Visit a well organized sawmill sketches and label the parts, stickers, air spaces, protection. Keep the site clean.</p>

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	can be avoided.	To avoid defects: a. Painting the ends b. Air circulation should be regulated etc.	
7.	Moisture Content Define moisture content and the content in timber and state the use for joinery items	Moisture content (MC): c. The water in cells. d. Percentage of content remains in cells. Determination of M.C. a. $\frac{W1 - W2}{W2} \times 100\%$ W1 = Wet Weight W2 = Dry Weight b. an electric moisture meter Moisture content for i. Internal Joinery ii. External joinery	Cut green timber weigh it and record it. Dry it in an oven, weigh it again and record. Use the formula to determine the moisture content. Use electric meter to determine (M.C.) of the timber. Sketch the effect of moisture content in timber
8.	Wood Destroying Agents Describe and explain common wood destroying agent, cause of fungus growth and its effect in timber and environment.	1. Wood destroying agents a. Fungi-dry and wet b. Insect-borers 2. The growth a. Life cycle of wood from eggs etc. 3. Causes of: a. Dampness, b. Stagnant air warmth and sap etc. 4. The effects in timber a. Reduce the strength b. Change the colour	Show the sample of timber attacked by fungi and, conditions for fungi growth and spread. Timber affected and causes in fungi growth. Treat with chemicals Floors in contact with affected timbers must be thoroughly washed and treated with chemicals.
9.	Timber Products 1. Name and identify wood product and how the boards are manufactured. 2. Explain and describe advantages and disadvantages of boards. 3. Describe methods of jointing the	Wood products e.g. a. Plywood b. Laminboard c. Block board d. Chipboard e. Hardboard Specific applications are: a. Market sizes b. Structure c. Properties etc. Manufacturing: Chips, veneers, glue and dry Advantages of: 1. reduction in labour, 2. Stability	Present sample of each types of boards. Types of timber used for the core or the type of adhesive. Practice on the Lipping edge joints and veneering.

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	board.	3. Decorative 4. Less weight Disadvantages of: a. less-holding screw power b. weather instability Methods of jointing: a. Right angles and edges b. Lipping edges i. Metal i. Hardwood strip and ii. Veneers	
10	Wood Veneers 1. Describe the production of veneer, edge-glue and explain application of veneer and adhesives 2. Select appropriate adhesive for veneering	Wood veneer methods: a. Slicing b. Rotary c. Sawing Edge-glue: pieces of veneers, tapeless, splicer machine. a. Animal glues b. Evo-stick/contact adhesives Veneer surfaces e.g. a. Cheap wood b. Edges of plywood c. Laminboard d. Chipboards Cure glue-line 1. Veneer iron 2. radio frequency	
11	Veneer Describe veneer and its purposes and identify two main types:	Veneer: thin sheet: The purpose: a. proving beautiful, b. expensive surface on cheap wood c. protective surface Two types: A. wood veneer B. plastic/laminates	Show the students examples of veneers and their purposes.
12	Plastic Laminate/Veneers 1. Describe the uses, examples of jobs and identify various types	Plastic/laminates: uses i. Covering surfaces ii. Decoration. The purposes: - Maintain cleanliness – Wearers. Types of jobs e.g. counter tops, kitchen cabinets, homes and office	Discuss the purpose and the use of laminated plastic. Identify each types of laminated plastic, different conditions and their resistance to wear

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	<p>of plastics laminate.</p> <p>2. Identify various types, the composition of adhesives, merits and demerits of plastic laminate</p>	<p>furniture etc.</p> <p>Types of plastic laminates</p> <ol style="list-style-type: none"> i. Decorative, ii. Hardness types etc. <p>Composition and properties: e.g. resistance to wear, burn, stains etc. merits over standard wood:</p> <ul style="list-style-type: none"> - easy to clean. <p>Demerit: it can break</p> <p>Man-made wood product: e.g. fir stability, wider uninterrupted and regular surface.</p>	<p>burns, stains, acid attack, impact, force etc.</p> <p>Treat each case as describe for lipping.</p>
13	<p>Adhesives</p> <p>1. Identify the various types of adhesives and describe their properties.</p> <p>2. Describe the use of glue spreader, illustrate with sketches how a properly framed joint can be glued.</p> <p>3. Define and explain thermoplastic and thermosetting.</p> <p>4. Describe two method of curing glue lines.</p>	<ol style="list-style-type: none"> 1. Principles of adhesives. 2. Types of adhesives, e.g. animal glue, urea formaldehyde, polyvinyl acetate, etc. 3. classification of adhesive into two broad classes and properties of each type of adhesive. 4. Job for which each type is most adaptable: Interior joining. 5. Comparison of all the types of adhesives e.g. cost, availability, safety, durability, water resistance etc. 6. Use of glue spreader and its advantages e.g. mass production board. 7. Thickness or width covering. 8. Types of adhesive terms - Shelf life, pot life 9. Properties of thermosetting adhesives: heat curing, hardness resistance. 10. properties of thermosetting adhesives: soften heat 11. Differences and characteristics that make each type useable under certain situations, curing and soften. <p>Gluing in traditional method and electronic ratio frequency equipment.</p>	<ol style="list-style-type: none"> 1. Show how adhesive develop little fingerlike holding compound, which hold two surface together.. 2. Identify the various types of adhesives by name and use. Classify the various types of adhesives according to their moisture resistance qualities. 3. Those used for interior work and those used for exterior work. 4. Visit the glue spreader used by the manufacturers of man-made boards e.g. AT&P and Sapele Ape Ply wood – Lagos etc. 5. Make tight fit joints and others that are not so tight fit. Apply glue to them and test for strength. 6. Read the various directions on

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			<p>different adhesives as laid out by their manufacturer's. Prepare and apply the adhesives to materials and study the results.</p> <p>7. Visit factories where mass productions of materials are made where glued materials are required for delivery within a short time. e.g. gluing of manufactured boards.</p> <p>8. Gluing joints and in small construction where space will allow jobs to stay for some time before they are used or shipped.</p>					
14	<p>Estimating and Costing</p> <p>1. Interpret joinery and carpentry drawing and differentiate between costing and estimating.</p> <p>2. Make a cutting list and explain the types</p> <p>3. Calculate the quantity of all materials, define the component of an estimate and describe unit cost. Explain the importance of control and</p>	<p>1. Making and interpretation of rods and route sheets involving carpentry and joinery projects</p> <p>2. Writing and reading of specification e.g.</p> <ol style="list-style-type: none"> i. Estimating ii. Costing iii. Differences between the two iv. Process of estimating v. Process of costing vi. Format for making a cutting list vii. Making a cutting list of joinery item. <table border="1" style="margin-left: 40px;"> <tr> <td>Part No</td> <td>Name Part</td> <td>Number</td> <td>Saw size LW T</td> <td>Finish RM Ks LW T</td> </tr> </table>	Part No	Name Part	Number	Saw size LW T	Finish RM Ks LW T	<ul style="list-style-type: none"> - Make simple rods and route sheets involving carpentry and joinery projects. - Interpret already made rods - Write specifications on simple projects - Interpret specification prepared for simple project - Using the correct format make a cutting list of a joinery item. Calculate the quantities of materials required for joinery item. - Apply unit cost to
Part No	Name Part	Number	Saw size LW T	Finish RM Ks LW T				

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	write specification for joinery items	<div style="border: 1px solid black; width: 100px; height: 15px; margin-bottom: 5px;"></div> Nominal, undressed or saw size. 3. Calculation of quantity materials required for a job e.g. wood, transportation, labour cost, overhead, profit An estimate in terms of materials: labour cost, overhead and profit. Unit cost; e.g. door, window Costing of simple joinery items: parts, labour and job. Cost control as it affects the business and the client: importance, money and value, sizes and types of job. Writing of specification which should include <ol style="list-style-type: none"> a. sizes of items b. timber type and size of sections. c. Type of joints for connecting the various parts d. Finishing painting, polishing, varnishing, e.g. mortise and tenons 	joinery items e.g. skirting per meter run, paneling per M2, polishing per M2 cost a simple joinery item - Write specifications for basic joinery items which must touch on timber type and sizes of sections, sizes of items, types of points connecting the parts and finishing.
15.0	Frame Construction 1. Define frame, explain the principles of design, sketch the joints and assemble the simple joints. 2. Explain the purpose of moulding and differentiated between Greek and Roman mouldings. 3. Make Greek and Roman mouldings by hand and	1. Definition of frame: two sides, one top and bottom. 2. Basic principles of frame design taking into accounts e.g. <ol style="list-style-type: none"> a. functionality b. structural ability c. aesthetics value 3. Joints used for making a standard frame e.g. <ol style="list-style-type: none"> a. butt and nailed b. housing and joint c. mortise and tenon d. dowel joint 4. Keeping frames stable e.g. sketch the frames, square-ness by cross braching, letting a panel into a groove, rebate or hauled to the face(s) of frame. The purpose of mouldings and rebate on door members and frames: holding	- Make neat and clear sketches of joints used in frame construction e.g. butted and nailed and nailed, housed and nailed, mortise and tenon and dowel joint. - Make and assemble simple frames using any of the joints discussed above. - With hand and machine tools make Greeks and Roman mouldings.

