240 MACHINE WOODWORKING

Examination Structure

For this trade, the following are the trade – related courses:
193 Engineering drawing (CTD 11-13)
194 Basic Electricity (CE 1 11)

The trade will also be examined under the following component or subject grouping 241 – Machine Woodworking (CMW 11, 12 13, 14, 15 and 16) 241 –1 Machine woodworking

Examination Scheme

The examination will comprise two papers; Objective test & essay and practical.

241-1 - Paper I: This consists of:

Section A: The paper will consist of 40 multiple choice questions to be attempted 40 minutes and carries 40 marks

Section B: Essay written paper of 6 questions and candidates are to answer 5 questions for 2 hours and it carries 60 marks.

241–2 Paper II: Practical Paper of 4 hours duration for the component and it carries 100 marks.

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

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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

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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 constractions. 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.	- 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

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Boards 1. Identify common manufactured boards and state their uses.	and their uses. Plywood, lamin-board, block-board, chip board etc. 2. Properties e.g. grain, figure density etc.	samples of boards. 2. Collect specimens.
12.0 **Adhesives** 1. State and describe types of adhesive and their composition e.g. protein, synthetic resin etc. 2. Prepare glue for use.	1. Main types of adhesive: protein, synthetic resin and contact, animal vegetable and thermosplastics glues (PVC, ponal). 2. Properties, preparation and application of each type.	1. Apply the different types of adhesive to on-going projects. 2. Show the students different types of adhesive.
13.0 **Fittings and Fastenings** 1. List and identify various types of fittings. 2. Explain and state the properties of the fasteners and materials used for common fitting.	1. Types of fitting, e.g. hinges, locks, handles, catches etc. 2. Selection and application of fittings. 3. Properties of materials used for common fitting e.g. brass, mild steel, aluminium, plastics etc.	1. Examine different types of each hardware. - Make freehand sketches; - Make projects; using various types of fittings and fasteners. 2. Demonstrate correct methods of fixing fittings.
14.0 **Wood Finishing** 1. Explain the purposes and state types of wood finishing materials.	1. Purposes of finishing wood. 2. Types of wood finishes e.g. paints varnishes, pigments etc.	1. Prepare the surface.
1. Name the composition of finishing materials. 3. Prepare wood surface for finishing.	3. Composition of common wood finishing materials.	1. Apply finishes to on-going job.

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

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

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3.0 **Dimension Saw Bench** 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. 2. Calculate spindle speed and peripherical speed of saw, mount the saw blades, and lubricate the machine parts.	1. Features of dimension saw. - Principles of operation. - Necessary safety precautions. - Metal/materials used in the manufacture of components. 2. Set the blade into spindle and tighten it. - cross-cutting to length mitring. - mitring - tongue and groove. - rebating, ripping etc. 3. Maintenance, cleaning etc. 4. Calculation of spindle and peripheral speed of the saw blade.	Instruction and demonstration for correct and safe use. Sawing exercise to cover straight and angular work. Any adjustment should be done before switching on the machine. Safety precautions and regulations to be observed. Routine service as given by the manufacturer.
4.0 **Surface Planer** 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. 2. Observe the safety precautions involved while operating the machine, explain the purpose of devices and calculate the speed of the cutter.	1. The surface planer – materials used in the manufacture of the components e.g. cutters, table, block, etc. 2. Arrangement and functions of various parts and methods of adjusting tables and fence. Methods used and patent devices for resetting cutters. 3. Necessary safety precautions. 4. Planing 'out of wind', squaring, bevelling, rebating, use of back stops, push blocks and springs for safe working and to reduce accident risk. 5. Mount and dismount the cutters. 6. Maintenance.	Demonstration the safe operation of he machine. Exercises on surfacing and squaring stock. Exercises to include bevelling and tapering with the use of back stop. Correct adjustment and setting of guard. Setting of cutter in machine sharpening etc. Planing, the surface and edge of timber, tapering and stopped rebating, etc. Sketch the machine lubricate machine.
3. Explain the cutting action of the blades,		

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

Topic/Objective	Contents	Activities/Remarks
and pictorial view and working drawing and prepare route sheets for the production of joinery and furniture items.		
7.0 **Narrow Band Saw** 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.	1. Narrow band saw machine. - functions, the materials and uses of each of the part. Ensure that wheels are clean. Both top and bottom wheels are covered before operation. 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.	Care of wheels and guide adjustment for efficient and safe working. Use of jigs. Exercise of sawings to straight lines and simple curves marked from item plate. Demonstration of safe operation of the machine.

