FEDERAL MINISTRY OF EDUCATION

National Technical Certificate (NTC) Curriculum in

FURNITURE MAKING AND UPHOLSTERY

February, 2025

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

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NATIONAL BOARD FOR TECHNICAL EDUCATION

Plot B, Bida Road, P.M.B. 2239, Kaduna, Nigeria

NATIONAL TECHNICAL CERTIFICATE

CURRICULUM AND MODULE SPECIFICATIONS

IN

FURNITURE MAKING AND UPHOLSTERY

FEBRUARY, 2025

GENERAL INFORMATION

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

ENTRY QUALIFICATIONS CRAFT PROGRAMME
Candidates must not be less than 14 years of age and should have successfully completed three years of Junior Secondary Education, Prevocational 1 – 3 or its equivalent. Special consideration may be given to sponsored candidates with lower academic qualifications who hold trade test certificates and are capable of benefiting from the programme.

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

a. General Education, which accounts for 30% of the total hours required for the programme.
b. Trade Theory, Trade Practice and Related Studies which account for 55% and
c. Supervised Industrial Training/Work Experience, which accounts for about 15% of the total hours required for the programme. This component of the course which may be taken in industry or in college production unit is compulsory for the full-time students.

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

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

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

a General Objectives
b Specific Learning Outcomes

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

a. Orthographic Projection in Engineering/Technical Drawing
b. Loci in Mathematics
c. Basic Concepts of Politics and Government in Political Science
d. Demand and Supply in Economics

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

GENERAL EDUCATION IN TECHNICAL COLLEGES

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

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

National Certificate
The NTC programme is run by Technical Colleges accredited by NBTE

NABTEB conducts the final National Examination and awards certificates.

Trainees who successfully complete all the courses/modules specified in the curriculum table and passed the National Examinations in the trade will be awarded of the following certificates.

LEVEL	**CERTIFICATE**
Technical Programme	Furniture Making and Upholstery
Craft Level	National Technical Certificate

Guidance Notes for Teachers Teaching the Curriculum

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

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

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

INTEGRATE APPROACH IN THE TEACHING OF TRADE.

Theory, Trade Science and Trade Calculation

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

Evaluation of Programme/Module

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

Contents

CURRICULUM TABLE COURSE HOURS/WEEK

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN FURNITURE MAKING AND UPHOLSTERY

Module Code	MODULE	YEAR I						YEAR 2						YEAR 3						TOTAL HOURS
		Term 1		Term 2		Term 3		Term 1		Term 2		Term3		Term 1		Term 2		Term 3		
		T	P	T	P	T	P	T	P	T	P	T	P	T	P	T	P	T	P	
CMA 12-15	Mathematics	2	-	2	-	2	-	2	-	2	-	2	-	2	-	2	-	1	-	216
CEN 10-12	English and Communication	2	-	2	-	2	-	3	-	3	-	3	-	2	-	3	-	3	-	288
CPH 11-12	Physics	2	2	2	-	2	-	2	1	2	1	2	1	2	1	1	1	2	1	288
CCH 10	Chemistry	2	2	2	-	2	-	2	1	2	1	2	1	2	1	2	1	2	1	288
CEC 10	Economics	2	-	2	-	2	-	2	-	2	-	2	-	2	-	2	-	2	-	252
CBM 10	Entrepreneurship	-	-	-	-	-	-	-	-	-	-	-	-	2	-	2	-	2	-	72
CTD 11	Technical Drawing	-	2	-	2	-	2	-	-	-	-	-	-	-	-	-	-	-	-	72
CTD 12	Descriptive Drawing	-	-	-	-	-	-	2	-	2	-	2	-	-	-	-	-	-	-	72
ICT 10	Introduction to Computer	-	-	-	-	-	-	1	2	-	-	-	-	-	-	-	-	-	-	36
ICT 11	Computer Application I	-	-	-	-	-	-	-	-	1	2	-	-	-	-	-	-	-	-	36
ICT 12	Computer Application II	-	-	-	-	-	-	-	-	-	-	1	2	-	-	-	-	-	-	36
ICT 13	AutoCAD	-	-	-	-	-	-	-	-	-	-	-	-	1	2	-	-	-	-	36
ICT 14	AutoCAD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	2			36
CMW 11	Fundamentals of Woodworking I	2	8			-	-	-	-	-	-	-	-	-	-	-	-	-	-	120
CMW 12	Fundamentals of Woodworking II	-	-	-	-	-	-	3	17	-	-	-	-	-	-	-	-	-	-	240
CPD 12	Wood and Metal Finishing	-	-	-	-	-	-	-	-	-	-	-	-	3	17	-	-	-	-	240
CME 11	General Metal Work I			2	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	84
CME 12	General Metal Work II	-	-	-	-	-	-	2	3	-	-	-	-	-	-	-	-	-	-	60

CFC 11	**Furniture Design and Construction I**	**-**	**-**	**-**	**-**	**3**	**12**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**180**
CFC 12	**Furniture Design and Construction II**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**8**			**-**	**-**	**-**	**-**	**-**	**-**	**120**
CFC 13	**Furniture Design and Construction III**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**10**	**-**	**-**	**144**
CFC 12	**Upholstery Design and Construction**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**17**	**-**	**-**	-	-	**240**
	Total	**12**	**14**	**12**	**7**	**13**	**14**	**19**	**24**	**16**	**12**	**14**	**4**	**19**	**38**	**15**	**14**	**12**	**2**	**261**

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN FUNITURE MAKING AND UPHOLSTERY.			
MODULE: FUNDAMENTAL OF MACHINE WOODWORKING I		**MODULE CODE: CMW 11**	**TOTAL CONTACT HOURS: 240HRS**
YEAR: 1	**TERM:** 1	**PRE: REQUISITE:**	**Theoretical:** 24 Hours **Practical:** 96 Hours
Goal: This module is intended to introduce the student to the basics of machine woodworking.			

GENERAL OBJECTIVES:]

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

1. Know the operation of Pull-Over Cross Cutting Machine
2. Know the operation of Circular Saw
3. Understand the operation of Dimension Saw
4. Know the operation of Surface Planer
5. Understand the operation of Combined Planer/ Thicknesser
6. Know the preparation and use of setting out rods.
7. Know band sawing operations.
8. Know CNC router operations.

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN FUNITURE MAKING AND UPHOLSTERY.						
Module: Fundamental of Machine Woodworking 1				**MOUDLE CODE: CME 11**		**CONTACT HOURS: 120**
Module Specification: Theoretical and Practical Content						
YEAR: 1	**TERM: 1**	**PRE: REQUISITE:**	**Theoretical: 24** Hours **Practical: 96** Hours			
GOAL: This module is designed to introduce the trainee to the basics of machine woodworking						
Theoretical Content				**Practical Content**		
General Objective 1.0: Know the operation of pull-Over Cross Cutting Machine						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**

1-3	1.1 Discuss the uses of Pullover cross cutting machine. 1.2 List the parts of pullover cross cutting machine. 1.3 State the properties of materials used in making the part of the machine. 1.4 State the principles of operation of the machine. 1.5 State the basic function of the machine. 1.6 List the types of hazards related to the use of the machine. 1.7 State the potential causes of the hazards. 1.8 State necessary operational Precautions to be taken when using the machine. 1.9 List the types of cutters and accessories used on	Explain the uses of Pullover cross cutting machine. Discuss the parts of pullover cross cutting machine. Explain the properties of materials used in making the part of the machine. Elaborate the principles of operation of the machine. Explain the basic function of the machine. Explain the types of hazards related to the use of the machine. Explain the potential causes of the hazard. Discuss necessary operational Precautions to be taken when using the machine.	Whiteboard Marker Projector Computer Wall chart Lesson notes Posters	Identify the parts of pullover cross cutting machine. Identify types of cutters and accessories used on the machine. Operate Pullover cross cutting machine.	Guide the students to: Identify the parts of pullover cross cutting machine. Identify types of cutters and accessories used on the machine. Operate Pullover cross cutting machine.	Pullover cross cutting machine Pullover cross cutting machine accessories.

	the machine. 1.10 Explain the use of each type of cutter and accessory.	Explain the types of cutters and accessories used on the machine. Discuss the use of each type of cutter and accessory.				
General Objective 2.0: Know the operation of Circular Saw.						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
4-5	2.1 Discuss the uses of circular sawing machine. 2.2 List the parts of circular sawing machine. 2.3 State the properties of materials used in making the part of the machine. 2.4 State the principles of operation of the machine. 2.5 State the basic function of the machine. 2.6 List the types of hazards related to the use of the machine. 2.7 State the potential causes of the hazards.	Explain the uses of circular sawing machine. Discuss the parts of circular sawing machine. Explain the properties of materials used in making the part of the machine. Elaborate the principles of operation of the machine. Explain the basic function of the machine. List the types of hazards related to the use of the machine.	Whiteboard Marker Projector Computer Chalk board Lesson note Drawings/Posters	Identify the parts of circular sawing machine. Perform basic operation on the circular sawing machine. Apply necessary safety measures when using the machine. Identify the types of cutters and accessories used on the machine.	Guide students to: Identify the parts of circular sawing machine. Perform basic operation on the circular sawing machine. Apply necessary safety measures when using the machine. Identify the types of cutters and accessories used on the machine.	Circular saw bench Circular saw accessories

	2.8 State necessary operational Precautions to be taken when using the machine. 2.9 State the types of cutters and accessories used on the machine. 2.10 Explain the use of each type of cutter and accessory of circular saw. 2.11 State necessary safety and operational precautions to be taken when using the machine.	Explain the potential causes of the hazard. Discuss necessary operational Precautions to be taken when using the machine. Explain the types of cutters and accessories used on the machine. Discuss the use of each type of cutter and accessory. Explain necessary safety and operational precautions to be taken when using the machine.				
General Objective 3.0: Understand the operation of Dimension saw.						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
6-7	3.1 Discuss the uses of Dimension saw. 3.2 List the parts of Dimension saw.	Explain the uses of Dimension saw. Discuss the parts of Dimension saw.	Whiteboard Marker Projector Computer Posters Lesson note	Identify the parts of Dimension saw. Perform basic operation on the Dimension saw.	Guide students to: Identify the parts of Dimension saw.	Dimension saw. Dimension saw accessories.

	3.3 State the properties of materials used in making the part of the machine. 3.4 State the principles of operation of the machine. 3.5 State the basic function of the machine. 3.6 List the types of hazards related to the use of the machine. 3.7 State the potential causes of the hazards. 3.8 State necessary operational Precautions to be taken when using the machine. 3.9 State the types of cutters and accessories used on the machine. 3.10 Explain the use of each type of cutter and accessory of circular saw. 3.11 State necessary safety and operational precautions to be taken when using the machine.	Explain the properties of materials used in making the part of the machine. Elaborate the principles of operation of the machine. Explain the basic function of the machine. List the types of hazards related to the use of the machine. Explain the potential causes of the hazards. Discuss necessary operational Precautions to be taken when using the machine. Explain the types of cutters and accessories used on the machine. Discuss the use of each type of cutter and accessory.		Apply necessary safety measures when using the machine. Identify the types of cutters and accessories used on the machine.	Perform basic operation on the Dimension saw. Apply necessary safety measures when using the machine. Identify the types of cutters and accessories used on the machine.	

		Explain necessary safety and operational precautions to be taken when using the machine.				
General Objective 4. 0: Know the operation of Surface Planer						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
8	4.1 Explain the uses of Surface Planer. 4.2 List the parts of Surface Planer. 4.3 State the properties of materials used in making the part of the machine. 4.4 State the principles of operation of the machine. 4.5 State the basic function of the machine. 4.6 List the types of hazards related to the use of the machine. 4.7 State the potential causes of the hazards.	Discuss the uses of Surface Planer. Discuss the parts of Surface Planer. Explain the properties of materials used in making the part of the machine. Elaborate the principles of operation of the machine. Explain the basic function of the machine. List the types of hazards related to	Whiteboard Marker Projector Computer Posters Lesson note	Identify the parts of Surface Planer. Perform basic operation on the Surface Planer. Apply necessary safety measures when using the machine. Identify the types of cutters and accessories used on the machine.	Guide the students to: Identify the parts of Surface Planer. Perform basic operation on the Surface Planer. Apply necessary safety measures when using the machine. Identify the types of cutters and accessories used on the machine.	Surface planer Surface planer Accessories

	4.8 State necessary operational Precautions to be taken when using the machine. 4.9 State the types of cutters and accessories used on the machine. 4.10 Explain the use of each type of cutter and accessory of circular saw. 4.11 State necessary safety and operational precautions to be taken when using the machine.	the use of the machine. Explain the potential causes of the hazard. Discuss necessary operational Precautions to be taken when using the machine. Explain the types of cutters and accessories used on the machine. Discuss the use of each type of cutter and accessory. Explain necessary safety and operational precautions to be taken when using the machine.				