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	machine tools	the door, decorations etc Types of moulding e.g. i. Greek moulding (planted moulding) ii. Roman mouldings (solid moulding)	
16.0	Door Sizes List standard sizes of external and internal doors	Machines use for moulding: 1. Standard sizes of door – internal and external 1950mm x 750mm 2025mm x 825mm 2025mm x 900mm 210mm x 900mm 2. Names of the parts and sizes of a door frame Head – 100mm x 50mm Jambs –100mm x 50mm 3. Rod for a standard door frames 4. A bill of quantities of materials	<ul style="list-style-type: none"> - rebate and mould frame members. - Study (The standard sizes of internal and external doors) - Special purpose doors. E.g. double margin and entrance doors to public buildings may have bigger size than those stated above. Make a rod of route sheets for the construction of a door frame. - make a bill or quantities of materials need for the frame. - Prepare a cutting list. Make a standard door frame rebated and moulded ready for a paneled door using any of these mouldings or a combinations of them, chamfer, cavelto and ovolo. - Traditional construction technique and mass production of component parts to be employed. - Discuss paneled doors plywood or fielded and raised,

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			<p>glazed panels and hush paneled doors.</p> <ul style="list-style-type: none"> - Draw a five paneled door and name its parts. - Give sizes of (a) Stiles, (b) Bottom rail, (c) Meddle rail (d) Frieze top and intermediate rails, - Treat a five paneled door with plywood panel (i) solid wood raised and fielded (ii) Glass panels (iii) Treat the door with mouldings stuck or planted on the edges of members. - Construct (a) raised and fielded panel (b) beadfulsh and beadbut panel suitable for a paneled door. - Draw detailed working drawing of a paneled door with five raise fielded panel finished with bolecion mould. - Make a rod/rout sheet for a five paneled door. - Prepare a cutting list for the door. - Produce a five paneled door using hand and machine tools as appropriate. - The door frame must be produced full size. - Produce half blazed paneled door. - Sketch methods of:

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			<ul style="list-style-type: none"> a. having joint between glazing bass b. joining the diminished gun-stock stile. c. Joint between top rail and stile for glass panels
17.0	Door Frame Name the parts and sizes of doorframe and make a rod or route. Sheets bill of materials and produce a standard door frame rebated and moulded	1. Construction of a standard door frames rebated and moulded ready for a paneled door <ul style="list-style-type: none"> a. chamfer b. cavelto c. ovolo d. combination of mouldings 	
18.0	Paneled door 1. Define door, describe three types of paneled door and name the components and state their conventional sizes. 2. Sketch types of joints	1. Definition and functions of a door: e.g. security 2. Description of types of paneled doors, plywood or fielded and raised, glazed panels and flush paneled doors. 3. A five paneled door with plywood/solid wood panel or glass panel with moulding stuck or planted to edge of members. The conventional sizes: Stiles: Ex 50 x 100mm Bottom Rail: Ex (50x220)mm Freeze top and intermediate Rail: (50 x 100)mm Plywood/solid panel, moulding stuck to edge of members or planted. 4. Construction of (a) raised and fielded panel (b) bead-flush and beadbut panels suitable for a paneled door. Working drawing of a paneled door with five raised and fielded panel finished with bolection	

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		<p>mould e.g. butt panel flush door.</p> <p>Rod/route sheets for a five paneled door drawing and working sheets.</p> <p>Cutting list for the door e.g. numbers sizes and remarks.</p> <p>Using hand and machine tools as appropriate the production of a five paneled door.</p> <p>Methods of fixing mouldings in paneled door rails and stiles.</p> <p>Diminished gun stock.</p> <p>5. Production of half blazed or fully blazed door e.g. glazing brass, gun stock stile, top rail and stiles</p>	
19.	<p>Flushed Paneled Doors</p> <ol style="list-style-type: none"> 1. Name the components of a flush paneled doors and describe the types and methods of joining the rails to stiles and make the joints. 2. explain the basic principles and purposes of stress-skin and describe the methods of spreading adhesives. 3. Sketch a flush door press and explain methods of curing glue lines. 4. Explain the 	<ol style="list-style-type: none"> 1. Components and sizes of parts of a flush panel door stiles – 32 x 75 – 100mm rails 32 x 75mm 2. Description of methods and types of joints used in joining the rails to stiles e.g. <ol style="list-style-type: none"> i. corrugated fastener ii. dowel joints etc. 3. construction of joints between rails and stiles, The basic principle and purpose: <ol style="list-style-type: none"> a. the stress skin construction. Application: manually hand and by machine. 4. Manually operated flush door press e.g. hydraulic/air operated flush door press. Sketches of both types of press. e.g. hand machine and hydraulic, air purpose. 5. construction of full size flush paneled door ready for fixing on the site. 6. The purposes: <ol style="list-style-type: none"> a. Treat as in lipping b. Edging strip in manufactured 	<ul style="list-style-type: none"> - Study the components and conventional sizes of flush paneled doors - Make joints between stiles and rails as applied to flushed doors e.g. mortise tenon, corrugated fasteners and the use of dowels. - Give a clear description of how to apply adhesive to a flush door frame manually and by the use of machines. - Sketch a hydraulic/air operated press and name its parts and state its mode of operation. - Make full-size flush paneled doors ready for fixing on site. - Sketch details of

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	<p>purpose of edging strip and produce full size flush paneled doors</p> <p>5. paneled doors with sketch details of the provision mode for a mortise lock in flush door</p>	<p>board</p> <p>7. Details edging strip and stile of a flush door.</p> <p>2. Details e.g.</p> <p>a. Fixing block to the stiles to increase their width</p> <p>b. Increasing the width of the frame stiles ex. 100mm</p> <p>9. Finishing: e.g. paint, varnish to the door</p>	<p>edging strip and stile of a flush door.</p> <p>- Apply finishing like paint or varnish to the door made ready for hanging to a frame.</p>
20.0	<p>Batten Doors.</p> <p>1. Describe and state the common types of batten door withdraw line diagrams.</p> <p>2. Explain the mechanics of the brace as a structured member and describe the methods of bracing</p> <p>3. Sketch the joints used for constructing the frame and construct the joint between the stile and rails.</p>	<p>1. Types of batten doors e.g. ledged and battened door</p> <p>2. Ledged, battened and braced doors.</p> <p>3. Framed, ledged. And braced doors</p> <p>4. Frame. Ledged, braced and battened doors</p> <p>5. Where each of them can be used</p> <p>6. Mechanics of the Brace</p> <p>7. Line diagrams of the various doors.</p> <p>8. Names of the parts: Stiles, rails, medium. Functions of the parts: e.g. structural holding etc</p> <p>9. Importance of the brace in a batten door; Support and stability</p> <p>10. The two methods of bracing a batten door e.g. Lipping/batten Crossing batten</p> <p>11. Joints used for constructing the frame components of batten doors. Top rail and stile middle/bottom rail and stile e.g. mortised and Tenons etc.</p>	<p>- Draw line diagram of the various doors, label the parts and discuss the functions of each parts</p> <p>- Emphasize their suitability as garage and ware house doors.</p>
21	<p>Window</p> <p>1. Explain the purposes and state the standard sizes of window in a building.</p>	<p>1. Function of a window e.g. security, ventilation and light. Standard size of windows.</p> <p>2. Window frame – cill, jamb, head transome, mullion e.g. (1,200 x 750 mm)</p> <p>3. Window sash – stile, top and bottom rail, glazing bars.</p>	