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

Topic / Objective	Contents	Activities / Remarks
1.0 **The Mortising Machine** 1. State and describe the working principles, layout, types of job each machine cutter performs and type of clamping devices. 2. Install, set up cutters, for mortising operations, safety and operational precautions related to the use of the machine. 3. Grind and sharpen mortise chisels and chains.	1. Working principles of a mortising machine. 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. 3. Different sizes of chisels. Use of stop bars for repetitive work. 4. Grinding and sharpening of chisels.	Safety instruction. 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. Emphasize safe working rules and adjustment of cutting tools.
2.0 **Tenoning Machine** 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. 2. Apply safety and operational precaution. 3. Set up machine to produce tenons, backing piece, sharpen and cut off and balancing cutters.	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. 2. Produce template for setting tenoning cutter. 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.	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. 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. Design the jig. Apply backing piece and stops fence.

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

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1.	**Feature and Principles of Operation of Wood Turning Lathes** 1. Distinguish the two main classes of wood turning lathes and describe the features and functions of the components and the principles of operation. 2. Identify the functions of the accessories, potential hazards related to the operation of the wood turning lathe. 3. Write out safety rules, set up and the use of the machine and carry out the service and maintenance.	1. Classes of wood turning lathes e.g. a. Hand wood lathes. b. Automatic wood lathe. 2. Parts; Head stock, spindle, bed, tailstock, tool rest, pulley, guard, tools support etc. 3. Drive and speed change system. 4. Work holding and tool control devices etc. Regular face plate, single screw center, sanding drum or disc, steady rest etc. 5. Identification of potential hazards. 6. Cleaning and oiling the machine.	- Display the two classes of the lathes. - Display the safety precautions on the wall to be observed by the students. - Exercise in turning - Clean off the machine and put oil where necessary.
2.	**Turing Tools** 1. Identify various turning tools and state the materials used in manufacturing them. 2. Sharpen turning tools to correct profile angle and explain basic methods of turning and their suitability:	1. The wood turning tools: gouge, skew parting tools, square, nose, round nose, spear point etc. 2. Types of metal and wood used to produce the tools and oil stone. - separating - cutting or parting.	- State the uses. - Display and show the tools to the students. - Give tools to sharpen on oil stones. - Design the project and each student should design project to be turned.
3.	**Wood Turning Operations**	1. Preparation of working drawing of a project to be	- Design the project and each student

S/N	Topic/Objective	Contents	Activities/Remarks
	1. Prepare a design and working drawing of project and describe the quality of suitable timber for turning operations. 2. Explain basic procedures and methods for various turning operations and design jigs for automatic operation. 3. Explain and determine the relationship between spindle speed for a given stock-diameter. 4. Mount stock correctly for turning, mark out and describe the turning operation. 5. Carry out operations involving the use of back steady jigs/rest.	turned e.g. cup, bowl, legs etc. 2. Qualities of timber used for turning e.g. timber free from knots, shakes and defective grain, seasoned wood, etc. 3. Preparation of the wood on the planing machine and cut into sizes and select the wood pieces. - Spindle turning, rough turning between centers, finish turning a plain cylinder, using parting tools, cutting shoulder etc. 4. Jigs or features. 5. Methods of driving and speed changing 6. Methods of speed changing - Fix the stock to the spindle - Measurement by using marking out and measuring instruments. 7. Face plate operation using bowls, plates and shallow trays.	should design a project to be turned. - Instruct and demonstrate safe use. Positioning of rests. - Prepare some pieces. - Instruct and demonstrate how to use turning tools and materials. - Produce jigs speeds in relation to dimensions of material being worked. - Diameter of rough stock. - Demonstrate the mounting the stock on the machine. - Jigs exercise and instruction. - Observe safety.
8.	**Features and Principles of Operation of Spindle Moulder** 1. Outline and describe the principles of operation, major features of design and various cutter heads and accessories	1. Principles of operation of vertical spindle moulder for cutting, moulding the edges, grooving, fluting and reeding etc. Ring fence guard, attachment jigs etc. 2. Various cutter heads e.g. square cutter block, slotted collars, cylindrical cutter block, whitehill cutter block, French head, drunken or wobble saw. 3. Appropriate attachment for	- Display the machine and explain the principles of operation. - Show the students all available cutters and accessories on the spindle-moulding machine. - Highlight on the hazards on the