General Objective 5.0: Understand the operation of Combined Planer/ Thicknesser						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
9	5.1 Explain the uses of Combined Planer/ Thicknesser. 5.2 List the parts of Combined Planer/ Thicknesser. 5.3 State the properties of materials used in making the part of the machine. 5.4 State the principles of operation of the machine. 5.5 State the basic function of the machine. 5.6 List the types of hazards related to the use of the machine. 5.7 State the potential causes of the hazards. 5.8 State necessary operational Precautions to be taken when using the machine.	Discuss the uses of Combined Planer/ Thicknesser. Discuss the parts of Combined Planer/ Thicknesser. Explain the properties of materials used in making the part of the machine. Elaborate the principles of operation of the machine. Explain the basic function of the machine. List the types of hazards related to the use of the machine.	Whiteboard Marker Projector Computer Lesson note. Wall chart/posters Pictures	Identify the parts of Combined Planer/ Thicknesser. Perform basic operation on the Combined Planer/ Thicknesser. Apply necessary safety measures when using the machine. Identify the types of cutters and accessories used on the machine.	Guide students to: Identify the parts of Combined Planer/ Thicknesser. Perform basic operation on the Combined Planer/ Thicknesser. Apply necessary safety measures when using the machine. Identify the types of cutters and accessories used on the machine.	Combined Planer/Thicknesser Accessories

	5.9 State the types of cutters and accessories used on the machine. 5.10 Explain the use of each type of cutter and accessory of circular saw. 5.11 State necessary safety and operational precautions to be taken when using the machine.	Explain the potential causes of the hazards. Discuss necessary operational Precautions to be taken when using the machine. Explain the types of cutters and accessories used on the machine. Discuss the use of each type of cutter and accessory. Explain necessary safety and operational precautions to be taken when using the machine.				
General Objective 6.0: Know the preparation and use of setting out rods.						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
10	6.1 Define the term setting out rods. 6.2 State the steps of setting out rods in furniture making	Define the term- "setting out rod; Route Sheet and Cutting list and differentiate between them.	Whiteboard Marker Projector Computer Lesson note Chalk Board	Set-out rods for common woodwork items such as doors stool, kitchen unit, bookshelves, etc.	Guide the students to: prepare rod, route sheet and cutting list to specification.	

	6.3 Explain the purpose of a cutting list. 6.4 State the importance of a cutting list in determining the cost of a job. 6.5 Differentiate between setting out rod, Route Sheet and Cutting list 6.6 Explain the purpose of each. 6.7 State the application of each. 6.8 explain details of the procedure.	Explain the purpose and application of each. Prepare a typical route sheet/cutting Give assignment to student.	Posters/Drawing	Prepare route sheets for the production and joinery and furniture items. Produce setting-out rods for common woodwork/joinery/furniture items such as door, bookshelves, etc. Prepare cutting list for a given project	Guide students to draw detailed cutting list of a particular project. Demonstrate the preparation of route sheets	
General Objective 7.0: Know Band Sawing Operations.						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
11	7.1 Explain the uses of band-sawing machine. 7.2 List the parts of band-sawing machine	Discuss the uses of band-sawing machine. Discuss the parts of band-sawing machine.	Posters/pictures Lesson note Parts of the narrow bad saw Whiteboard Marker	Mount the saw blade on the wheels correctly. Dismount the saw blade on the wheels correctly.	Guide the students to: Mount the saw blade on the wheels correctly.	Narrow band saw Narrow band saw Accessories Jigs

	7.3 State the properties of materials used in making the part of the machine. 7.4 State the principles of operating the machine. 7.5 State the basic function of the machine. 7.6 List the types of hazards related to the use of the machine. 7.7 State the potential causes of the hazards. 7.8 State necessary operational Precautions to be taken when using the machine. 7.9 State the types of cutters and accessories used on the machine. 7.10 Explain the use of each type of cutter and accessory of circular saw. 7.11 State necessary safety and operational precautions to be taken when using the machine.	Explain the properties materials used in making the part of the machine. Elaborate the principles of operation of the machine. Explain the basic function of the machine. List the types of hazards related to the use of the machine. Explain the potential causes of the hazard. Discuss necessary operational Precautions to be taken when using the machine. Explain the types of cutters and accessories used on the machine.	Projector Computer	Set up the machine for various band sawing operations. Use the machine for various band sawing operations. Carry out various cutting operations on the narrow band saw. Produce simple jig for various band sawing operations. Use simple jig for various band sawing operations. Calculate the length of the band saw blades. Set saw blade manually. Set saw blade with sharpening machine. Sharpen saw blade manually. Observe all operational safety procedures Sharpen saw blade with sharpening machine.	Dismount the saw blade on the wheels correctly. Set up the machine for various band sawing operations. Use the machine for various band sawing operations. Carry out various cutting operations on the narrow band saw. Produce simple jig for various band sawing operations. Use simple jig for various band sawing operations. Calculate the length of the band saw blades. Set saw blade manually. Set saw blade with sharpening machine.	

		Discuss the use of each type of cutter and accessory. Explain necessary safety and operational precautions to be taken when using the machine.		Braze or butt-weld band saw blade. Undertake routine service of the narrow bad sawing machine. Carry out minor routine maintenance on moving parts of the machine. Undertake maintain services of the narrow bad sawing machine.	Sharpen saw blade manually. Observe all operational safety procedures Sharpen saw blade with sharpening machine. Braze or butt-weld band saw blade. Undertake routine service of the narrow bad sawing machine. Carry out minor routine maintenance on moving parts of the machine. Undertake maintain services of the narrow bad sawing machine.	

General Objective 8.0: know CNC router operations.						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
12	7.1 Explain the uses of CNC router. 7.2 List the parts of CNC router. 7.3 State the properties of materials used in making the part of the machine. 7.4 State the principles of operating the machine. 7.5 State the basic function of the machine. 7.6 Explain scope of operation of the CNC router. 7.7 List the types of hazards related to the use of the machine. 7.8 State the potential causes of the hazards. 7.9 State necessary operational Precautions to be taken when using the machine.	Discuss the uses of CNC router. Discuss the parts of CNC router. Explain the properties of materials used in making the part of the machine. Elaborate the principles of operation of the machine. Explain the basic function of the machine. Discuss scope of operation of the CNC router. List the types of hazards related to the use of the machine. Explain the potential causes of the hazard.	Posters of the CNC router. Lesson note Whiteboard Marker Projector Computer	Design (decorations) on panel doors Design decorations on beds. Observe safety precautions when using the CNC router. Set the work on the computer to align with the operation on the bed of the CNC router. Perform simple operation with the CNC router.	Guide the students to: Designs (decorations) on panel doors Design decorations on beds. Observe safety precautions when using the CNC router. Set the work on the computer to align with the operation on the bed of the CNC router. Perform simple operation with the CNC router.	CNC router Computer

	7.10 State the types of cutters and accessories used on the machine. 7.11 Explain the use of each type of cutter and accessory of CNC router. 7.12 State necessary safety and operational precautions to be taken when using the machine. 7.13 State materials used in manufacturing the parts of the machine.	Discuss necessary operational Precautions to be taken when using the machine. Explain the types of cutters and accessories used on the machine. Discuss the use of each type of cutter and accessory. Explain necessary safety and operational precautions to be taken when using the machine. Elaborate materials used in manufacturing the parts of the machine.				
Week 13	**Examination: Practical - 70% Theory – 30%**					

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN FUNITURE MAKING AND UPHOLSTERY.			
Module: Fundamentals of Machine Woodworking II		**MODULE CODE: CMW 12**	**TOTALCONTACT HOURS: 240HRS**
YEAR: 2	**TERM:** 1	**PRE: REQUISITE:**	**Theoretical:** 36Hours **Practical: 204** Hours
Goal: This module is designed to provide the trainee with knowledge and skill to set up, operate, maintain and repair the following wood working machines: Mortising machine, tenoning machine, drilling machine and sanding machine.			
General Objectives: On completion of this module, the trainee should be able to: 1. Know the working principles of a mortising machine. 2. Know the working principles Tenoning Machine. 3. Know how to carry out various drilling machine operations. 4. Know the use of power tools to carry out various operations. 5. Know the operation of sanding machines. 6. Know the operation of a surface planer. 7. Understand Circular Sawing Machine operation. 8. Understand the processes of Carcass Construction. 9 Know the processes of Frame Construction. 10. Know the operations of an edge banding machine.			

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN FUNITURE MAKING AND UPHOLSTERY.			
Module: Fundamentals of Machine Wood Working II		**MOUDLE CODE: CMW12**	**CONTACT HOURS: 240HRS**
Module Specification: Theoretical and Practical Content			
YEAR: 2	**TERM:** 1	**PRE: REQUISITE:**	**Theoretical:** 36 Hours **Practical: 204** Hours
1. **GOAL:** This module is designed to introduce the trainee to the working principles of the mortising machine			
Theoretical Content		**Practical Content**	
General Objective 1.0: Know the working principles of a mortising machine.			

Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**

1	1.1 Define mortising machine. 1.2 List the types of mortising machine. 1.3 State the primary function of mortising machine. 1.4 State the importance of mortising machine in woodworking. 1.5 List the parts of mortising machine. 1.6 Describe the types of clamping devices and attachments for the mortising machine. 1.7 List the types of hazards related to the use of the machine. 1.8 State the potential causes of the hazards. 1.9 State necessary operational Precautions to be taken when using the machine. 1.10 State the types of cutters and accessories used on the machine. 1.11 Explain the advantages and disadvantages of each type of cutter of Mortising machine.	Explain mortising machine. Discuss the types of mortising machine. Explain the primary function of mortising machine. Explain the importance of mortising machine in woodworking. Explain the parts of mortising machine. Elaborate the types of clamping devices and attachments for the mortising machine. Explain the types of hazards related to the use of the machine. Explain the potential causes of the hazards. Explain necessary operational Precautions to be taken when using the machine.	Whiteboard Marker Projector Computer Drawing of a mortising machine and charts showing the various parts of the machine. Maintenance equipment, oil, brush etc. Chalk Board Lesson note.	Identify different types of mortising machine. Identify the parts of mortising machine. Identify the clamping devices and attachments used on mortising machine. Set up the machine for normal and repetitive mortising operation. Carry out mortising operations to given specifications. Apply routine safety and operational precautions related to the use of the machine. Select appropriate hollow chisel on a mortising machine. Install appropriate hollow chisel on a mortising machine	Guide the students to: Identify different types of mortising machine. Identify the parts of mortising machine. Identify the clamping devices and attachments used on mortising machine. Set up the machine for normal and repetitive mortising operation. Carry out mortising operations to given specifications. Apply routine safety and operational precautions related to the use of the machine. Select appropriate hollow chisel on a mortising machine. Install appropriate hollow chisel on a mortising	Mortising machine. Mortising machine accessories

		Discuss the types of cutters and accessories used on the machine. Discuss the advantages and disadvantages of each type of cutter of Mortising machine.			machine	
General Objective 2.0: Know the working principles of Tenoning Machine.						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
2-3	2.1 Define Tenoning Machine. 2.2 List the types of Tenoning Machine. 2.3 State the primary function of Tenoning Machine. 2.4 State the importance of Tenoning Machine in woodworking. 2.5 List the parts of Tenoning Machine. 2.6 Explain the working principles of the single end tenoning machine in its various forms. 2.7 Describe the spur cutters and state their functions. 2.8 State the relationship of tenoning to mortising. 2.9 Explain the purpose of balancing each pair of cutters on the machine.	Explain the use of tenoning Machine. Discuss the types of Tenoning Machine. Explain the primary function of Tenoning Machine. Explain the importance of Tenoning Machine in woodworking. Explain the parts of Tenoning Machine. Explain the working principles of the single	Mortising machine Charts Chalk board Lesson note. Whiteboard Marker Projector Computer	Identify different types of tenoning Machine. Identify the parts of tenoning Machine. Identify the clamping devices and attachments used on tenoning Machine. Set up the machine for normal and repetitive tenoning operation. Carry out tenoning operations to given specifications. Apply routine safety and operational	Identify different types of tenoning Machine. Identify the parts of tenoning Machine. Identify the clamping devices and attachments used on tenoning Machine. Set up the machine for normal and repetitive tenoning operation. Carry out tenoning operations to given specifications. Apply routine safety and operational	Tenoning machine. - do -