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		Louvre window –frame and blades (glass/wooden). (1000 –2000mm).	
22	<p>Casement Windows</p> <ol style="list-style-type: none"> 1. Sketch outline of a casement window and draw full size details of its various parts 2. Explain the importance of weathering and sketch the joints 3. State the purpose of throating under the projecting parts of the transome and cill and select the timber of casement construction and produce it 	<p>Outline of a casement window its parts and their function: Stiles, rails, cill, frame.</p> <p>Full size details of various parts of the window e.g. cill and bottom rail, jamb and stile, top rail and transome/head, stile and mullion.</p> <p>Importance of weather Weathering off sun, rain and etc.</p> <p>Light: stability Cill Transome of window/frames.</p> <p>The joints between</p> <ol style="list-style-type: none"> a. top/bottom and stile of a sash b. intersecting bars in a sash c. transome and jamb d. jamb and cill e. jamb and head <p>Allowance given for rebated and moulded sections to fit together - scribing, mitring inter-sections of mouldings</p> <p>The purpose: Throating and capillary gooves as a means of weathering.</p> <p>Characteristics and properties of timber suitable for casement window construction, e.g. economic, light and resistance.</p> <p>Production of a casement windows e.g. hand and machine.</p>	<ul style="list-style-type: none"> - On the rod or route sheets draw full size details of the various parts of a window, especially the cill and bottom rail, jamb and stile, top rail and transome/head, stile and mullion. - Treat weathering as it relates to the cill and transoms window frames. - Sketch the joints between: <ol style="list-style-type: none"> a. top/bottom and stile of a sash b. intersecting bars in a sash c. transome and jamb d. jamb and cill e. jamb and head - Show the use of scribing and/or miltres at intersection of moulding. Emphasis should be on Nigerian timbers. - By hand and machine processes produce a casement window ready for installation.
23	<p>Louvre Window</p> <ol style="list-style-type: none"> 1. Define louver and state their purposes and types of louver wooden and glass 2. Draw/sketch 	<ol style="list-style-type: none"> 1. Definition of louver, and set of glass. Purpose of louvers:- wooden glass 2. Vertical sections through rectangular wooden frame <ol style="list-style-type: none"> a. wooden louver blades recessed into the frame, carried on steel louver frame. 	<p>Draw/sketch vertical sections through a rectangular wooden frame showing the arrangements of:</p> <ol style="list-style-type: none"> a. wooden louver blades recessed into the frame, carried on steel louver frame.

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	<p>vertical sections of rectangular wooden frame and produce louvre window for a toilet window ready for fixing</p> <p>3. Develop true shape of louver blades and trenches.</p> <p>4. Sketch joints in the three louvers, produce triangular louver window and describe methods of furnishing.</p>	<p>b. Glass louver blades carried by steel louver frames and installed on the wooden frame.</p> <p>3. Construction of a rectangular wood louver window. Development of true shape louver blades and trenches for a triangular louver frame.</p> <p>Produce template for making out.</p> <p>4. Joints used for jointing the three corners of the frame.</p> <p>5. Construction of a triangular wood louver window ready for installation using hand and machine tools.</p> <p>6. Methods of finishing windows e.g. painting - types and application.</p>	<p>b. Glass louver blades carried by steel louver frames and installed on the wooden frame.</p> <ul style="list-style-type: none"> - Make a rectangular wood louver window ready for fixing to a toilet window. - Development of true shape louver blades and trenches for a triangular louver frame. <p>Produce template for making out as appropriate.</p> <ul style="list-style-type: none"> - Sketch joint used for joining the three corners of the frame using continuous and weathered cill - Using hand and machine tools produce a triangular louver window ready for installation.
24	<p>Window Lining Explain the purpose of lining and architrave in a window, select suitable Nigerian timber for casing and sketch joints in produce, lining, plain and paneled</p>	<p>1. Purchase of lining and architrave in a window – support</p> <p>2. Nigerian timbers suitable for wood casing: Opepe, Mahogany etc</p> <p>3. Joints between lining and frame, head and sides of the lining e.g. boltion joints, frame – mortise, sides – tenons Linnings plain and paneled ready for installation on site.</p>	<ul style="list-style-type: none"> - Make sketches of joints used between lining and frame head and sides of lining. - Make lining – plain and/ paneled ready for installation on site
25	<p>Architrave Explain purpose of an architrave in door and windows openings, sketch it and produce section of architrave.</p>	<p>1. Architrave and their purpose in door and windows openings, e.g. decoration. Suitable sections of architraves:</p> <ul style="list-style-type: none"> a. plain timber strip b. moulded – using solid or planted moulds or 	<ul style="list-style-type: none"> - Make sketches of suitable section of architrave – plain timber strip, moulded strip, moulded Roman or Greek strip collection moulding.

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		<p>Production of sections of architrave</p> <ol style="list-style-type: none"> i. hand ii. machine methods 	<p>Architrave can also be found in plastics and metal</p> <ul style="list-style-type: none"> - Produce sections of architrave in item. - Using hand and machine tools. - Discuss mass production methods in joinery
26	<p>Plinth Block Explain the purpose of plinth block. Show with sketches the difference of architrave and plinth block</p>	<ol style="list-style-type: none"> 1. Plinth block and its purposes. <ol style="list-style-type: none"> i. take the foot of the architrave ii. ends of shirting board. 2. sketches o sections of architraves and plinth block 3. Joint between architrave of architraves and plinth block e.g. dovetails. 4. Joint between skirting board and plinth block e.g. housing and dovetails 	<ul style="list-style-type: none"> - Explain a plinth block and its purposes - take foot of the architrave - take ends of shirting board. - With the aid of sketches describes: sections of architrave sections of plinth block joint between architrave and plinth block joints between shirting board and plinth block.
27.	<p>Wall Paneling</p> <ol style="list-style-type: none"> 1. Explain the purpose of wall paneling describe two basic topic and define the terms 2. Select suitable timbers design, draw and write the specification for a Dado wall panel. 3. Estimate the cost of panel per square 	<ol style="list-style-type: none"> 1. Purpose of wall paneling. <ol style="list-style-type: none"> i. decorating ii. beautiful/aesthetics iii. warmth in cold weather 2. The two basic types of wall paneling: <ol style="list-style-type: none"> a. Dado (b) $\frac{3}{4}$ paneling. 3. Definition of terms used in wall paneling : <ol style="list-style-type: none"> a. Dado paneling b. Full – height of c. Three-quarter or frieze rail paneling d. Skirting e. Dado rail 	<ul style="list-style-type: none"> - Design a dado wall panel - Draw a dado wall panel - Write a specifications for a dado wall panel. - Estimate the cost of the panel per square meter. - With hand and machine tools produce a dado wall panel with fielded and raised panel finished with bolecion mouldings ready for installation..

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	meter and produce a dado wall panel	f. Cover mould g. Grounds h. Plaster 4. Suitable Nigerian timbers for wall, paneling, e.g. Sapele mahogany, Abura, Lagos mahogany e.t.c. 5. The characteristics of the various timbers, colours 6. Application of those timber in wall paneling – using hand tools and machinery 7. Dado wall panel: – Design panel – Drawing to details – Specifications of sizes. Estimate for the wall panel, labour materials etc. A dado wall panel with fielded and raised panels finished with bolection mouldings ready for installation.	
28.	Door and Window with shaped Head in Single curvature 1. Describe shapes of head of doors and windows, determine the joint lines and produce templates, requisite sections and the frames with shaped head by jointing the various compounds of the frame	1. Shapes of heads of doors and windows e.g. segmental, semi-circular and elliptical . Setting out on rod - semi circular or a door or window 2. Joint lines in the curvature and between the jamb/sill and curved head, hammer head joint, mortise and tenon. 3. Templates for the shaped head: - use of curve templates 4. A bill of materials to make the head 5. Use of hammer:- headed key joint, handrail bolt and dowel joint in making the requisite sections of the frame/window using both hand and machine methods for a. hammer header key b. handrail bolt	- Set out a rod a semicircular or semi-elliptical head of a window or door in a single curvature. - Determine the joint liners in the curvature and between the jamb/sill and curved head. - Treat single or double hammer joints, key joints etc. - Develop true shape of the curved shape. - Prepare templates from the developed shape. - Write out a bill of materials to make the head. - By hand and/or