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	2. List and outline hazards and the safety and operational precautions in the use of attachments of the spindle Moulder. 3. Explain the principles of positive and negative angles in relation to the cutting of hard or soft wood. 4. Perform: simple shaping operation, use of cutter blocks with suitable jigs and stopped work moulding on the spindle 5. Develop geometrically true shape of cutter profile. 6. prepare the setting templates for use on the various heads, set cutters and explain the principles of the wobble saw. 7. Classify various types of tongue and groove joint, used in woodwork and explain purpose.	mild steel etc. a. Dovetailing b. Corner lock joining c. Trenching etc. 4. Principles of positive and negative angles. - with hard and softwood - use the cylindrical cutter blocks and ring fence for the curved work cutter block, jigs etc. 2. Development of cutting profile. 3. Preparation of templates, cutter and heads, grinding stone etc. 4. Principles of wobble saw, and carrying out of grooving exercises. 5. Types of tongue and groove boarding, e.g. loose tongue and groove. 6. Dovetailing, tenoning, corner locking etc.	spindle moulder. - Exercises of fitting the attachment. - Produce straight moulding using the various cutter heads. - Carry out exercises involving grinding of cutter to shape. - Exercises on the machine to produce grooves and tongues. - Use machine to produce the joint. - Adjust the spindle machine to step speeds for various cutter heads.
9.	**Maintenance** 1. Dismantle and assemble the spindle moulder and identify faults in the operation,	1. Dismantling and assembling of spindle moulder 2. Identification of operational faults 3. fix, grind on machine and balance cutters, sharpening and	- Exercise on dismantling and fixing of spindle moulder. - Faults in the operation and

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	rectify them and explain the grind, hone and balance cutters. 2. Carry out simple calculations involved in balance of cutters and undertake routine service and maintenance of the spindle moulder.	setting. 4. Centrifugal force for the purpose of balance cutters 5. Cleaning, oiling etc.	methods to prevent the operator from injuries, and machine from damage. - Demonstrate the sharpening, setting, grinding, and balancing of cutters. - Ensure pair of cutters are of the same weight and are cutting in the same cutting circle.
10.	**Jig Saw** 1. Identify the various parts of the jig saw and describe the functions of the parts, the materials used for the manufacture of the components and explain the working principles of a jig saw. 2. Analyze the difference between a jigsaw and a narrow band saw and explain how to mount and dismantle jigsaw blades. 3. Demonstrate how to cut internal and external curved patterns of all types on the machine.	1. Parts of the jig and their functions e.g. base, overarm, belt, blade, pulley guard, table, motor, etc. 2. The types of metal used for the manufacture of components parts. 3. scroll saw blade and endless blade cutters. 4. Installing a jig saw blade. 5. Application of the machine to cut curved pattern.	- Define the jig saw, list its parts and function. - Use the machine or drawing/sketches to show the parts - Show the students the blade cutter and shape of the machines. - Installing a blade using an allen wrench to tighten the chuck. - Use the machine to cut curves, both internal and external job. - Note safety precautions.

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	High Speed Router 1. Define the principles of operation identify and state functions of the parts and accessories and appropriate cutter in accordance with specific uses. 2. Select various spindle speed and explain the uses of frequency and adjustments 3. State the purpose of the various holes, jigs and templates for repetitive work, various cuttings. 4. Perform operations using the high-speed router. 5. Choose cramp, improvise jigs, identify the guide pins and explain the importance of using the correct spanner. 6. List the sequence of operation when setting cutter heads on the spindle.	1. Principles of operation of a high-speed router e.g. jigs, pattern rings etc. 2. The use of the machine to carry out various woodworking processes in shaping 3. Method of mounting various bits. Movements of the work-table for the job. 4. Purpose of the various holes on the table. 5. Designing, fabricating and use of jigs and templates. 6. Various operations of the machine recessing, boring raised panel, staircase trenching, circular work (plain and moulded) dovetailing, tonguing and groovings mount the cutter correctly into the cutter heads 7. Selecting cramps and securing devices to the specific work. 8. jig and fixtures. 9. Locating the guide pins for panel of fluted cutters. 10. Sequences of operation when setting cutter heads.	- Give reasons for high or low speeds 18,000, 24,000 r.p.m. - Carry out exercise on the worktable - Don't adjust when the machine is working. - Show the holes and set the screws and practice on the machine. - Exercise on the design of jigs and templates - Prepare the wood and demonstrate the operations - Select, fix and adjust cramps and other devices. - Fix the guide pins to suit the panel of flutted cutter - Always use correct spanner when tightening nuts - Display the sequence of operation charts beside the machine. - Emphasize safety precautions.

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	Maintenance of the Jig Saw and High Speed Router 1. Dismantle the areas to overhaul, identify faults and explain the procedures for grinding and honing cutter on jigsaw and router machine. 2. Execute the grinding of cutters and carry out routine service and maintenance.	1. Dismantling, overhauling and assembling the major components of the jig saw and router machine. 2. Detecting and rectifying faults 3. Grinding and honing cutters 4. Routine service and maintenance of jig saw, router machines.	- Identify the parts to be dismantled, overhauled and assembled parts. - Check the machines before use. - Carry out exercises on grinding and honing. - Balance a pair of cutters. - Clean the machines after use.