	2.10 List the types of hazards related to the use of the machine. 2.11 State the potential causes of the hazards. 2.12 State necessary operational Precautions to be taken when using the machine. 2.13 Explain the working principles of the single end tenoning machine in its various forms. 2.14 List the different cutter blocks that can be mounted on machine. 2.15 State the type of job each cutter is best suited for	end tenoning machine in its various forms. Describe the spur cutters and state their functions. State the relationship of tenoning to mortising. Explain the purpose of balancing each pair of cutters on the machine. Discuss the types of hazards related to the use of the machine. Explain the potential causes of the hazards. Explain necessary operational Precautions to be taken when using the machine. Discuss the working principles of the single end tenoning machine in its various forms. Discuss the different cutter blocks that can		precautions related to the use of the machine. Set vertical and horizontal head adjustments. Grind and sharpen mortise chisels chains. Set scribing cutters to produce the mould. Adapt the machine for trenching. Adapt the machine for square tenoning. Set up tenoning machine and produce mitre tenons Design and produce suitable jig that is safe for use on the machine 2.8 Balance each pair of cutters on the tenoning machine. Undertake routine servicing and maintenance on the machine.	precautions related to the use of the machine. Set vertical and horizontal head adjustments. Grind and sharpen mortise chisels chains. Set scribing cutters to produce the mould. Adapt the machine for trenching. Adapt the machine for square tenoning. Set up tenoning machine and produce mitre tenons Design and produce suitable jig that is safe for use on the machine 2.8 Balance each pair of cutters on the tenoning machine. Undertake routine servicing and	

		be mounted on machine. Explain the type of job each cutter is best suited for			maintenance on the machine.	
General Objective 3.0: Know how to carry out various drilling machine operations.						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
4	3.1 Define drilling machine. 3.2 List the types of drilling machine. 3.3 State the primary function of drilling machine. 3.4 State the importance of drilling machine in woodworking. 3.5 List the parts of drilling Machine. 3.6 State the basic principle of drilling machine. 3.7 State major parts of drilling machine. 3.8 State main functions of drilling machine. 3.9 Demonstrate the scope of operations of the drilling machine. 3.10 State safety precautions related to drilling machines.	Explain the use of drilling machine. Discuss the types of drilling machine. Discuss the primary function of drilling machine. Explain the importance of drilling machine in woodworking. Discuss the parts of Tenoning Machine. Explain the basic principle of drilling machine. Elaborate major parts of drilling machine.	Drilling machine Charts Chalkboard Whiteboard Marker Projector Computer	Select bits suitable for given jobs. Mount bits correctly Dismount bits correctly Mark out work pieces for drilling operations Make simple jigs and fixtures for repetitive drilling operations. Set drilling machine for the following operations: ➢ single holes. ➢ double holes. ➢ stopped or blind holes. ➢ through holes. Carry out drilling operations to factory specification.	Guide the students to: Select bits suitable for given jobs. Mount bits correctly Dismount bits correctly Mark out work pieces for drilling operations Make simple jigs and fixtures for repetitive drilling operations. Set drilling machine for the following operations: ➢ single holes. ➢ double holes. ➢ stopped or blind holes. ➢ through holes.	Drilling machine. Portable

		Elaborate main functions of drilling machine. Demonstrate the scope of operations of the drilling machine. Explain safety precautions related to drilling machines.		Sharpen bits to correct profile and keenness. Replace worn belts. Undertake routine service and maintenance on the drilling machine. Select the correct size of drill bit and fix on chuck. Set up drilling machine and drill holes on timber accurately.	Carry out drilling operations to factory specification. Sharpen bits to correct profile and keenness. Replace worn belts. Undertake routine service and maintenance on the drilling machine. Select the correct size of drill bit and fix on chuck. Set up drilling machine and drill holes on timber accurately.	
General Objective 4.0: Know the use of power tools to carry out various operations.						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
5	4.1 Define power tools. 4.2 List the types of power tools. 4.3 State the importance of power tools in woodworking. 4.4 List the parts of power tools. 4.5 State the function of each of the following power tools. ➢ Portable power saw	Explain the use of power tools. Discuss the types of power tools. Explain the importance of power tools in woodworking. Discuss the parts of power tools.	Whiteboard Marker Projector Computer Portable Power Tools Charts Chalk board Lesson note	Identify the parts of each potable power tools. Carry out ripping operation with a power saw. Set up power tool for normal and repetitive operations. Carry out different operations on each of the power tools e.g.:	Guide the students to: Identify the parts of each potable power tools. Carry out ripping operation with a power saw. Set up power tool for normal and repetitive operations.	Portable saw Portable planer Portable drill Portable sander Jig saw

	➢ Portable power planer ➢ Portable power drill ➢ Portable power sander ➢ Jig saw ➢ Drilling machine ➢ Power router 4.6 State the advantages and disadvantages of power tools.	Explain the function of each of the following power tools. Portable power saw ➢ Portable power planer ➢ Portable power drill ➢ Portable power sander ➢ Jig saw ➢ Drilling machine ➢ Power router State the advantages and disadvantages of power tools.		Ripping and Mitre cutting with a power saw Surfacing and chamfering, with a planer. Stopped hole and through hole with a power drill. Sanding operation with portable sander. Cut curved surfaces with a jig saw. Groove and chamfer a with power router.	Carry out different operations on each of the power tools e.g.: Ripping and mitre cutting with a power saw Surfacing and chamfering, with a planer. Stopped hole and through hole with a power drill. Sanding operation with portable sander. Cut curved surfaces with a jig saw. Groove and chamfer a with power router.	Router
General Objective 5.0: Know the operation of sanding machine.						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
6	5.1 Define sanding machine. 5.2 List the types of sanding machine. 5.3 State the primary function of sanding machine. 5.4 State the importance of sanding machine in woodworking. 5.5 List the parts of sanding Machine.	Explain the use of sanding machine. Discuss the types of sanding machine. Explain the primary function of sanding machine.	Whiteboard Marker Projector Computer Portable Power Tools Charts Chalk board Lesson note	Identify all the component parts of the overhead travelling belt sanding machine. Use the fence or the table and pressure pad.	Guide the students to: Identify all the component parts of the overhead travelling belt sanding machine. Use the fence or the table and pressure pad.	Overhead travelling belt Disc sander Drum sander

	5.6 State the basic principle of sanding machine. 5.7 State major parts of sanding machine. 5.8 State main functions of sanding machine. 5.9 State the principles of operation of the following sanding machines: ➢ Overhead travelling belt ➢ Disc and bobbing sanders ➢ Drum sander 5.10 State safety and operational precautions related to the use of the sanding machines.	Explain the importance of sanding machine in woodworking. Discuss the parts of sanding Machine. Discuss the basic principle of sanding machine. Discuss major parts of sanding machine. Explain main functions of sanding machine. Explain the principles of operation of the following sanding machines: ➢ Overhead travelling belt ➢ Disc and bobbing sanders ➢ Drum sander State safety and operational precautions related to the use of the sanding machines.		Set up the machine for normal and repetitive operations. Mount the belt on the overhead sander. Strain the belt correctly. Track the belt correctly. Adjust the worktable to convenient working height. carry out specific operations to factory specifications. Apply the belt to the face of the job using one of the following: a. Hand pad b. Travelling pressure pad Skitch different types of sanding machine	Set up the machine for normal and repetitive operations. Mount the belt on the overhead sander. Strain the belt correctly. Track the belt correctly. Adjust the worktable to convenient working height. carry out specific operations to factory specifications. Apply the belt to the face of the job using one of the following: c. Hand pad d. Travelling pressure pad Skitch different types of sanding machine	

General Objective 6.0: Know the operation of a surface planer.						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
7-8	6.1 Define surface planer. 6.2 List the parts of surface planer. 6.3 State the primary function of surface planer. 6.4 State the importance of surface planer in woodworking. 6.5 State the basic principle of operation of surface planer. 6.6 Demonstrate how to plane stock to width and thickness on the thickness machines.	Explain the use of surface planer. Discuss the parts of surface planer. Explain the primary function of surface planer. Explain the importance of surface planer in woodworking. Explain the basic principle of operation of surface planer. Describe how to plane stock to width and thickness on the thickness machines.	Planing machine Chart, Chalk board, Tools and accessories Whiteboard Marker Projector Computer	Perform the following operations with the surface planer: ➢ Surfacing and edging. ➢ Tapering ➢ Chamfering ➢ Through and stopped rebating Mount cutters correctly. Dismount cutters correctly. Plane stock to width and thickness on the thickness machines. Grind, hone and set cutters. Undertake routine service and maintenance of the surface. carry out specific operations to factory specifications.	Guide the students to: Perform the following operations with the surface planer: ➢ Surfacing and edging. ➢ Tapering ➢ Chamfering ➢ Through and stopped rebating Mount cutters correctly. Dismount cutters correctly. Plane stock to width and thickness on the thickness machines. Grind, hone and set cutters. Undertake routine service and maintenance of the surface.	Surface planer Surface planer accessories

					carry out specific operations to factory specifications.	
General Objective 7.0: Understand Circular Sawing Machine operation.						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
9	7.1 Define Circular Sawing Machine. 7.2 List the types of saw blade used on Circular Sawing Machine. 7.3 State the primary function of Circular Sawing Machine. 7.4 State the importance of Circular Sawing Machine. in woodworking. 7.5 List the parts of Circular Sawing Machine. 7.6 State the basic principle of Circular Sawing Machine. 7.7 State main functions of Circular Sawing Machine. 7.8 State the working principles of circular sawing machines. 7.9 State the specific uses of each of the following machine: ➢ Cross cut saw. ➢ Rip saw. ➢ Dimension saw. 7.10 State safety precautions related to the circular sawing machine.	Explain the use of Circular Sawing Machine. Discuss the types of saw blade used on Circular Sawing Machine. Explain the primary function of Circular Sawing Machine. Explain the importance of Circular Sawing Machine in woodworking. Explain the parts of Circular Sawing Machine. Explain the basic principle of Circular Sawing Machine. Elaborate the main functions of Circular Sawing Machine.	Circular saw machine Charts Whiteboard I.T Teaching aids Video clips P.P.E Kits Marker Projector Computer	Carry out the following operations on a circular sawing machine: - ripping stock to width - cutting stock to length - grooving - trenching - bevel cutting - miter cutting Keep the machine in good state after use.	Guide the students to: Carry out the following operations on a circular sawing machine: - ripping stock to width - cutting stock to length - grooving - trenching - bevel cutting - miter cutting Keep the machine in good state after use.	Circular sawing Machine Accessories

		Explain the working principles of circular sawing machines. Explain the specific uses of each of the following machine: ➢ Cross cut saw. ➢ Rip saw. ➢ Dimension saw. Explain safety precautions related to the circular sawing machine.				
General Objective 8.0: Understand the process of Carcase Construction.						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
10	8.1 Define Carcase Construction. 8.2 List the types of saw blade used on Carcase Construction. 8.3 State the primary function of Carcase Construction. 8.4 State the importance of Carcase Construction in woodworking. 8.5 List the parts of Carcase Construction. 8.6 State the basic principle of Carcase Construction work using sketches of various	Explain Carcase Construction. Discuss the types of saw blade used on Carcase Construction. Explain the primary function of Carcase Construction. Explain the importance of Carcase Construction in woodworking.	Models Charts White board Markers I.T Teaching aids P.P.E Kits Projector Computer	Use hand tools to construct: Angle joints. Widening joints. Make woodwork items based on carcase construction. Carry out carcase constructions. Test carcase for squareness.	Guide students to: Use hand tools to construct: Angle joints. Widening joints. Make woodwork items based on carcase construction. Carry out carcase constructions.	Hammer Tape Pincers Saw Try square Mortise gauge

	joints. 8.7 State main functions of Carcase Construction. 8.8 State the uses of common joins used in carcase construction: ➢ Widening joints: ➢ Butt ➢ Dowel ➢ Tongues and groove ➢ Slot-screw joints ➢ Angle joints ➢ Mitre ➢ Lap joint ➢ Through dovetail ➢ Lap dovetail ➢ Secret mitre ➢ dovetail ➢ Intermediate Joints ➢ Housing joint ➢ Dovetailed- housing joint. 8.9 State the functional requirements of joints. 8.10 State different Models of various joint used in carcase construction.	Discuss the parts of Carcase Construction. Explain the basic principle of Carcase Construction work using sketches of various joints. Explain main functions of Carcase Construction. Explain the uses of common joins used in carcase construction: ➢ Widening joints: ➢ Butt ➢ Dowel ➢ Tongues and groove ➢ Slot-screw joints ➢ Angle joints ➢ Mitre ➢ Lap joint ➢ Through dovetail ➢ Lap dovetail ➢ Secret mitre ➢ dovetail ➢ Intermediate		Lip edges of man-made boards using: Veneer, solid piece, (plain or moulded) Make simple carcase moulding. Sketch common joints used for carcase construction. Assemble frame of carcase. Test the frame for squareness and out of wind.	Test carcase for squareness. Lip edges of man-made boards using: Veneer, solid piece, (plain or moulded) Make simple carcase moulding. Sketch common joints used for carcase construction. Assemble frame of carcase. Test the frame for squareness and out of wind.	Marking gauge Sliding bevel