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		<p>c. dowel joint</p> <p>6. Jointing the various components to produce the shaped head e.g. France bar, transome.</p>	<p>machine tools produce requisite sections of the frame/window head using hammer headed key joint, handrail bolt and dowel joint.</p> <p>- Joint the various components of the frame to produce the frame with shaped head ready for fixing.</p>
29.	<p>Gate and Garage Doors Gates</p> <p>1. Explain the difference between a standard door and a gate sketch designs of typical gates and produce it.</p> <p>2. State the conventional sizes, sketch designs of wood garage and construct a half glazed garage door</p> <p>3. Finish door for painting and for hanging.</p>	<p>1. Difference between a gate and a door e.g. sizes, designs and uses.</p> <p>2. Designs of typical gates to private and public buildings/premises.</p> <p>3. Construction of gates suitable for:</p> <p>a. a private premises</p> <p>b. an industrial/public premises.</p> <p>4. Ironmongery suitable for hanging the gates. E.g. hinges, locks, etc.</p> <p>5. Conventional sizes of a standard garage door: 2.10m x 2.10.</p> <p>6. Designs of wooden garage doors: e.g.</p> <p>a. all framed, glazed and braced door, or</p> <p>b. half glazed door with tongue and groove or plywood panel below.</p> <p>7. Construction of a half glazed garage door with a panel: match board.</p> <p>8. Painting: Finishing of garage door ready for painting and hanging by using paints and hinges.</p>	<p>With the aid of sketches design typical gates to private and public buildings.</p> <p>Make gates suitable for:</p> <p>a. private premises</p> <p>b. industrial/public premises</p> <p>fix suitable iron-mongery for hanging the gates.</p> <p>Finish the gates ready for hanging.</p> <p>- sand papering</p> <p>- painting</p> <p>Discuss the conventional size of a standard garage doors.</p> <p>a. all framed glazed and braced door; or</p> <p>b. half glazed door with tongue and groove or plywood panel below with hand and machine tools, construct a half glazed garage door with a panel of match board below finish door ready for painting and hanging.</p>
30.	Pre-Fabrication	1. Prefabricated timber buildings.	- Discuss prefabricated

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	<p>Building:</p> <ol style="list-style-type: none"> 1. Explain, state and describe pre-fabrication, the principles of construction and typical application. 2. List various organization, select Nigerian timbers and design sections of a typical site hut. 	<ol style="list-style-type: none"> 2. Examples of prefabricated construction: wood, metal, transportation, erect and construction <ol style="list-style-type: none"> a. Modular to facilitate transportation and ease of handling. b. Erect any size of structure by building up with more fabricated units. c. Construction under controlled. Conditions and supervision, which improves quality control. <p>Basic principles of prefabricated construction in terms of transportation and ease of handling, ease of erecting any size of buildings, construction under controlled conditions etc.</p> 3. Application of pre-fabricated buildings in Nigerian e.g. units, parts, components. 4. Objectives for using timber buildings: reducing cost, e.g. easy to erect. 5. Organization producing timber pre-fabricated component e.g. A.T. & P etc. 6. Nigerian timbers suitable for pre-fabricated timber components:- Iroko, Mahogany, Manila. 7. Their treatment against insect attack and fire e.g. use chemicals. 8. modular units of prefabricated timber panel suitable for a typical site hut or porter's lodge: size of panels, doors, windows ease of erection etc. 	<p>construction as it relates to timber buildings. Give example of prefabricated construction.</p> <ul style="list-style-type: none"> - Discuss the basic principles of prefabricated construction. - Explain how the modular system facilitates transportation and ease of handling, facilitates erection of any size of building and how construction of the units are made under controlled conditions. - Describe typical application of prefabricated buildings in Nigeria and also discuss the objectives for using timber building. - Treat timber against insect fungi attack and fire. - Design typical prefabricated timber units in modular sections suitable for a site hut or a porters lodge.
31.	<p>Estimate Cost of Production for the Panels</p> <p>Produce prefabricated timber components</p>	<ol style="list-style-type: none"> 1. Estimate for the production of the panels e.g. specifications for the panels, cost, etc 2. Production of pre-fabricated timber components to given specification e.g. trial erection 	<ul style="list-style-type: none"> - Using hand and machine tools produce pre-fabricated timber components to given specifications. - Make trial erection of

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	to given specifications and explain methods of quality control.	<p>components.</p> <p>3. Finishing prefabricated.</p> <p>4. Methods of quality control an standard of production. (1). Using housing point. (2) angles</p>	<p>the components.</p> <p>Finish the components ready for installation.</p>
32.	<p>Stairs and Hand-railing</p> <p>1. State the purpose of stair, explain the factors and select Nigerian/West African timber suitable for stair construction.</p> <p>2. Describe with line diagrams the common types of stair explain the term. The functions.</p> <p>3. Design and draw details of a straight flight with adosed string open risers.</p> <p>4. Produce template, work out string and other components.</p> <p>5. Assemble stairs and install a wooden stairs, prepare and fix wooden thread, riser and string in a building with suitable ironmongery.</p> <p>6. Sketch details</p>	<p>1. Purpose of a stair in building – landing – moving up and down.</p> <p>2. Factors that determine the location of a stair in a building</p> <p>3. Nigerian and other West African timbers e.g. Iroko, Mahogany, Opepe suitable for their construction.</p> <p>4. Types of stair using line diagrams e/g/ straight fight, dogleg, open newel etc.</p> <p>5. Terms used in stair construction: Rise and going of (a) step (b) a stair headroom, flight and pitch.</p> <p>6. Functions of the various parts of a stairs, (a) trade, (b) riser, (c) baluster, (d) balustrade, (e) handrail. (f) newel, (g) landing, (h) step –tapered, bullnosed, ordinary etc.</p> <p>7. Design standards of various components of stir in accordance with the Building Regulations/code.</p> <p>8. Explain the various components of stair in accordance with building/regulations e.g</p> <p>a. rise and going of a step</p> <p>b. riser and tread relationship</p> <p>c. headroom</p> <p>d. width of stair for domestic and Public Building.</p> <p>e. Width of landing</p> <p>f. Sizes of the component parts e.g. (i) string, (ii) hand rail, (iii) tread (iv) risers etc.</p> <p>9. Straight night stair – design and drawing of details – closed string and open riser.</p> <p>10. Templates for making out housing</p>	<p>- With line diagrams describe the following types of stair:</p> <p>a. straight flight,</p> <p>b. doge leg</p> <p>c. open newel.</p> <p>d. geometrical/spiral.</p> <p>- discuss the special features of each types.</p> <p>- With the aid of sketches and diagrams explain the rise and going of a step and a stair headroom, flight and pitch.</p> <p>- With the aid of sketches illustrate the terms used and names of parts of a stair.</p> <p>- With the help of sketches, discuss the design standards for various components of a stair in accordance with Building Regulations and Building Code.</p> <p>a. rise and going of a step</p> <p>b. riser/tread relationship</p> <p>c. headroom</p> <p>d. Width of stair for domestic and public building.</p> <p>e. Width of landing</p> <p>f. Sizes of the component parts e.g. handrail, string</p>

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	<p>of handrail and balusters and their relationship with string, newel, step and landing.</p> <p>7. Prepare handrail, balusters, fix in position and join hand rails</p>	<p>for treads and risers in a closed string and open riser stairs</p> <p>11. Use of steel in stair construction</p> <ul style="list-style-type: none"> - use of templates - closed strings - open risers - cut strings <p>12. Making recess using manual processes and wood working machines.</p> <p>13. Recess stair strings to take treads and riser using (a) manual process (b) woodworking machines</p> <ul style="list-style-type: none"> (i) the spindle moulder (ii) the high speed router <p>14. Preparation of treads, riser, wedges and other components of the stair ready for assembly</p> <p>15. Assembly of all the components of stair</p> <p>16. Ironmongery used in stair construction. Installation of a wooden stair in a building using suitable ironmongery.</p> <p>17. Use of wooden tread riser and string as a facing to a concrete stair.</p> <p>Preparation and fixing of wooden treads risers and strings to a concrete stair.</p> <p>18. Handrails – height fixing to balusters/balustrade, its relationship with strings, newel step and landing.</p>	<p>tread, riser etc.</p> <ul style="list-style-type: none"> - Design a straight flight stair in relation to total rise and total going. (b) size of step i.e. tread and riser relationship, (c) use of storey rod. - Draw details of a straight flight stair taking into consideration building regulations as it applies to size of members. - Making full-size drawings from which templates for marking out housing for treads and risers can be produced. - Make the necessary templates demonstrate the use of steel square in marking our strings. - Cut trenches and other recess in strings to receive risers and treads using manual and machine processes – spindle moulder, high speed router. - Prepare treads, risers wedges and other components ready for assembly. - Assemble all the components of the stair - Use suitable iron mongery to install a stair in a building. - Prepare grounds in the concrete to receive treads, risers and strings. - Prepare wooden treads,

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			<p>risers and string fix them to the concrete stair as a facting. With the aid of sketches illustrate the details of handrails and balusters/balustrade of their relationship with string, newel step and landing.</p> <p>- Prepare handrails prepare balusters, fix handrails and balusters in position.</p>
33.	<p>Furniture for Public and Domestic Building.</p> <p>1. Explain the basic characteristics of furniture design and state the basic design requirement for furniture in public building.</p> <p>2. design an sketch furniture items and explain the principles and estimate and cost a job involving furniture items.</p>	<p>1. Basic characteristics of furniture design for public and domestic building.</p> <p>2. Basic design requirement for furniture in public building e.g. (a) study to withstand wear. (b) comfortable to sit guests (c) heavily decorated.</p> <p>3. Sketches of details furniture for public and domestic buildings. Specifications for the furniture ironmongery use in such furniture e.g. church, chairs etc., reading tables.</p> <p>4. interchangeability of component parts in joinery/furniture.</p> <p style="text-align: center;">Application of interchangeability to the production of joinery/furniture.</p> <p>5. Estimate of a job involving furniture items listed above.</p> <p>6. Production of various items of joinery furniture selected from those involving car case and frame construction.</p>	<p>Design simple furniture for:- public and domestic buildings such as writing tables with drawers dining, kitchen table, chest of drawers for storage, church furniture, library furniture and reading table and chairs.</p> <p>Draw some of the above listed types of furniture.</p> <p>Sketch the details of some parts of the prepared specifications for the furniture and discuss the iron mongery used in making such furniture.</p> <p>Work out an estimate for a job involving furniture items listed above.</p> <p>Cost a job involving furniture items listed above.</p> <p>Design draw and produce</p>

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			various items of furniture selected from those involving car-case and frame construction ready for installation.
34.	<p>Hoarding</p> <ol style="list-style-type: none"> Describe the purpose, identify types and names the parts of a hoarding in building and their functions. Describe the various materials used for hoarding construction and explain the basic factors. Select appropriate hoarding for the job putting and calculate its materials, construct, erect and dismantle, apply all safety precautions and town planning laws 	<ol style="list-style-type: none"> Definition of hoarding, the purpose, building site and other sites. Construction/site hoarding and general purposes. Materials used for hoarding construction e.g. timber, steel and steel sheets, plywood and other boards. Factors to be considered in the design of general hoarding in terms of structural stability, protection of the public pedestrians and motorists during site construction and/or other hazards appearance and economics. <p>The hoarding for a specific job. Consider design, rigidity, etc. materials suitable for hoarding etc.</p> <p>The specifications of the hoarding. The quantities of materials needed and estimate for them. The construction of erection of hoarding.</p>	<p>With the aid of sketches name the parts of a hoarding and state their functions.</p> <ul style="list-style-type: none"> - Design an appropriate hoarding for a specific job taking into consideration rigidity etc. - Prepare a specification for the hoarding. Work out the quantity of materials needed. - Estimate the cost of the materials - Apply safety precautions - Apply town planning laws.
35.	<p>Centres</p> <ol style="list-style-type: none"> Define and explain the purpose of an arch in building and set out geometrical profile. Explain basic factors 	<ol style="list-style-type: none"> Definition of an arch, purpose of an arch in building and Civil Engineering construction (a) aesthetic and (b) support a load in place of beam The geometrical profiles: (a) turning piece/flat arch (b) segmental arch (c) semi-circular arch (d) elliptical arch (e) gothic arch. The basic factors: 	<ul style="list-style-type: none"> - Demonstrate the geometrical setting out of the profiles of the following centers: <ul style="list-style-type: none"> (a) turning piece/flat (b) segmental arch (c) semicircular arch (d) elliptical arch (e) gothic arch

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	<p>influencing the design of wooden and name parts of arch center and their functions.</p> <p>3. Explain the purposes of open and closed lagging, explain how the ribs of center and design and construct center.</p> <p>4. Erect, ease and strike centers and apply safety precaution in construction</p>	<p>Basic factors, the design of wooden centers for various arches – achieving the desired geometrical shape of the arch, rigid to be able to carry the weight of building units forming the arch until set, economic to construct and erect and strip.</p> <p>4. Parts of an arch center.</p> <p>5. Functions of the various parts.</p> <p>6. Nigerian and West African timber e.g. Opepe, Mahogany etc. The use of open laggings Ribs of centers: shape for the span</p> <p>7. Erection of centers, erasing of centers and sticking of center</p> <p>8. Safety precautions applied to arch construction in accordance with building regulations.</p>	<ul style="list-style-type: none"> - Security precautions in construction erection and stripping should be emphasized. - Name the various parts of an arch with the aid of sketches and samples of arches. - Erect centers ease centers, strike centers when arch is set. - Discuss in detail and apply relevant safety precautions in the construction, erection and striking of centres
36.	<p>Timbering to Trenches</p> <p>1. Define and describe timbering to trenches and shoring, describe the type of soil depth design simple timbering to trenches and shoring.</p> <p>2. Explain the functions of the various parts of the timbering and select local timbers in normal water logged soil.</p> <p>3. Apply safety precautions as</p>	<p>1. The definition of timbering to trenches, description of timbering and shoring to trenches and the purpose timbering e.g. trenches.</p> <p>2. Types of soil: water logged, soil lump etc. Maximum safe depths to which different types of soil may be cut into without timbering.</p> <p>3. The function of the various parts of the timbering. Shoring to trenches and shoring.</p> <p>4. Nigerian and West African timbers suitable for shoring. Use of steel pipes and poles in conjunction with timber for timbering to trenches patent timbering equipment: steel sheets flat or corrugated, hydraulic and adjustable pipes and poles etc.</p> <p>5. Timbering to trenches in normal water logged soils.</p> <p>6. safety precaution and requirements of building</p>	

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	necessary during construction and erection of timbering	regulation/code as applied to shoring to trenches.	
37.	Shoring 1. Define shore and shoring in building and civil engineering construction. 2. Describe types of shoring and select materials, apply the principles of design to produce shoring structures	1. Definition of shore and shoring in building and civil engineering works. 2. Types of shoring in common use dead, raking and flying. 3. Names of parts and it's functions, specific application of the shores in alteration and maintenance works. 4. The materials used e.g. steel, timber, iron mongery and size of materials used. 5. Design of shoring structures: (a) the support of upper wall when converting a window to an entrance to a departmental store. (b) Preventing temporarily a building work from falling on to a public thorough fare/street. 6. Erection of the shores, easing, striking and safety precautions s applicable to various types of shoring.	<ul style="list-style-type: none"> - Practice timbering shoring to trenches in normal and water logged soils. - Discuss safety precautions and building regulations/code as applied to shoring to trenches. - Professionalism in shoring/timbering to trenches - With the aid of sketches, label the parts and members used. - Discuss the functions of the various parts. - Discuss the specific applications of the shores in alteration and maintenance work. - Apply the basic principles - To design a dead shoring system to raking shore system to design a flying shore system. - Construct and erect of the above shoring - Apply the method of tightening and casting the shores. - Strike the shore.
38.	Formwork 1. Define and	1. Definition of formwork and the purposes of formwork in building	

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	<p>explain formwork and its terms. State its purpose in building construction</p> <p>2. State the general requirement of formwork.</p> <p>3. state common types of forms.</p>	<p>and civil engineering work.</p> <p>2. Terms used in formwork construction: in-situ-precast stripping. Striking setting/set, cure, mould.</p> <p>3. General requirements of formwork. Shape or concrete structure required.</p> <ul style="list-style-type: none"> - shape of concrete structure required. - Rigidity and structural stability - Ease of erection and stripping - Built up formwork boards should be sufficiently light to prevent loss of finished materials from the concrete. 	
39.	<p>Timber for Formwork</p> <p>1. Identify and state the characteristics of Nigerian timber. State the sizes and explain the difference between plywood and form ply.</p> <p>2. sketch/draw details of formwork construction and state the effect of liquid concrete on forms.</p> <p>3. Explain the merit and demerits of using steel of timber forms and describe methods of treating the</p>	<p>1. The common types of forms timber and steel and merits and demerits reuse and stability.</p> <p>2. Timber used in formwork: Abura, Afara, Obeche, and the characteristics of the Nigeria timbers used.</p> <p>3. sizes of various timber components used in formwork Beams. Beam bottom, floor, slabs, joist, props, head , tree, ledger/ribbon. Beam bottom – 25 – 150mm Floor slabs - 25 - 50mm Joist - 50 - 150mm</p> <p>4. Differences between plywood and formply.</p> <p>5. Details of formwork construction for beam, floor and roof slab, lintel</p> <p>6. Wall concrete, straight flight stair and landing, site concrete, column square, circular, tapered footing/foundation base and balconies</p> <p>7. Effect of liquid concrete on forms weak for the effect of liquid concrete on forms the construction of formwork.</p>	<ul style="list-style-type: none"> - Apply the necessary safety precautions. - Identify Nigerian timber – abura, Afara, Obeche etc. used for formwork - Treat the sizes of various timber components used in formwork Beams. Beam bottom floor slab, joist props head tree ledge/ribbon. - Explain the characteristics of formly, which make it suitable for formwork and compare it to ordinary plywood. - Emphasis skills - Construct forms for the concrete items. - Erect the forms. - Ease and strip the forms. - State the length of time forms should remain after pouring