		Joints ➢ Housing joint ➢ Dovetailed-housing joint. Explain the functional requirements of joints. Exhibit different Models of various joint used in carcase construction.				
General Objective 9.0: Know the processes of Frame Construction						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
11	9.1 Define Frame Construction. 9.2 List the types of saw blade used on Frame Construction. 9.3 State the primary function of Frame Construction. 9.4 State the importance of Frame Construction in woodworking. 9.5 List the parts of Frame Construction. 9.6 State the basic principle of Frame Construction work using sketches of various joints. 9.7 State main functions of Frame Construction. 9.8 State the uses of common	Explain Frame Construction. Discuss the types of saw blade used on Frame Construction. Explain the primary function of Frame Construction. Explain the importance of Frame Construction in woodworking.	Models Charts Whiteboard Marker Projector Computer I.T Teaching aids P.P.E Kits Tools and Equipment	Select tools for frame installation requirements. Demonstrate frame installation requirements. Produce the joints using hand and machines, Apply hand tools correctly in accordance with instructions given for the construction of frames. Make sketches of framing joints	Guide the students to: Select tools for frame installation requirements. Demonstrate frame installation requirements. Produce the joints using hand and machines, Apply hand tools correctly in accordance with instructions given for the construction of frames.	Hammer Tape Pincers Saw Try square Mortise gauge Marking gauge

	joins used in Frame construction: ➢ Widening joints: ➢ Butt ➢ Dowel ➢ Tongues and groove ➢ Slot-screw joints ➢ Angle joints ➢ Mitre ➢ Lap joint ➢ Through dovetail ➢ Lap dovetail ➢ Secret mitre ➢ dovetail ➢ Intermediate Joints ➢ Housing joint ➢ Dovetailed- housing joint. 9.9 State the functional requirements of joints. 9.10 State different Models of various joint used in Frame construction. 9.11 List factors that must be considered in frame construction: ➢ rigidity ➢ Jointing method ➢ Squareness of frame in all ➢ directions 9.12 State the principles of	Discuss the parts of Frame Construction. Explain the basic principle of Frame Construction work using sketches of various joints. Explain main functions of Frame Construction. Explain the uses of common joins used in Frame construction: ➢ Widening joints: ➢ Butt ➢ Dowel ➢ Tongues and groove ➢ Slot-screw joints ➢ Angle joints ➢ Mitre ➢ Lap joint ➢ Through dovetail ➢ Lap dovetail ➢ Secret mitre ➢ dovetail ➢ Intermediate Joints ➢ Housing	Drawings		Make sketches of framing joints	Sliding bevel

	triangulation in relation to the rigidity of a square frame carcase.	joint ➢ Dovetailed-housing joint. Explain the functional requirements of joints. Discuss different Models of various joint used in Frame construction. Explain factors that must be considered in frame construction: ➢ rigidity ➢ Jointing method ➢ Squareness of frame in all directions Explain the principles of triangulation in relation to the rigidity of a square frame carcase.				
General Objective 10.0: Know the operations of an edge banding machine.						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
	10.1Define edge banding machine.	Explain the use of edge banding machine.	Posters of edge	Perform edge banding.	Guide the students to: Perform edge banding.	Edge banding machine

	10.2 State the primary function of edge banding machine. 10.3 State the importance of edge banding machine in woodworking. 10.4 List the parts of edge banding machine. 10.5 State the basic principle of edge banding machine. 10.6 State the function of edge banding machine. 10.7 State the working principles of the edge banding machine. 10.8 State safety precautions to be observed when using the edge banding machine.	Explain the primary function of edge banding machine. Explain the importance of edge banding machine in woodworking. Discuss the parts of edge banding machine. Explain the basic principle of edge banding machine. Explain the function of edge banding machine. Explain the working principles of the edge banding machine. Explain safety precautions to be observed when using the edge banding machine.	Banding machine. Whiteboard Marker Projector Computer Lesson note	Identify all parts of the machine.	Identify all parts of the machine.	Compressor
13	**Examinations: Practical = 70%; Theory = 30%**					

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN FUNITURE MAKING AND UPHOLSTERY.			
Module: Wood and metal finishing		**MODULE CODE: CPD 12**	**TOTAL CONTACT HOURS: 240HRS**
YEAR: 3	**TERM:** 1	**PRE: REQUISITE:**	**Theoretical:** 36 Hours **Practical:** 204 Hours
Goal: This module is designed to provide the trainee with knowledge and skill to design, construct and finish wood and metal furniture items to industry standard.			
General Objectives: On completion of this module, the trainee should be able to: 1. Understand wood and metal finishing. 2. Understand wood and metal furniture design.			

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN ENGINEERING CRAFT PRACTICE						
MODULE: Wood and metal finishing				**MOUDLE CODE: CPD 12**		**CONTACT HOURS: 240 Hours**
Module Specification: Theoretical and Practical Content						
YEAR: 3	**TERM:** 1	**PRE: REQUISITE:**	**Theoretical:** 36 Hours **Practical:** 204 Hours			
GOAL: This module is designed to introduce the trainee to design, construct and finish wood and metal furniture items to industry standard.						
Theoretical Content				**Practical Content**		
General Objective 1.0: Understand wood and metal finishing.						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Resources**
1-6	1.1 Discuss the layout of a standard spray boot and its standard structural requirements such as lighting, types and sizes of work stations, safety installations, storage facilities, etc.	Explain how to draw plan of a spray painting workshop and mark out activity areas for typical operations	Charts showing typical workshop lay-out. Furniture Items for spraying Metal sheet to be sprayed etc.	Prepare a layout sketch of a standard spray boot showing standard structural requirements e.g. lighting, types and sizes of work stations, safety installations, storage facilities, etc.	Guide students to: draw plan of a spray painting workshop and mark out activity areas for typical operations	Spray equipment such as compressor, cylinder and spray guns brushes

	1.2 Explain the layout features of a typical low bake and make conveyor ovens. 1.3 Explain the necessary considerations for effective spraying and describe methods of their attainment e.g. pure air, adequate temperature and humility, proper lighting. 1.4 Describe how to dry prepared surfaces by using air duster or chamois leather 1.5 Explain how to mask up job prior to spray painting using: (i) masking paste (ii) masking tape(iii) masking paper. 1.6 Describe the adjustment of :(i) material setting(ii) pressure S-in a spray test area. 1.7 Describe the process of preparing newly fabricated and rusted (old) ferrous metal surfaces, aluminum alloy surface, glass fibre reinforced plastics and resinous and oily woods for spray finishing. 1.8 State the process of carrying out masking operation. 1.9 Describe the process of organizing and executing operations involved in spray finishing such as;	Explain the characteristics of various spray surfaces e.g. wood surface, ferrous and non-ferrous metal, fibre, etc. Enumerate the sequence of operation involved in spray work.	Whiteboard Marker Projector Computer	Make outline sketches showing the layout features of a typical low bake and make conveyor ovens. Identify necessary considerations for effective spraying and describe methods of their attainment e.g. pure air, adequate temperature and humility, proper lighting. Dry the prepared surfaces by using air duster or chamois leather. Mask up job prior to spray painting using:(i) masking paste(ii) masking tape(iii) masking paper. Spray test area taking care to adjust:(i) material setting(ii) pressure. Prepare newly fabricated and rusted (old) ferrous metal surfaces, aluminum alloy surface, glass fibre reinforced plastics and resinous and oily woods for spray finishing. Carry out masking operation. Execute operations involved in spray finishing such as;	Identify the characteristics of various spray surfaces prepare surface by using air duster, chamois leather and masking tape prior to spraying. Guide the students to carry out complete finishing operation on a given furniture item using: hand brush; spray gun etc.	

7-9	cellulose synthetic (half-hour enamel), acrylic enamel and other classes of metallic paints:(i) complete spray from bare metal(ii) refinishing over an existing finish(iii) local repair. 1.10 Describe the essential operations to be carried out after spraying and explain their importance e.g. removal of masks, burnishing, polishing, removal of over-spray, cleaning and refitting of parts removed from machine, vacuum cleaning of the interior, lining work.			cellulose synthetic (half-hour enamel), acrylic enamel and other classes of metallic paints:(i) complete spray from bare metal(ii) refinishing over an existing finish(iii) local repair. removal of masks, burnishing, polishing, removal of over-spray, cleaning and refitting of parts removed from machine, vacuum cleaning of the interior, lining work.		
General Objective 1.0: Understand wood and metal furniture design.						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
10-12	1.11 Discuss defects in finished spray work and explain their possible causes, preventive and repair measures e.g. blistering, blooming, brushing, bridging, cob-webbing dry spray, excessive overspray, lifting, orange peel, pin-holing, runs, sags, curtains, shelving, discoloration, etc. 1.12 Explain the final detailed operations after spraying. 1.13 Describe finishing and	Describe the process of carrying out complete finishing work on a furniture item using hand brush; spray gun, etc.	Tools Materials Furniture item Equipment Solvent. Whiteboard Marker Projector Computer	Spot defects in finished spray work and explain their possible causes, preventive and repair measures e.g. blistering, blooming, brushing, bridging, cob-webbing dry spray, excessive overspray, lifting, orange peel, pin-holing, runs, sags, curtains, shelving, discoloration, etc. Execute final detailed operations after spraying.	Guide students to: carry out complete finishing work on a furniture item using hand brush; spray gun, etc. perform such projects.	compressor, cylinder spray guns

	refinishing job that is comparable to factory standard. 1.13 check for defects and the preventive or remedial measures to be taken against such defects in furniture spraying work. 1.14 state conditions under which defective parts of the spray gun should be replaced. 1.16 Explain how to dismantle a spray gun. 1.16 State the appropriate solvent for cleaning up spray gun components. State measures to be taken to prevent spray gun components from rusting. 1.17 Explain how to re-assemble spray gun components for storage. 1.18 Explain the process off maintaining other tools used in spray painting. 1.19 Explain the importance of tidying up work and work environment/premises.			Inspect finishing and refinishing job and certify that it is good enough to factory standard. Check for defects and take preventive or remedial measures against such defects in furniture spraying work. Identify and replace defective parts of the spray gun. Dismantle the gun. Clean up the spray gun components with appropriate solvent. Grease and oil spray gun components to prevent rusting. Re-assemble spray gun components for storage. Maintain other tools used in spray painting. Tidy up work and work environment/premises.		
Week 13	**Examination Theory 30% Practical 70%**					

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN FUNITURE MAKING AND UPHOLSTERY.			
MODULE: GENERAL METAL WORK I		**MODULE CODE: CME 11**	**TOTAL CONTACT HOURS: 168 HRS**
YEAR: 1	**TERM: 2**	**PRE: REQUISITE:**	**Theoretical:** 48 Hours **Practical:** 120 Hours
Goal: This module is designed to introduce the trainee to the fundamentals of general metal work processes including fitting of mechanical parts and production of simple engineering component.			
GENERAL OBJECTIVES: On completion of this module the student will be able to: 1. Understand workshop safety rules. 2. Know the physical properties of metals in common use. 3. Understand metal work tools. 4. Understand the working principles of drilling machine. 5. Understand the application of screw threads and rivets. 6. Understand the ISO system of tolerances and fit. 7. Know the Production process of engineering components. 8. Understand the working principles of Centre-lathe.			