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	<p>interior of forms.</p> <p>4. Construct erect and strip form for various concrete items.</p> <p>5. Determine how long concrete forms should remain after pouring liquid concrete before form is stripped and state the basic factors.</p>	<p>8. Comparison of steel forms to timber forms.</p> <p>9. Lining the interior with paper to prevent forms from sticking to concrete. Coating the interior of form with soap or form oil for the same purpose.</p> <p>10. construction of forms for concrete items. Erection and easting and stripping of the forms.</p> <p>11. The length of time concrete forms should remain after pouring liquid concrete before form is striped e.g. beam soffits removal of props to slab and props to beams.</p>	<p>liquid concrete before form is stripped e.g. beam sides, wall and columns, slabs, beam, soffits removal of props to slab and props to beams.</p>
40.	<p>Pre-cast</p> <p>1. Explain and list the difference in the preparation of forms in-site and pre-cast concrete and sizes of mould.</p> <p>2. Make detailed sketch/scaled drawing of moulds and construct and strip mould for the pre-cast concrete items</p>	<p>1. Factors affecting the stripping time:</p> <ol style="list-style-type: none"> type of cement type of structure mix of concrete re-use of forms on large building site. <p>2. Preparation of forms for in-site concrete and pre-cast concrete.</p> <p>3. The components and their sizes of moulds for pre-cast items.</p> <p>4. Details sketches sealed drawings for lintels. Windows sill cornice mould soak away and septic tanks. Fence posts and circular ring etc.</p> <p>5. Detailed sketches sealed drawings of provisions for stripping, built up true shape of the pre-cast unit and example of a gang mould for producing several units of the same types.</p> <p>6. The construction and stripping of mould for pre-cast concrete items.</p>	<ul style="list-style-type: none"> - Draw to scale and make details sketch of moulds for pre-cast concreted items like lintel window sill cornice mould cover slab for manhole soak away and septic tanks fence posts and circular ring etc. - Draw to scale and make detailed drawings of provisions for stripping. Built up true shape of the pre-cast unit and example of a gang mould for producing several units of the same types. - Construct mould for the pre-cast concrete items. - Strip mould for the pre-cast items.
41.	<p>Support to Workmen and</p>	<p>1. The purpose of scaffold e.g. support to workmen and materials</p>	<ul style="list-style-type: none"> - Safety regulations as it relates to

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	<p>Materials above Ground Level Scaffolding</p> <ol style="list-style-type: none"> 1. Explain the purposes of scaffold and state their requirements, the parts and their functions. 2. Differentiate between scaffolds and state its uses and the factors in the structure design. 3. construct, erect wooden and metal scaffolds and maintain it. 4. Explain the merits and demerits and determine the sizes of scaffolds board. 	<p>above ground level and support to structures during construction or alteration..</p> <ol style="list-style-type: none"> 2. Basic Requirements of a good scaffold as it relates to structural rigidity and safety for workmen. 3. the main parts of a scaffold ledger, bracer standard, guide rail, toe, rail platform coupler etc. 4. The difference between dependent scaffold and independent scaffold. Use of independent scaffold 5. Factors to be considered e.g. moving, dead and lateral load to be carried, rigidity and stability through triangulation and correct sizes of members. Construction and/or erection of wooden for heights up to 6m. 6. Maintenance of scaffolds in good working conditions. 7. the advantages and disadvantages of <ol style="list-style-type: none"> (1) Wooden scaffolds (2) Metal scaffolds 3. The scaffold boards width and, thickness of wooden platform, and tender. 4. maximum and minimum projection of board over the ledger in accordance with current safety regulations. 	<p>scaffolding should be emphasized.</p> <ul style="list-style-type: none"> - With illustrated description, name the main parts of the scaffold e.g. ledger, braces, standard, guide rail, toe rail, platform, coupler etc. - State their sizes. - Discuss the functions of each part. - Construct and/or erect wooden and metal scaffolds for heights up to 6m. - Determine the width and thickness of wooden platform and tender.
42.	<p>Ladder and Step</p> <ol style="list-style-type: none"> 1. Determine and state the purpose of ladder step, and the sizes. 2. Construct step and ladder in timber and apply all safety regulations. 3. State the difference 	<ol style="list-style-type: none"> 1. The purpose of ladder and steps, e.g movement etc. 2. The sizes of timber used for step and ladder e.g. 200mm, 250mm. 3. Suitable Nigerian timber for the construction of step ladder e.g. Mahogany etc. 4. The safety regulations in the use of ladder, and steps; pitching of ladder, trying of the head and foot a stakes putting foot of the ladder on sand bag or a sole plate and maximum overhang of plate form 	<ul style="list-style-type: none"> - Select a suitable Nigerian timber for the construction of a step and ladder. - Use the selected Nigerian timber to construct a step and ladder. - Sketch details of a timber gantry - Determine sizes of members used in timber gantry.

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	<p>between timber gantry and scaffold, with sketches.</p> <p>4. Determine the sizes of timber used in constructing of erecting timber gantry.</p> <p>5. State and apply all current safety regulations in all erection, maintenance and use of timber gantry.</p>	<p>plank.</p> <p>5. The difference between timer gantry and scaffold.</p> <p>6. size of member used in timber gantry</p> <p>7. Construction of timber gantry e.g. sizes, erection of timber gantry on construction site.</p> <p>8. Safety regulations in the erection, maintenance and use of timber gantry</p>	<p>Construct and erect timber gantry on construction site.</p> <p>- Discuss safety regulations as it applies to</p> <ol style="list-style-type: none"> erection of timber gantry maintenance of timber gantry and use of timber gantry.
43.	<p>Timber Floor Construction</p> <p>1. Explain and classify purpose of floor into grounds and upper floor into single, double and frame and state their applications.</p> <p>2. Sketch line diagrams of four types and describe the applications</p> <p>3. Explain floor joists and determine the sizes of floor joists calculation.</p> <p>4. Select Nigerian timber used for floor construction</p>	<p>1. The purposes: Floors/Plat forms ground floors and characteristics, sizes and areas.</p> <p>2. Upper floor sand its main characteristics – resistance</p> <p>3. the classification of upper floors single, double and framed.</p> <p>4. Application of each type e.g. angles.</p> <p>5. line diagram of four types of floor cill, joist, grades etc. members of each type of floor.</p> <p>6. Functions of each member subholding etc.</p> <p>7. The floor joists in simple supported beams with points and evenly distributed loads.</p> <p>Sizes of</p> <ol style="list-style-type: none"> $W = \frac{IBD^2C}{L}$ $(\frac{L}{2} + 2)M$ <p>8. Nigerian and West African timbers used for floor construction. E.g. Iroko, Afara, etc: The characteristics – treatment of the</p>	<p>- Make line diagrams of the four types of floors.</p> <p>- Identify the members by names</p> <p>- State the functions of each member.</p> <p>- Treat floor joists as simply supported beams with points and evenly distributed loads.</p> <p>- Using the formulae $W = \frac{IBD^2C}{L}$ Where W = breaking weight at the center of the beam in kg. B = breadth of the center of the beam in mm C= constant for the types of timber used. D = depth of the beam. L = span of the beam in mm . $(\frac{L}{2} + 2)M$</p>

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	<p>and design, using line diagrams.</p> <p>5. Describe the purposes methods and applications of damp proofing and ventilation suspended ground floor construction.</p> <p>6. Describe methods of supporting joist in floor and platforms.</p> <p>7. Describe the various hand tools and power tools used in floor construction, lay floor joists for it</p> <p>8. Explain the purposes of strutting in upper floors</p> <p>9. Describe the common types of strutting fixing and trimming floor openings.</p> <p>10. Describe types, explain their difference and describe two methods of laying t and 9 sub-floor.</p>	<p>timber – colour, strength, against fire and wood destroyed agents: insect, fungi, chemical etc.</p> <p>9. Line diagrams of:</p> <ol style="list-style-type: none"> a. suspended ground floor b. upper floors of 3-8m span. <p>10. Details of various parts of the floor.</p> <p>11. Purposes of damp-proofing and ventilating suspended ground floor.</p> <p>12. Methods of damp-proofing and ventilating suspended ground floor.</p> <p>13. Application damp proof.</p> <p>14. Ground floor construction</p> <p>15. Preservation of timber to avoid wood destroying agents e.g. insects, dry and wet rot etc.</p> <p>16. Methods of supporting joists in floors and platforms e.g. – sleeper walls, corbels, piers wall brackets/etc.</p> <p>17. Hand and powered tools used for floor construction.</p> <p>18. Laying of joists for floors and platforms.</p> <p>19. The purposes of strutting in upper floors</p> <p>20. The solid strutting in upper floors. E.g. Herringbone, strutting in upper floors.</p> <ul style="list-style-type: none"> - Lay floor joists for floor/platforms designed in 1.8. above - Models should be full size - With the aid of sketches describe solid and herringbone strutting. <p>21. Fixing of struts to floor/platform.</p> <p>22. Trimming of floor openings to stairs trap doors etc.</p> <p>23. Methods of jointing between trimmer, trimmed and trimming joists.</p>	<p>2</p> <p>where L = span of the opening beam in metres.</p> <ul style="list-style-type: none"> - Identify Nigerian and West African timbers used for floor construction. - Using line diagrams design suspended ground floor upper floors of 3 –8m span. Sketch details of various parts of the floor - Preserve timber against wood destroying agents insect dry and wet rot etc. <p>Fix struts to floor/platform</p> <ul style="list-style-type: none"> - Demonstrate how floor openings are formed. - Make the necessary joints between the trimmed, trimmer and trimming joists. - Sketch the use of joist hangers.

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		<p>24. Types of floor covering – floorboards, strip flooring on sub floor.</p> <p>25. The purposes: Purpose of a sub floor.</p> <p>26. Difference between a sub floor and a normal wooden floor.</p> <p>27. Two methods of laying t and g sub floor:</p> <ol style="list-style-type: none"> a. normal at right angle across the joist.. b. diagonally across the joists. c. Preference between the two method. d. Reasons for the preference. <p>28. Fixing of boards to joists and/or sub-floor.</p> <p>29. Finishing of floor board ready for polishing.</p> <p>30. Application of varnish/polish and PVC tiles as a finishing to flooring.</p> <p>31. Composition of PVC tiles varnish/polish bathrooms and kitchen.</p> <ul style="list-style-type: none"> - Varnish/polish bathrooms and kitchen. - Fix floor finished to joists and/or sub-floor. - Finish flooring ready for polishing. - Apply suitable finish to flooring etc. varnish/polish and PVC tiles <p>32. The characteristics of adhesives used for laying wood block flooring to wooden or concrete sub-floor.</p> <p>33. Methods used in fitting joists two strips floor boards and cramps.</p> <p>34. Finishing of wood block and strip floor.</p> <ol style="list-style-type: none"> a. brushing b. spraying. <p>35. Costing of the flooring of a typical project including cost of materials, area of flooring labour and overheads</p>	

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		<p>Sketch details of wood strip flooring and wood block flooring on a concrete floor. Show details of fixing the materials. Cost the flooring of a typical project in terms of cost of materials, area of flooring, labour and overheads.</p>	
44.	<p>Timber Roofs and Ceiling</p> <ol style="list-style-type: none"> 1. Explain the purpose, basic requirements and structurally wind and roof covering materials load. 2. Define the terms, sketch, the profile, the functions of the parts of timber roof. 3. State the factors to determine slope, sizes of members, the species of local timbers for roofing using geometrical methods. 4. Determine by graphical methods of stress, draw details to show two methods and construct the roof. 	<ol style="list-style-type: none"> 1. The purpose of a roof in a building. Covering from rain, aesthetics functionality. 2. Basic requirements of a roof design and construction: sizes, slopes, span, ridge, etc. 3. The term roof covering, material, load, aesthetics to enhance the architectural features of a building and functionality. 4. Definition of terms: e.g. span, pitch, rafter strut, tie beams rise, ridge, wall plate, eaves fascia. 5. Profile of lean – to- roof, flat roof and pitched roof trusses. 6. The names of the various component parts. 7. Functions of the following parts of a timber roof, rafter, pullins, fascia board, wall plate, struts, tie beam/ceiling joist wall plates. 8. The basic factors: e.g. slope of the roof, the design of the structural frame-work of the roof the method of construction and erection. 9. Species of Nigerian and West Africa Timbers used for roofing boards etc. 10. Treatment of the timber against wood destroying agents. 11. Geometrical methods of determining the true length and levels of each member of a roof truss. 12. Methods of determining true shape of roof spans. 13. Determining of dihedral angle, 	<ul style="list-style-type: none"> - It should also be discussed how structural stability, aesthetics enhance the architectural features of a building and functionality come into play in designing and construction of a roof. - Name of the various component parts - Taking span, the calculated load and species of timber used into consideration determine the sizes of the members of a roof truss. - Carry out exercises on: <ul style="list-style-type: none"> i. Determination of true length and levels of each member of a roof truss using geometrical and workshop method. ii. determining true shape of roof. iii. Determination of dihedral angle. - Using graphical methods

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		<p>slope, length, level rafters, purlin etc.</p> <p>14. Graphical method of determining the stresses on each member of a roof truss. E.g compressive or tensile.</p> <p>15. Types of stress on the members – compressive or tensile.</p> <p>16. Methods of securing e.g.</p> <ol style="list-style-type: none"> a. wall plates b. corrugated iron sheets c. corrugated asbestos sheets and concrete tiles d. and concrete tiles <p>17. The characteristic e.g. support the various materials</p>	<p>determine the stress on each member of a roof truss.</p> <ul style="list-style-type: none"> - By the same method determine the stress on each member – compressive or tensile. - Draw details of two methods of securing wall plate to block wall. - Construct and erect roof trusses to support corrugated iron sheets, corrugated asbestos sheets, and concrete tiles. - Explain the main characteristic of roof trusses to support the materials to ensure safety.
45.	<p>Ceiling</p> <ol style="list-style-type: none"> 1. Describe the types of ceiling and draw line diagrams. 2. State factors that determine the structural arrangement with sketch details of members. 3. Describe the various materials timbers used for construction covering ceilings: 	<ol style="list-style-type: none"> 1. Common types of ceiling used for domestic construction: nogging, plane etc. 2. Line diagrams e.g. ceiling joints and noggings. 3. The factors: e.g. members and sizes of the room. 4. Nigerian timbers for constructing the structural frame work for a ceiling e.g. Afara. 5. Methods of preservation against wood destroying agents. 6. Materials for covering ceiling e.g. soft board, hardboard, asbestos sheets, plywood and metal slates. 	<ul style="list-style-type: none"> - Show line diagrams showing arrangements of ceiling joints and noggings. - Make sketch of details of the arrangement of members for the ceiling at the eaves. - Construct a ceiling and install covering and battens as finishing

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	4. Trim opening in a ceiling		
46.	Steel Square 1. Name the parts of the square, read the rafter tables, and mark out an octagon. 2. Explain the terms used in steel square and apply the theorem of Pythagoras to the steel square. 3. Solve simple problem and determine, using the square, the true length and levels of members, angle and intersecting surfaces.	1. Part of steel – the blade and the tongue. 2. Rafter table contained in the square 3. Application of the tables in determining the length of rafter. 4. The use of steel square for marking out polygons 5. Terms used in steel square construction e.g. rise and run. 6. Pythagoras theorem as it applies to the steel square. <ul style="list-style-type: none"> - The use of steel square to determine the structure length and levels of common rafters, hip rafters inclined struta etc. <p>Using the steel square, determine the dihedral angle of two inclined and intersecting surface</p>	<ul style="list-style-type: none"> - Study the rafter tables in determining the length of rafters. - Study the use of steel square for marking out polygons and mark out on octagons. Using the theorem of Pythagoras solve simple problem relating to the sides of triangle. - Using the steel square determine the true length and levels of members of a timber structure e.g. common rafter struct e.g. foot of a trestle etc. - Using the steel square to determine the dihedral angle of two inclined and intersecting surfaces.
47.	Wood Partitional and Screens 1. Explain the difference between a partition and screen and state their requirements. 2. State their functions and select timbers and other materials for it. 3. explain the	1. Difference between screen and partition 2. The basic requirements of a good partition e.g structural stability, aesthetics, ease of fixing and removal when necessary. 3. The functions, cill, head noggings, sheeting/facing panel, brace/struct in partition construction. 4. Suitable timbers use in the construction of partitions e.g. Mahogany, Walnut, Omo etc. 5. Methods of framing various parts of a partition together e.g. Jointing railing etc. 6. Function of a face panel on a	<ul style="list-style-type: none"> - Identify suitable timber and other material used for partition construction such as Abura, Afara, Mahogany plywood, hardboard. Etc. - Make working drawings of partitions. Interpret working drawing of partitions - Make sketches of partitions - Write simple