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN ENGINEERING CRAFT PRACTICE						
MODULE: General metal work I				**MOUDLE CODE: CME 11**		**CONTACT HOURS: 7hrs/wk PER WEEK: T2, P5**
Module Specification: Theoretical and Practical Content						
YEAR: 1	**TERM:** 2	**PRE: REQUISITE:**		**Theoretical:** 36 Hours **Practical:** 48 Hours		
GOAL: This module is designed to introduce the trainee to the fundamentals of general metal work processes including fitting of mechanical parts and production of simple engineering component.						
Theoretical Content				**Practical Content**		
GENERAL OBJECTIVE 1.0: Understand workshop safety rules.						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**

1	1.1 State sources of hazards in the workshop and how to prevent them. e.g. a handling and using hand tools, portable power tools and machines; b stepping on or striking obstructions left on floors or benches; c lifting, moving and storing materials or jobs; d using inflammable or corrosive liquids and gases; e inhaling vapours or fumes; 1.2 Explain the application of factory safety regulations in the machine shop 1.3 Name safety equipment and wears essential in the machine shop, and state their application in working situations. Note: Example of safety wears and equipment should include overall, eye goggles, gloves, safety boots, helmet, fire extinguishers, etc. 1.4 Outline safety rules and regulations relating to: a. Clothing and health hazards; b. Workshop hygiene; c. Movement and other	Explain sources of hazards in the workshop through questions and answers, determine whether the students grasped the topic Show a film on industrial safety through questions and answers determine comprehension. Demonstrate how to treat emergency cases like artificial respiration, cold compress etc. List the safety equipment and wears that are essential in the workshop. Give detail notes and explanation in each topic a-e. Use questions and answers to	Safety posters, common hand tools like files hacksaw Television, Video machine. Overall, goggles, gloves, hard shoes, head shield, fire extinguishers.	Use hand tools, portable power tools and machine safely. Lift, move and store materials or job carefully Demonstrate first aid application in cases of minor cuts, electric shock, burns.	Guide the students to: Demonstrate safe ways of handling basic hand tools. Show a film on industrial safety. Demonstrate how to treat energy cases like artificial respiration cold compress, etc	First aid box

	behaviour of workers in the workshops; d. Materials handling. e. Tool handling, storage and usage. f. Machine operation. g. Fire protection. 1.5 Understand appropriate procedures in the events of a workshop accident. 1.6 Examples of procedures may include: a application of first aid to the victim; b removal or rectification of the accident. c reporting the accident to the appropriate authority. 1.7 keeping a record of accidents for management use.	determine comprehension. Assess the students. ▪ Give detail notes and explanation on appropriate procedures to be taken in the event of workshop accident				
GENERAL OBJECTIVE 2.0: Know the physical properties of metals in common use.						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
	1.1 Explain the meaning of the following general physical properties of metals: - ductility, malleability, strength, toughness, brittleness, elasticity, plasticity. 1.2 Describe the basic composition and properties of plain	▪ Give detail notes and explanations to explain the meaning of the following general physical properties of metals: ductility, malleability, strength,	Video clips Cassettes Whiteboard Marker Projector Computer	Identify the following metals based on their properties: plain carbon steels, cast iron and alloy steel and state their application in the engineering industry	Guide students to: Identify the following metals based on their properties: plain carbon steels, cast iron and alloy steel and state their application in	

	carbon steels, cast iron and alloy steel and state their application in the engineering industry. Note: Specific examples of tools and equipment made from the various steel and cast iron should be mentioned. Examples of steels and cast irons should include: plain carbon steels, dead mild steels, mild steel, medium carbon steel, high carbon steel. Cast Irons - grey cast iron, malleable cast iron, iron carbide, alloy cast irons (spheroidal and acicular). Alloy Steels - high speed steels, high tensile steels, tungsten, stainless steels. 2.3 Outline: a The copula process of manufacture of cast iron; b The blast furnace process of manufacture of pig iron; c The direct reduction process of manufacture of steel. Note: A visit to a steel manufacturing plant is recommended.	toughness, brittleness, elasticity, plasticity. Assess the students. ▪ Give detailed notes and explanations for the topics in 2.1 ▪ Give notes and specific examples of tools and equipment made from the various steels and cast iron. ▪ Examples of steels and cast irons should include plain carbon steels, dead mild steels, mild steel, medium carbon steel high carbon steel, grey cast iron, malleable cast iron, iron carbide, alloy cast iron, high speed steels, high tensile steels, tungsten, stainless steels ▪ Give notes and explanation on the		Identify the following non-ferrous metals based on their properties: copper, tin, zinc, aluminum and aluminum alloys, brass bronze, etc.	the engineering industry. Guide students to Identify the following non-ferrous metals based on their properties: copper, tin, zinc, aluminum and aluminum alloys, brass	

	2.4 Describe the physical properties and applications of non-ferrous metals below: copper, tin, zinc, aluminum and aluminum alloys, brass (muntz metal, cartridge brass, gilding etc.) metal, bronze (manganese bronze, gunmetal, bell metal, aluminum bronze, phosphor bronze and lead.	cupola process, the blast furnace and the direct reduction process of manufacture of steel. ▪ This can be preceded by film show and a visit to be manufacturing plant. Give detail notes and explanations describing the physical properties and applications of the following non-ferrous metals: copper, tin, zinc, aluminum, aluminum alloys, brass, (muntz metal, cartridge brass, gilding metal) etc. bronze, manganese bronze, bell metal, aluminum bronze, phosphor bronze and lead. Assess the students				
GENERAL OBJECTIVE 3.0: Understand metal work tools.						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
	3.1 Explain with examples the difference between "line" and "end" measurement.	Prepare notes that will clearly differentiate	Steel rule, dividers calipers, trammel, scriber, angle	Cary out "line" and "end" measurement.	Guide students to:	▪ Bench drill, pillar drill, drill bits

	3.2 Explain the use of datum points, datum lines and datum faces in marking out. 3.3 Describe, the functions and application of the following instruments used in metal-work; steel rule, dividers, calipers (inside, outside and odd-legs), trammel, scriber angle plate, vee-block, Centre square. 3.4 Describe the various types of files, stating their grades and applications. Note: Types of files should include: flat, square, round, half round, three square, warding pollar, mill and rasp. 3.5 Classify the common files use in metal work and state their composition of material used for their manufacture. 3.6 Sketch the bench vice, explain its clamping power and demonstrate the technique of holding work in the vice for filing, tapping and designing operations. 3.7 Describe the functions of the various parts of a bench	between "line" and "end" measurement. Prepare notes and examples that will explain the use of datum points, datum lines, and datum faces in marking out. Demonstrate, give detailed notes and explanations regarding the functions and application of: steel rule, dividers, calipers (inside, outside and oddleg) trammel, scriber, angle plate, vee-block, Centre square Prepare notes that will describe the various types of files stating their grades and applications. By type it means: flat, square round, half round, three square, warding, mill and rasp. Prepare detail notes that will classify the common files used in	plate, vee-block, Centre square. Micrometer Vernier calipers Vernier height gauge combination set Flat file, hard file, round file square, half round, triangular warding, mill file, rasp file. Flat file, hand file engineers square. Surface plate try square (engineers square) Bench vice. Ball pein hammers mallets. Cold chisels, Centre punches, dot punch, scrapers, power hacksaw and blades. Hacksaw blade	Use datum points, datum lines, and datum faces in marking out. Demonstrate, the functions and application of: steel rule, dividers, calipers (inside, outside and oddleg) trammel, scriber, angle plate, vee-block, Centre square in marking out Classify the common files used in the metal work. Show a bench vice and demonstrate holding of the work in a vice for filing, tapping and designing operations.	Cary out "line" and "end" measurement. Use datum points, datum lines, and datum faces in marking out. Demonstrate, the functions and application of: steel rule, dividers, calipers (inside, outside and oddleg) trammel, scriber, angle plate, vee-block, Centre square in marking out Classify the common files used in the metal work. Show a bench vice and demonstrate holding of work piece in a vice for filing, tapping and	▪ Bench drill, pillar drill, twist drill, flat drill, counter sink drill, counterbore drill, center drill ▪ Drills, taps, tap wrench, die and die stock ▪ Rivets and sets of drill bits Surface table, surface plate, marking solution, center/dot punches, scribing block

	vice, its holding power while performing various operations on its, such as filing, tapping sawing etc. 3.8 Describe and use the following tools: a. cold chisels (flat, cross, cut half round, diamond-point) b. Centre punch and dot punch c. scrappers (flat, triangular half round) d. power hack saw 3.9 Describe the various parts of a hack saw and their function. 3.10 Describe the common types of hacksaw blades, their range of pitches and their applications. 3.11 Show a bench vice and demonstrate the technique of holding work in the vice for filing, tapping and designing operations. 3.12 Prepare detailed notes that will describe the functions of the various parts of a bench vice, its holding power while performing various operations.	the metal work as well as stating the composition of materials used for their manufacture. Show a bench vice and demonstrate the work in the vice for filing, tapping and designing operations. Prepare detailed notes that will describe the functions of the various parts of a bench vice, its holding power while performing various operations. Assess the students. Prepare detailed notes and demonstrations that will describe the uses of: cold chisels, Centre punch, dot punch, scrapers and power hacksaw. Prepare notes that will describe the various parts of a hacksaw and their functions.	Hacksaw frame Adjustable hacksaw junior hacksaw piercing saw.		designing operations.	

	3.13 State the safety precautions to be observed when using a hand hacksaw	Show samples of hacksaw blades as well as prepare notes that will describe the common types of hacksaw blades, their range of pitches and their applications. Prepare notes that will show correct way of inserting blades. Prepare detail notes and explanation, stating the safety precautions to be observed when using a hand hacksaw. Prepare notes that will describe the uses of various hacksaws. Assess the students				

GENERAL OBJECTIVE 4.0: Understand the working principles of a drilling machine.						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**		**Teachers Activities**	**Learning Resources**
	4.1 Identify the various types of drilling machines. 4.2 Describe the main features of a bench	Describe different types of drilling machines Describe the main features of a bench or pillar drilling machine.	Bench drill Pillar drill. Twist drill, flat drill counter sink drill	Identify the various types of drilling machines. Sketch and label the main features of a bench or pillar drilling machine.	Guide students to: Identify the various types of drilling machines.	Point tools, grinding machine, lathe machine

	or pillar drilling machine. 4.3 State where each of the following types of drills are best suited. e.g. twist drill (taper shank, parallel shank and jobbers drill, and their relative merits), flat drill, countersink drill, counter bore drill, combination Centre drill. 4.4 State the effects of the following faults in a ground twist drill bit: a. point angle too acute. b. point angle too obtuse. c. cutting edges at unequal angles. d. insufficient lip clearance e. excessive lip clearance. 4.5 Explain how to calculate spindle revolution or cutting speed for specified size of drill using the formulae:-	Explain describe where each of the following drills are best suited Twist drill (taper shank, parallel shank, jobber drill and their relative merits), flat drill, counterbore drill and combination center drill. Explain the effects of the following faults in a ground twist drill bit: a. point angle too acute. b. point angle too obtuse. c. cutting edges at unequal angles. d. insufficient lip clearance e. excessive lip clearance. Explain how Calculate spindle revolution or cutting speed for specified size of drill using the formulae:- Explain the cause and remedy of drilling faults such as:-	counter bore drill combination Centre drill. Ball pein hammers mallet, cold chisels, dot/center punches, hacksaw and hacksaw blades Drilling machines and its accessories.	Use the following drills for different operations. e.g. twist drill (taper shank, parallel shank and jobbers drill, and their relative merits), flat drill, countersink drill, counter bore drill, combination Centre drill. Perform reaming operation to given specification by hand and machine method.	Sketch and label the main features of a bench or pillar drilling machine. Use the following drills for different operations. e.g. twist drill (taper shank, parallel shank and jobbers drill, and their relative merits), flat drill, countersink drill, counter bore drill, combination Centre drill. Perform reaming operation to given specification by hand and machine method.	3-jaw chuck and lathe machine Point tools lathe machine Lathe machine and accessories Centre lathe and accessories like catch plate, face plate, dog lathe, lathe centers fixed steady and traveling steading Round nose turning tool, fine finishing tool, form tool, parting off tool, drilling tool, bar of good length and 4mm diameter, Live/dead centers catch plates Standard exercises or prepared exercises.

	4.6 State the cause and remedy of drilling faults such as:- a. drill breaking; b. drill coloured blue; c. walls of drilled hole left rough; d. chipped cutting lips. 4.7 State the safety precautions to be observed when using a drilling machine. 4.8 State the purpose of reaming and describe different types of hand and machine reamers. 4.9 state the process of reaming to a given specification by hand and machine method.	e. drill breaking; f. drill coloured blue; g. walls of drilled hole left rough; h. chipped cutting lips. Explain the safety precautions to be observed when using a drilling machine. Explain the purpose of reaming and describe different types of hand and machine reamers. Explain how to ream to given specification by hand and machine method.				
General Objective 5.0: Understand the applications of screw threads and rivet.						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
	5.1 Describe the thread forms below and state their applications:- a the ISO metric thread	Describe the various forms of thread and their uses.	Diagrams/charts of thread forms Parallel reamers taper reamers twist drills.	Sketch various forms of thread. Identify taps, tap wrench, die and die stock .	Gude students to: Sketch various forms of thread.	Taps, tap wrench, stock .and dies

	b the unified thread c Whitworth and British fine threads d British Association (BA) thread e British Standard pipe f Square thread g Acme thread h Buttress thread. 5.2 State the functions of:- a taps (taper tap, second tap, plug) b tap wrench c die and die stock. 5.3 State the meaning of tapping size or tapping drill and estimate its value in given situations using formulae such as:- T = D - P Where T = tapping diameter D = thread top diameter P = pitch 5.4 State precautions to be taken when taping on the bench.	Explain the functions of taps, tap wrench, die and die stock . Explain how to produce internal and external threads. Explain tapping size or tapping drill and estimate its values using the formula: T = D – P Where T = tapping diameter D = thread top diameter and P = Pitch Explain different types of rivets, rivet sets, and their uses and how to calculate the diameter of rivet and riveting allowance.	Rivet sets Whiteboard Marker Projector Computer	Use tap and tap wrench to produce internal and external threads.	Identify taps, tap wrench, die and die stock . Use tap and tap wrench to produce internal and external threads	

	5.5 Describe and differentiate types of rivets. e.g. Snap and pan head, mushroom and counter-sunk head, flat head, dod rivet, etc. 5.6 Sketch the rivet set and state its use. 5.7 Calculate the diameter of rivet and riveting allowance in given situations.					
General Objective 6.0: Understand the ISO system of tolerances and fits.						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
	6.1 Differentiate between the following:- a nominal size b limits (upper and lower) c tolerance (unilateral and bilateral) d fit (clearance, transition interference). 6.2 Explain the importance of tolerance and fit in engineering production and	Give detailed notes that will differentiate between nominal size, limits, tolerance and fits. Prepare detailed note and diagrams that will explain the important of tolerance and fits in engineering production as well as describing the ISO systems of limits and fits. Give notes and explanations that will guide in calculating the	Whiteboard Marker Projector Computer Charts on tolerances, limits and fits.			

	describe briefly the ISO system of limits and fits. 6.3 Determine by calculation the amount of tolerance and types of fit in given situations.	amount of tolerance and types of fits in given situations. Assess the students.				
General Objective 7.0: Know the Production process of Engineering Components						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
	7.1 Explain layout procedures from working drawing of simple engineering components or tools such as:- a open ended spanner b engineer's try square c tool maker's clamp d plate bracket or gusset (involving rounds, angles, holes) e Centre square. 7.2 Explain how to produce any simple engineering component to given specifications including dimensions,	Teachers to prepare notes and explanations to guide the students in producing simple engineering components as in 7.1 Assess the students.	Lesson notes Diagrams charts. Whiteboard Marker Projector Computer			

	tolerance and finish 7.3 Explain how to carry out simple precision fitting project. e.g. hexagonal mild steel bar making push fit through a mild steel plate.					
General Objective 8.0: Understand the working principles of the Centre lathe.						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
	8.1 Describe the essential features of a Centre lathe and state their functions e.g. lathe bed, headstock, tailstock, saddle or carriage, etc. 8.2 Explain the working principles of the Centre lathe. 8.3 Identify and state the functions of Centre lathe accessories such as: catch or driving plate, face plate, lathe dog or carrier, lathe centers, fixed and travelling steadies. 8.4 Explain the difference between the Centre lathe,	Prepare detailed notes that will describe the essential features of center lathe and their functions. Give notes and diagrams that will explain the working principles of center lathe and functions of its accessories. Give explanations that will show the difference between center lathe and capstan lathe in terms of their main features and functions. Prepare notes that will list types of cutting fluid used for lathe turning	Centre lathe and accessories like catch plates, face plates, centers, fixed and traveling steadies. Charts of center lathe and capstan lathe. Round nose turning tool, finishing tool, site finishing, knife tool, form tool, parting off tool, and drilling tool. Charts on tool height Charts and diagrams of different			

	capstan lathe, in terms, of their main features and functions. 8.5 Name types of cutting fluids used for lathe turning operations and state their composition and purposes. 8.6 Outline safety precautions to be observed when working on the lath 8.7 Sketch and describe common tools: e.g. butt-brazed tool, tipped tool, bit and holder. Note: Tool description should include tool materials e.g. plain carbon steel, high speed steel, stellite, cemented carbide, diamond. 8.8 Explain with sketches the functions of tool angles (rake, clearance), and state their values for different metals to be machined.	operations and their composition and purposes. Prepare detailed notes and explanation that will outline safety precautions, common tools and materials used in marking them. Give detailed notes and diagrams that will explain the functions of tool angles, (rake, clearance) stating their values for different metals to be machined. Assess the students. Give notes and diagrams of various tool shapes and their uses. Prepare detailed notes and explanations to cover 8.10 to 8.15 Solve many problems for the students practice. Assess the students	machining operations.			

	8.9 Differentiate between various tool shapes and state their uses e.g. Round nose rougher, fine finishing, side finishing, knife tool, form tool, parting off tool, drilling tool, etc. 8.10 Explain with sketches the effects of wrong setting of cutting tool: e.g. vibration and chatter, tool rubbing against or digging into the job. 8.11 Define cutting speed and feed with respect to lathe operation. 8.12 Calculate the cutting speed and feed for given turning operation. 8.13 Estimate the rate of metal removal and time required for carrying out specified turning operations 8.14 State precautions to be observed when turning between centers'.					

	8.15 Set up the lathe for and carry out basic turning operations between centers. 8.16 Compute required taper dimensions from given data using taper ratio angle formulae i.e. Taper Ratio = $\frac{d2 - d1}{L}$ OR $\underline{\text{Tan}\ \theta} = \frac{d2 - d1}{2}$ where $\underline{\theta}$ = taper angle d1 - small end diameter d2 = large end diameter L = length of taper					
Week 13						

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN FUNITURE MAKING AND UPHOLSTERY.			
MODULE: GENERAL METAL WORK II		**MODULE CODE: CME 12**	**TOTAL CONTACT HOURS: 240HRS**
YEAR: 2	**TERM:** 1	**PRE: REQUISITE:**	**Theoretical:** 36 Hours **Practical:** 48 Hours
Goal: This module is designed to introduce the trainee to basic processes in mechanical engineering such as forging, sheet-metal work and welding.			
GENERAL OBJECTIVES: On completion of this module, the trainee should be able to: 1. Understand heat treatment of metal. 2. Know the Production of engineering components by forging. 3. Understand the process of gas and metal arc welding.			

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN FUNITURE MAKING AND UPHOLSTERY.					
MODULE: GENERAL METAL WORK II			**MODULE CODE: CME 12**	**CONTACT HOURS: 2hrs Theory; 1Hr. Practical/Wk.**	
YEAR: 2	**TERM:** 1	**PRE: REQUISITE:**	**Theoretical:** 36 Hours **Practical:** 48 Hours		
Goal: This module is designed to introduce the trainee to basic processes in mechanical engineering such as forging, sheet-metal work and welding.					
Theoretical Content			**Practical Content**		
GENERAL OBJECTIVE: 1.0 Understand heat treatment of metal.					
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
1-2	1.1 Explain briefly the structural behaviour of Plain Carbon Steel as it is heated from room temperature	Prepare detail notes that will explain the structural behaviour of Plain Carbon Steel as it is heated from temperature to about 1000^{o}C	Recommended Textbooks Lesson notes Whiteboard Marker Projector Computer	Carry out the following heat treatment processes Hardening, tempering, annealing, normalizing, case hardening on given plain carbon steel, engineering component or tool.	Guide the students to: Demonstrate heat treatment processes and explain the stages	Furnace Forge tongs

	to about 1000°C a. Hardening b. Tempering c. Annealing d. Normalizing e. Case-hardening 1.2 Explain the meaning of hardening metal work. Outline safety precautions relating to heat treatments processes and apply them to given situations.	Prepare detail notes that will explain the meaning of hardening in metal work Prepare notes that will outline safety precautions relating to heat treatment processes. Assess the students.		Anneal copper, brass and aluminium for various purposes	Demonstrate the annealing process on brass, copper and aluminum for various purposes. Assess the students.	
General Objective 2.0: Know the Production of Engineering Components by Forging.						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
5- 6	2.1 Explain with outline sketch the main features and working principles of the blacksmith's forge. 2.2 Describe and state the functions of common forging tools, e.g. anvil,	Prepare detail notes and diagrams that will explain the main features and working principles of the Blacksmith's forge. Prepare notes and diagrams that will describe the functions of common forging tools.	Diagrams of Forges Forging tools. Whiteboard Marker Projector Computer	Select appropriate forging tools and produce to specification given engineering components by forging processes a. Upsetting – drawing down b. Setting down – twisting c. Forge welding (scarf	Guide the students to: Demonstrate with appropriate forging tools how to produce some engineering components and let the student practice till they become competent	Anvil, swage block, leg vice, forging hammers, hot set, cold set, sets of hammer, punchers, drifts, fillers, top swage, bottom swage, flatter, open tongs, hallow bit

7-8	swage block, leg vice, forging hammers, hot and cold sets, set hammer, punches and drifts, hardie, fullers, top and bottom swages, flatter, tongs (open mouth, closed mouth, hollow bit, etc.) 2.3 Describe using sketches the following forging operations: a. Upsetting b. Drawing c. Setting down d. Twisting e. Forge welding (scarf and splice welds) f. Bending g. Forming closed ring h. Forming an eye	Prepare detail notes that will describe the following forging operations: upsetting, drawing down, setting down, twisting, forge welding, bending, forming closed ring and forming an eye. Assess the students.		and spice welds) d. Bending, turning closed ring Forming an eye	Assess the students	

GENERAL OBJECTIVE 3.0: Understand the process of gas and metal arc welding.						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
9-12	1.1 List gas and arc welding equipment 2.1 explain the basic principles and applications of gas and metal arc welding. 1.2 State the safety precautions to be observed and apply them in given welding situations. 1.3 State the uses of different welding tools and equipment	Describe gas and arc welding equipment Explain the basic principles and applications of gas and metal arc welding. 1.4 Explain the safety precautions to be observed and apply them in given welding situations. Explain the uses of different welding tools and equipment	Oxygen and Acetylene cylinder with regulators. Arc welding set, Goggles, Shield, Electrodes Diagrams and charts of various welding joints and techniques. Whiteboard Marker Projector Computer	Set up and operate gas or metal arc welding equipment in given situations. Prepare joints for welding in given situations Weld given components by arc or gas welding methods, and state safety precautions to be observed	Guide students to: Use of both gas and metal arc welding equipment; and all the students to practice. Prepare joints for welding purposes Weld various components using both gas and arc welding processes and state safety precautions to students to practice till competent	Oxygen and acetylene cylinders with regulations, arc welding equipment, goggles, shield, electrodes, diagrams and charts of various welding joints
Week 13	**Examination – Practical 60%, Theory 40%**					

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN FUNITURE MAKING AND UPHOLSTERY.			
MODULE: FUNITURE DESIGN AND CONSTRUCTION I		**MODULE CODE: CFC 11**	**TOTAL CONTACT HOURS: 240HRS**
YEAR: 1	**TERM: 3**	**PRE: REQUISITE:**	**Theoretical:** 36 Hours **Practical:** 48 Hours
Goal: This module is designed to provide the trainee with the basic knowledge and skill to enable him understand simple furniture and Construction			

GENERAL OBJECTIVES:

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

1. Understand design elements.
2. Know design principles.
3. Know Anthropometrics Principles
4. Know the principles of timber preparation.
5. Understand the interpretation of drawings and sketches
6. Know the nature of timber growth and structure.
7. Know the principles of timber finishing
8. Understand timber conversion and seasoning.
9. Understand timber defects.
10. Know the technical terms in furniture work.
11. Know the adhesives used in Furniture work

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN FUNITURE MAKING AND UPHOLSTERY.						
Module: Furniture Design and Construction I				**MOUDLE CODE: CFC 11**		**CONTACT HOURS 180**
Module Specification: Theoretical and Practical Content						
YEAR: 1	**TERM: 3**	**PRE: REQUISITE:**	**Theoretical:** 36 Hours **Practical:** 144 Hours			
GOAL: This module is designed to introduce the trainee to understand design elements						
Theoretical Content				**Practical Content**		
General Objective: 1.0 Understand design elements						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**