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	<p>functions of a face panel on a partition and state the purposes of insulation in a partition.</p> <p>4. Make and interpret working drawing/sketches details of methods of framing parts.</p> <p>5. Describe the materials used and construct and fix stud partition.</p> <p>6. Trim door, window and others opening and finish the partition.</p> <p>7. Sketch various types of screens construct the screen and finish it.</p>	<p>partition</p> <p>i. decoration</p> <p>ii. beautiful</p> <p>7. Purpose of insulation in a partition e.g.</p> <p>i. replacement</p> <p>ii. workable</p> <p>8. Material used for insulating partitions ply wood. Etc.</p> <p>- characteristics, application, durability, stability, tensile, nailing, jointing, screwing.</p> <p>The fix stud and construction: Trimming of doors, window and other openings. Hanging of doors and windows.</p> <p>9. Finishing polishing or painting</p> <p>10. The paneled – raise and flush – screen louvered screens, Free standing screens, Glazed screens.</p> <p>11. Construction of any of the screen e.g. Framing etc.</p> <p>12. Finishings to screens and installation e.g. polishing, painting and lacquering etc.</p>	<p>specifications of partitions.</p> <p>- Make detailed sketches of methods of framing various parts of partition together.</p> <p>- With hand and machine tools construct and fix stud partition. Use hand and powered tools.</p> <p>1. Trim doors and windows and other openings in the partition.</p> <p>2. Hang doors and windows as appropriate.</p> <p>- With appropriate tools and materials finish the partition ready for polishing or painting</p> <p>- Make sketch of the following types of screens.</p> <p>- Paneled raised and flush Louvered, Free standing, Glazed</p> <p>- Using appropriate tools and materials Give appropriate finishing to the screen and install the screen.</p>
48.	Installation of Joinery and Carpentry Items.	<p>1. Reading drawing. blue Print and pre-fabricated purpose made Joinery and Carpentry.</p> <p>2. Location of where the items</p>	<p>- Select appropriate tools and equipment use for installation and fixing of joinery</p>

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	<ol style="list-style-type: none"> 1. Read drawing. blue Print and specification of pre-fabricated Joinery and Carpentry items. 2. Explain the principles of modular construction and their application and describe various iron mongery items. 3. Describe the various methods of fixing woodwork items to brick, block wall. 4. Select, describe and install with appropriate hand tools and equipment use for installation on site. 5. Apply safety precautions. 	<p>will be installed.</p> <ol style="list-style-type: none"> 3. Principles of modular construction 4. Application of modular construction in pre-fabricated Joinery and Carpentry items. 5. Ironmongery items used for fixing joinery and carpentry items to brick wall such as plugs, pellets, rag bolts etc. 6. Methods of fixing woodwork items to brick/block wall, hollow partition and steel. 7. Preparation of grounds. 8. Selection of appropriate tools and equipment use for installation and fixing of joinery and carpentry items. 9. Description of the tools e.g. hammer, machines. 10. Installation and finishing to the following joinery items on site <ol style="list-style-type: none"> a. sliding doors. b. Screen c. Kitchen units. d. Counter and kiosks, and kitchen shelves e. Staircase and handrail, f. Built-in wardrobes g. Joist for a wooden floor/platform h. Picture rails i. Insulation materials. 5. Safety precautions as applied to installation of joinery and carpentry items on site e.g. <ol style="list-style-type: none"> a. fire b. accident etc 	<p>and carpentry.</p> <ul style="list-style-type: none"> - Describe the tools e.g. hammer, screw driver, portable power tools etc. - Using appropriate tools install and finish the following joinery items on site. <ol style="list-style-type: none"> a. Door and window frames b. Sliding doors. c. Wall panels flush or frame d. Screen e. Counter and kitchen shelves f. Staircase and handrail, g. Built-in wardrobes h. Hang doors and sashes and install louvers. i. Joist for a wooden floor/platform j. Picture rails k. Insulation materials. - Apply appropriate safety precautions while undertaking the installation of joinery and carpentry items building e.g. site office, a guards hut.
49.	<p>Timber Building</p> <ol style="list-style-type: none"> 1. Explain the basic principles of design of timber building, 	<ol style="list-style-type: none"> 1. Differences between temporary semi permanent and permanent buildings and examples of each types. 2. The basic principles of design of timber building 	<ul style="list-style-type: none"> - Identify species and sizes of timbers suitable for timber buildings. - Identify other materials used timbers products

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	<p>difference between platform and batton construction.</p> <p>2. Select sizes and species of timber and other materials used for timber building materials</p> <p>3. Prepare site for the erection and explain the importance of concrete foundation damp proof.</p> <p>4. List and state the functions of the components with drawing/sketches constructional details and apply safety and building regulations</p>	<p>a. temporary buildings – site, huts security, kiosk, at entrance</p> <p>b. semi permanent classroom, living homes, office etc.</p> <p>c. permanent building – living homes offices etc.</p> <p>3. The differences between platform and ballon construction.</p> <p>4. Characteristics of timbers and other materials.</p> <p>5. Preparation of site: erection of timber building construction of platforms or building of over site concrete with rug bolts set in various positions.</p> <p>6. The importance of:</p> <p>i. Elevated concrete foundation and over site concrete in timber building construction.</p> <p>ii. Damp-proofing between concrete block and timber framing.</p> <p>iii. Preservation of structural timber members.</p> <p>7. The functions of the various components of a timber building.</p> <p>8. Constructional details of a temporary timbers suitable for a site, office, a guard’s hut etc.</p> <p>9. Constructional details of a semi permanent or permanent timber building for domestic purpose using either platform or ballon construction.</p>	<p>and other manufactured boards, insulating materials.</p> <p>- Construct an elevated platform of timber or steel or build a concrete foundation/over site concrete with rag bolts sets in various positions to provide fixing for cill</p> <p>- Make details drawing/sketches of the constructional principles of a temporary timber building.</p> <p>- Draw/sketch constructional details of a semi permanent or permanent timber building for domestic purpose using either platform or ballon construction.</p> <p>- Using appropriate manual and powered tools construct a timber building using the details above.</p> <p>- Erect the timber frames on concrete or steel base.</p> <p>- Select and fix interior and exterior furnishing to the building.</p> <p>- With the aid of appropriate tools and equipment erect temporary and semi permanent building using pre-fabricated timber building components.</p>

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			<ul style="list-style-type: none"> - Finish for use as appropriate to client specifications - Apply safety precautions according to the existing building regulations as applied to prefabricated timber buildings.
50.	<p>Cladding to Concrete and Steel work</p> <ol style="list-style-type: none"> 1. Explain and state the purpose of cladding in building and describe with sketches various types, read and interpret working drawings and specifications. 2. Calculate the materials and select various tools hand and powered that used for installation grounds to steel or concrete to receive. 3. Fix cladding and finished for paints. 	<ol style="list-style-type: none"> 1. Definition of cladding. Purpose of cladding. 2. Various types of cladding used in building construction e.g. wall paneling, colum/stanchion and steel beam casing suspended ceiling. 3. Working drawings and specification of sections to be cladded. 4. Nigerian timbers and other materials used for cladding e.g. Iroko, Masonia etc. 5. The reasons for the choice of the materials e.g decoration and finishing. 6. The calculation of the materials used for cladding project. 7. hand and powered tools that may be used for the cladding project 8. Grounds to steel or concrete to received various fixings. 9. Finishing painting, varnishing or polishing 	<ul style="list-style-type: none"> - With the aid of sketches describe the various types of cladding used in building construction e.g. wall paneling, colum/stanchion and steel beam casing suspended ceiling. - Read and interpret working drawings of sections to be cladded. - Read and interpret specification of sections to be cladded. - Identify Nigerian timbers and other materials used for cladding - Calculate the materials to be used for cladding project and cost of project. - Prepare grounds to steel or concrete to received various fixings reading for paining varnishing or polishing.

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