1	1.1 Define design elements 1.2 State the basic design elements. 1.3 Explain how these elements affect the quality of a design. 1.4 State how these elements affect the quality of a design in two and three dimensions.	Explain design elements. with regards to types of lines, shapes and forms applied in drawing and how they affect dimensions.	Chalk board. Drawing instruments. Lesson notes. Whiteboard Marker Projector Computer	Carry out a simple design of own choice of furniture item. Carry out some design work applying specific design principles to the various design elements. Use the anthropometrics principles to determine various sizes of different types of furniture e.g. chairs, stools, tables, etc.	Guide the students to: produce a sketch of own choice of furniture item with functional dimensions Draw the isometric view of a chosen piece of furniture.	Drawing Tables and equipment. T-Squares Materials, etc.
General Objective 2:0 Know Design Principles						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
2	2.1 Define the various design principles i.e. balance, movement, repetition, emphasis, contrast and unity. 2.2 Explain their effects in application to the design elements. 2.3 Describe how the design principles apply to the various design elements in nature.	Explain the various design Principles i.e. balance, movement, repetition, emphasis, contrast and unity. Elaborate on how these design principles apply to the various design elements in nature.	Chalk board. Drawing instruments. Lesson notes.	Carry out design of furniture items taking design principles i.e. balance, movement, repetition, emphasis, contrast and unity into account	Guide students to carry out design of furniture items taking design principles i.e. balance, movement, repetition, emphasis, contrast and unity into account	

General Objective 3.0: Know Anthropometrics Principles						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
3	3.1 Explain the principles of human proportions and dimensions, e.g. relationship of distance between one part of the body and another. 3.2 Use anthropometrics principles to determine various sizes of different types of furniture, e.g. chairs, stools, tables, etc.	Draw the three-dimensional views of a chosen object showing the front, side, and plan views. Draw the pictorial view of a chosen furniture item.	Chalk board working using drawing instruments.	Carry out material preparation using anthropometrics principles to determine various sizes of different types of furniture, e.g. chairs, stools, tables, etc.	Guide students to carry out material preparation using anthropometrics principles to determine various sizes of different types of furniture, e.g. chairs, stools, tables, etc.	Tape, try square, saw marking gauge, mortise gauge plane, etc.
General Objective 4.0: Know the Principles of Timber Preparation						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
4	4.1 Explain the principles of cutting wood to size using handsaws and machine.	List the tools used for timber preparation and explain their functions.	Chalk board Woodwork tools Materials (wood) Whiteboard Marker Projector Computer	4.1 Explain the principles of cutting wood to size using handsaws and machine.	List the tools needed for timber preparation and explain their functions. Guide the students to undertake material preparation	Chalk board Woodwork tools Materials (wood) Whiteboard Marker Projector Computer

General Objective 5.0: Understand the interpretation of drawings and sketches.						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
5	5.1 Explain simple working drawing of wood projects. 5.2 Identify conventional representation for timber fastenings on a drawer. 5.3 Define the principle of orthographic projection	Explain the concept of working drawings of wood projects Explain conventional representation of timber fastenings Explain the principle of orthographic projection students to make orthographic drawing of simple objects. Give drawing assignment	Drawing Equipment Marking out tools. Text books Chalk board Lesson notes. Whiteboard Marker Projector Computer	Carry out simple working drawing of wood projects. Interpret conventional representation for timber fastenings on a drawer. Make orthographic drawings of simple objects showing i. Front view ii. End view iii. Plan	Guide students to make carry out simple working drawing of wood projects. Guide learners to interpret conventional representations Guide students to do orthographic drawing of simple objects.	Drawing Tables, T-squares
General Objective 6.0: Know the nature of Timber Growth and Structure						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
6	6.1 Describe the growth of a tree from which timber is obtained, how it is fell; and cut into logs for sawmills. 6.2 Classify timber into two groups: - hardwoods and softwood and explain	Explain timber growth and Structure Explain the nature of trees from which timber is obtained.	Textbooks Chalk board. Samples of woods Lesson notes. Whiteboard Marker Projector Computer	Physically distinguish softwood from hardwood trees based on characteristics of each. Classify timber into hard and soft wood. Show samples of these.	Guide students to differentiate softwood from hardwood Guide them to physically classify timber into two groups: -	

	the difference between the two classifications. 6.3 State the main characteristics of hardwoods and softwoods.	Explain the classification of timber into hard and soft wood. Show samples of these.			hardwoods and softwood	
General Objective 7.0: Know the principles timber finishing.						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
7	7.1 Define finishing. 7.2 State the purpose of finishing e.g. decoration, preservation. 7.3 State the types of material used for finishing wood 7.4 Explain the working principles of air compressors and air-line dryers. 7.5 State the importance of fan extractors. 7.4 Identify surface defects. 7.6 Outline the process of staining and filling 7.7 Explain how to apply stains, e.g. matching stain using appropriate safety equipment.	Explain the concept of finishing Elaborate on the purpose of surface preparation and finishing e.g. for aesthetics, preservation, hygiene. Discuss the types of finishing material e.g. abrasive paper, stain, transparent and opaque finishes paint, polish, etc. Explain the principle of air compressors and air-line dryers. Discuss the importance of fan extractors in surface preparation for finishing	Chalk board. Samples of wood finishing materials Lesson note Whiteboard Marker Projector Computer	Prepare surfaces of wooden items for application of finishing Apply matching stain using appropriate safety equipment. Use various grades of abrasive paper to prepare specified surfaces for finishing. Apply base coating, e.g. wood filler, undercoat and sanding sealer. Remove surface defect preparatory to application of finish Carry out filling and staining operation Apply lacquer or paint by spraying or by hand brush. Maintain and clean spray equipment	Guide students to prepare surfaces of wooden items with various grade of sandpaper for application of finishing material Guide the also to apply matching stain using appropriate safety equipment. Apply lacquer or paint by spraying or by hand brush. Maintain and clean spray equipment	Spray equipment Spray guns

General Objective 8.0 Understand timber conversion and seasoning.						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
8	8.1 Define Timber conversion 8.2 Describe the two types of conversion: a) through and through method, (b) back sawing or quarter sawing method. 8.3 State the characteristics of each method of conversion 8.4 List the advantages and disadvantages of each method. 8.5 Define seasoning 8.6 Describe two methods of seasoning 8.7 Calculate the percentage moisture content of timber. 8.8 State the advantages and disadvantages of each seasoning method. 8.9 Describe the effect of proper stacking of boards during seasoning	Explain conversion of timber. Explain the various methods of conversion. Discuss the advantages and disadvantages of conversion Explain seasoning and state the importance of seasoning wood. Describe the two main methods of seasoning. Explain the importance of proper stacking during seasoning. Explain the importance of proper stacking Explain how to determine moisture content	Chalk board Samples of timber from different conversion methods Lesson note Pictures of defects infested woods. Whiteboard Marker Projector Computer	Carry out proper stacking of boards as done during natural seasoning of the timber. Determine and calculate moisture content	Guide students to: Carry out proper stacking of boards as done during seasoning of timber. Guide students to determine and calculate moisture content	

General Objective 9.0 Understand timber defects.						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
9	9.1 Define timber defects 9.2 Classify timber defects into two main groups namely natural and artificial defects. 9.3 Explain the causes of the following timber defects; splits, warp, twist, case hardening, collapse, etc., 9.4 Explain the possible causes of the following timber defects; dry rot, wet rot,, woodborers and how they can be prevented. 9.5 Explain the methods of preventing natural and artificial defects in timber. 9.6 Explain how the effect of bowing and cupping can be corrected.	Explain defects in timber. Explain the various types of defects in timber - natural and artificial. Explain natural and artificial defects in timber and their effects. Explain the causes of timber defects Discuss how seasoning defects can be minimized. Explain how the effects of bowing and cupping can be corrected.	Whiteboard Marker Projector Computer Chalk board. Samples of defects infested woods. Lesson note Pictures of defects infested woods.	Examine and sketch timber defects. Physically identify and classify timber defects. Take steps to remedy defective timber affected by: i. Bowing ii. Cupping Sketch different types of timber defects	Guide students to physically identify and remedy defective timber affected by: Bowing Cupping Gide students to sketch different types of defects	
General Objective 10.0 Know the technical terms in furniture work.						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
10	10.1 State some Technical Terms used in furniture making e.g. Pot life, blooming, bleaching, staining, padding, tacking etc.	Explain the technical terms used in furniture making. Discuss types of wood found in Nigeria. Explain the	Whiteboard Marker Projector Computer Chalk board.	Physically identify the following Nigerian timbers - mahogany obeche, (cedar), afara, abura, omo, etc	Guide students to physically identify the following Nigerian timbers - mahogany obeche,	

	10.2 Define each of the technical terms stated in item 10.1 above. 10.3 State the names of some common timber found in Nigeria such as mahogany obeche, (cedar), afara, abura, Omo, etc. State the main use of each of the timbers	characteristics and use of each of the type.	Lesson notes.		(cedar), afara, abura, Omo, etc	
General Objective 11.0: Know the adhesives used in Furniture work.						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
11-12	11.1 Define adhesives. 11.2 Name types of adhesives Classify adhesives into interior and exterior types: Interior: - animal, Vegetable and thermo-plastic glues; Exterior:- Phenol formaldehyde (cascamite glue) 11.3 State the characteristics of each type of adhesive listed above. State the advantages and disadvantages of each type of adhesive	Describe different types of adhesives used in woodworking and their application. • Show samples of different adhesives to students. Explain the advantages and disadvantages of different types	Whiteboard Marker Projector Computer Chalk board Lesson note Samples of adhesive materials.	Prepare and apply adhesives. Cure glue lines by normal temperature and artificial heating methods	Guide students to prepare and apply adhesives. Cure glue lines by normal temperature and artificial heating methods	
13	**Examination: Practical: - 70%: Theory - 30%**					

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN FUNITURE MAKING AND UPHOLSTERY.			
MODULE: FURNITURE DESIGN CONSTRUCTION II		**MODULE CODE: CFM 12**	**TOTAL CONTACT HOURS: 240HRS**
YEAR: 2	**TERM:** 2	**PRE: REQUISITE:**	**Theoretical:** 36 Hours **Practical:** 48 Hours
Goal: The module is designed to provide the trainee with the knowledge and skill to enable him design and construct stools, chairs and tables			
GENERAL OBJECTIVES: On completion of this module, the trainee should be able to: 1. Know woodwork joints construction. 2. Understand the process of carcase construction. 3. Know Tables and Chairs production. 4. Understand the Finishing of furniture items. 5. Understand Fittings and Fastening materials**.**			

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN FUNITURE MAKING AND UPHOLSTERY.						
Module: Furniture Design and Construction II			**MOUDLE CODE: CFC 12**		**CONTACT HOURS: 240 Hours**	
Module Specification: Theoretical and Practical Content						
YEAR: 2	**TERM:** 2	**PRE: REQUISITE:**	**Theoretical:** 48 Hours **Practical:** 192Hours			
GOAL: This module is designed to introduce the trainee to						
Theoretical Content				**Practical Content**		
General Objective 1.0 Know woodwork joints' construction						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
1 - 4	1.1 Define woodwork joint 1.2 List types of woodwork joints 1.3 State the use of the following	Explain the principle of joint in woodwork	Whiteboard Marker Projector Computer	Sketch differ types of sketches Construct the following joints:	Guide students to sketch woodwork construct the following joints: a. Bare-faced mortised and tenon	• Tools

	joints a. Bare faced mortise and tenon joints b. Butt joints c. Housing joints d. Tongue and Grove e. dovetailed joint State the requirements of a good joint	Name, classify and describe types of woodwork joints Discuss the use of different types of joints. Explain the requirements of a good joint	Tools & equipment. Chalk board Models of specific joints.	a. Bare-faced mortised and tenon joints b. Butt joints c. Housing joints d. Dovetailed joint	joints b. Butt joints c. Housing joints d. Dovetailed joint	
General Objective 2.0 Understand the process of carcase construction.						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**		**Teachers Activities**	**Learning Resources**
5-6	2.1 Define carcase 2.2 translate abstract thoughts into sketches. 2.3 State the basic difference between solid wood and carcase construction. 2.4 State the various angles of inclination. 2.5 State the relative angles, shapes and proportions of the various parts.	Explain carcase construction. Explain the process of translating abstract thoughts into sketches. Explain the basic difference between solid wood and carcase construction Explain angles of inclination. Describe the relative angles, shapes and proportions of the various parts.	Chalk board Models. Drawings Lesson note Whiteboard Marker Projector Computer	2.1 Define carcase Translate abstract thoughts into sketches. Identify the various angles of inclination. Construct the relative angles, shapes and proportions of the various parts. Transform the sketches into working/production drawings.	Guide the trainees to: Transform the sketches into working drawings. Prepare working drawing and cutting list of a carcase. Construct the relative angles, shapes and proportions of the various parts of a carcase Assemble the carcase	Drawing board T-Squares, pencils Set Square and

General Objective 3.0: Know Tables and Chairs production.						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
7-9	3.1 State various types of chairs e.g. dining chair, easy chair, and rocking chair. 3.2 Describe designs and working drawing of chairs. 3.3 State various types of tables e.g. dining table, reading table, conference table etc. 3.4 Describe working drawing of specific type of table. 3.5 State the contents of a cutting list.	List and explain various types of chairs Explain the designs and working drawings of different types of chairs. List and describe various types of tables. Explain the contents of a cutting list	Chalk board Lesson note Drawings	Make simple designs and working drawing of chairs. Construct a simple chair Identify the various types of tables e.g. dining table, reading table, conference table etc. Make a simple design of a table Produce a working drawing of specific type of table. Prepare cutting list. Construct the table	Guide students to produce designs and working drawing of a simple chair and construct the chair Guide them to identify the various types of tables e.g. dining table, reading table, conference table etc. Make a simple design of a table Produce a working drawing of specific type of table. Prepare cutting list and construct the table	Chalk board Models. Materials

General Objective 4.0: Understand the Finishing of furniture items.						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
10-11	4.1 Define finishing 4.2 List different types of finishing materials 4.3 Explain the purposes of finishing wood surface: hygiene, preservation, and aesthetics. 4.4 Name and state the composition of common materials used	Discuss the use of wood finishing. Explain the purpose for application of wood finish. Explain the composition of common material used for finishing. Describe different	Chalk board Lesson note	Prepare surface for application of finishing material with brush. Apply finishing material with brush. Carry out preparation for application of finishing material with spray equipment. Apply finishing material with spray equipment	Guide students to select the appropriate finishing material, prepare the surface of wood and apply finishing material with brush and spray equipment	Spray equipment Materials.

	for finishing wood surfaces. 4.5 State different methods of applying finishing materials 4.6 State the advantages and disadvantages of each method 4.7 State the process of applying finishing material with spray equipment	methods of application of finishing material Explain different methods of applying finishing materials Discuss the advantages and disadvantages of each method Demonstrate the process of applying finishing material with brush and spray equipment				
General Objective 5.0: Understand Fittings and Fastening materials						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
12	5.1 Define furniture fittings 5.2 List types of furniture fittings 5.3 Classify furniture fittings hinges, handles, locks, catches, stays, etc. 5.4 Explain how fasteners are used to hold two parts together. 5.5 State the properties of materials used for common fittings - brass, mild steel, aluminum, plastics, etc. 5.6 Define wood fasteners:	Explain furniture fittings Discuss types of furniture fittings Discuss classification of furniture fittings hinges, handles, locks, catches, stays, etc. Explain how fasteners are used to hold two parts together. Explain the properties of	Chalk board Samples of fittings and fastenings, e.g. locks handles etc. Whiteboard Marker Projector Computer	Select and fix different types of fasteners such as Screws, nails, corrugated fasteners, bolts and nuts; Sketch different types of fitting Select and fix different type of fittings such as hinges, handles, locks, catches, stays, etc. on finished furniture item. Sketch different types of fittings	Guide students to select and fix different types of fasteners such as Screws, nails, corrugated fasteners, bolts and nuts; and fittings such as hinges, handles, locks, catches, stays, etc. on finished furniture item.	Screwdrivers, hammer Gimlet, hand drill.

	5.7 List types of wood fasteners Classify wood fasteners hinges, handles, locks, catches, stays, etc. 5.8 Explain how fasteners are used to hold two parts together. 5.9 State the properties of materials used for common fasteners - brass, mild steel, aluminum, plastics, etc.	materials used for common furniture fittings Explain wood use of fasteners: List types of wood fasteners Classify wood fasteners. State the properties of materials used for common fasteners. Explain the difference between fasteners and fittings. .				
13	**Examination: Practical: - 70%: Theory - 30%**					

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN FUNITURE MAKING AND UPHOLSTERY.			
MODULE: FURNITURE DESIGN CONSTRUCTION III		**MODULE CODE: CFC 13**	**TOTAL CONTACT HOURS: 144HRS**
YEAR: 3	**TERM:** 2	**PRE: REQUISITE:**	**Theoretical:** 24 Hours **Practical:** 120 Hours
GOAL: The module is designed to provide the trainee with the knowledge and skill to enable him construct cabinet and bed			
GENERAL OBJECTIVES: On completion of this module, the trainee should be able to: 1. Understand the characteristics of natural timber and manufactured boards. 2. Know the design and construction carcase cabinets. 3. Understand lipping and veneering of furniture items.			

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN FUNITURE MAKING AND UPHOLSTERY.						
Module: Furniture Design and Construction III				**MOUDLE CODE: CFC 13**		**CONTACT HOURS: 144**
Module Specification: Theoretical and Practical Content						
YEAR: 3	**TERM:** 2	**PRE: REQUISITE:**	**Theoretical:** 24 Hours **Practical:** 120Hours			
GOAL: This module is designed to introduce the trainee to						
Theoretical Content				**Practical Content**		
General Objective 1.0. Understand the characteristics of natural timber and manufactured boards.						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
1-2	1.1 Define Natural timber 1.2 State the characteristics of natural timber 1.3 State the advantages and disadvantages of natural timber 1.4 Define manufactured Board 1.5 List different types of manufactured boards	Describe natural timber Explain the characteristics of natural timber Discuss the advantages and disadvantages of natural timber Describe manufactured	Samples of timber, plywood, particle board block-board, Whiteboard Marker Projector	Identify different types of natural timber Carry out physical identification of different manufactured board Use natural wood for a given project	Guide students to: identify different types of natural timber Carry out physical identification of different manufactured board	

	1.6 State the characteristics of manufactured board 1.7 State the advantages and disadvantages of natural timber 1.8 State the main uses of manufactured board	board Discuss different types of manufactured boards Discuss the characteristics of manufactured board State the advantages and disadvantages of natural timber State the main use of manufactured board.	Computer	Use different manufactured boards for different projects particleboard, block board, etc.	Use natural wood for a given project Use different manufactured boards for different projects particleboard, block board, etc.	
General Objective 2.0: Know the design and construction carcase cabinets.						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
3-7	2.1 List different types of cabinets e.g. wardrobe, side furniture, chest of drawers, sideboard, etc. 2.2 State the design of a chosen type of carcase 2.3 Discuss the Preparation of cutting list 2.4 Explain the select and preparation of the joints to be used- e.g. dowelling joint, etc. 2.5 State the process of assembling carcase with adhesive and glue blocks. 2.6 State the steps of Constructing drawers with lap dovetail joint 2.7 Identify the various methods of securing drawers into the carcase e.g. runner or slide and fix them.	2.1 Explain the different types of cabinets e.g. wardrobe, side furniture, chest of drawers, sideboard, etc. 2.2 Explain the Design of a chosen type of carcase 2.3 Discuss the Preparation of cutting list 2.4 Explain the select and preparation of the joints to be used- e.g. dowelling joint, etc. 2.5 State the process of assembling carcase with	Woodwork tools. Finishing materials fittings. Whiteboard Marker Projector Computer	Design a chosen type of carcase Prepare cutting list Select and prepare the joints. Assemble carcase with adhesive Construct drawers with lap dovetail, grooving, housing, pinning, dowelling joint. Securing drawers into the carcase e.g. runner or slide and fix them. Construct and fix shelves (permanent, loose, adjustable). 2.9 Construct and fix various types of doors e.g.: - plane panel, raised panel, glazed	Guide students to design carcase and prepare cutting list for its construction. Guide them to construct joints. and assemble carcase, fix into the carcase Guide them to also construct and fix various types of doors and plinth	Screw driver, saw, chisel, hammer, cramps, etc.

8-10	2.8 State the process of constructing and fixing shelves (permanent, loose, adjustable). 2.9 Outline how to fix plane panel, raised panel, glazed door, sliding doors, etc. 2.10 Outline the design and construction of box plinth, stool plinth	adhesive and glue blocks. 2.6 State the steps of Constructing drawers with lap dovetail joint 2.7 Identify the various methods of securing drawers into the carcase e.g. runner or slide and fix them. 2.8 State the process of constructing and fixing shelves (permanent, loose, adjustable). 2.9 Outline how to fix plane panel, raised panel, glazed door, sliding doors, etc. 2.10 Outline the design and construction of box plinth, stool plinth		door, sliding doors, etc. Design and construct box plinth, stool plinth, cabriole leg and metal legs.		
General Objective 3.0: Understand lipping and veneering of furniture items.						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
11-12	3.1 Outline the purpose of lipping 3.2 Demonstrate the process of veneering 3.3 Identify types of lipping and veneering for specified furniture item.	Give the students some specific projects involving lipping and veneering activity and guide/supervise	Veneers Tools Samples of finished project with lipping and veneering work. Whiteboard	Carry out lipping ang veneering process Scrape and sandpaper material paper ready for veneering.	Guide students to accomplish a project involving lipping and veneering activity and supervise them in	

	3.4 Scrap and glaze paper ready for finishing. 3.5 identify the appropriate bonding material fir veneering	them in performing the task	Marker Projector Computer		performing the task	
Week 13	**Examination: Practical: - 70%: Theory - 30%**					

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN FUNITURE MAKING AND UPHOLSTERY.			
Module: UPHOLSTERY DESIGN AND CONSTRUCTION		**MODULE CODE: CFC14**	**TOTAL CONTACT HOURS: 240HRS**
YEAR: 3	**TERM: 1**	**PRE: REQUISITE:**	**Theoretical:** 36 Hours **Practical:** 204 Hours
GOAL: The module is aimed to provide the trainee with the skill to enable him design and construct a complete upholstered furniture			
GENERAL OBJECTIVES: On completion of this module, the trainee should be able to: 1. Know the design and Construction of Upholstery Car-case. 2. Know the principles of upholstery construction. 3. Understand upholstery fabrics and leather materials. 4. Know the process of fixing upholstery material. 5. Understand the design of upholstered furniture.			

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN FUNITURE MAKING AND UPHOLSTERY.						
Module: UPHOLSTERY DESIGN AND CONSTRUCTION			**MOUDLE CODE: CFM 14**		**CONTACT HOURS: 7hrs/wk PER WEEK: T2, P5**	
Module Specification: Theoretical and Practical Content						
YEAR: 3	**TERM: 1**	**PRE: REQUISITE:**	**Theoretical:** 36 Hours **Practical:** 48 Hours			
GOAL: This module is designed to introduce the trainee to						
Theoretical Content				**Practical Content**		
General Objective: 1.0 Know the design and Construction of Upholstery Car-case.						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
1 – 3	1.1 Define design 1.2 State the steps of transforming ideas into a product. 1.3 Define pictorial drawings	Explain the concept of design Explain the steps of transforming an idea into product	Drawings Models Lesson note Whiteboard Marker	Transform an idea into product Make a neat sketch and pictorial drawing of a given carcase	Guide students to: Transform an idea into product. Make a neat sketch and pictorial drawing of a given carcase. Identify parts of a carcase.	

	1.4 Define working drawings. 1.5 List the parts of carcase such 1.6 Describe the method of assembling carcase	Explain the concept of pictorial drawings e.g. oblique, isometric, perspective, projections. Describe parts of a carcase. Explain method of assembling a carcase	Projector Computer	Identify parts of a carcase. Construct different parts of a carcase and assemble them	Construct different parts of a carcase and assemble them	
General Objective 2.0: Know the principles of upholstery construction.						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
3-5	2.1 Define upholstery construction. 2.2 State different types of upholstery. 2.3 Explain the purpose of frames and how to achieve strength and rigidity. 2.4 State the requirements in chair frames to support the type of upholstery such as loose seat, show-wood, stuff over. 2.5 Recognize the characteristics of the various kinds of upholstery	2.1 Explain the basic principles of upholstery construction. Describe different types of upholstery 2.2 Explain the purpose of frames and how to achieve strength and rigidity. 2.3 Explain the requirements of frames for supporting upholstery . 2.4 Describe the characteristics of the various kinds of upholstery 2.5 Discuss types of adhesive and	Chalkboard Glue/tack nails Sewing machine Measuring tape Lesson note Whiteboard Marker Projector Computer	Identify different types of upholstery work. Construct different types of upholstery. Use different types of adhesive. Identify and compare the properties of upholstery and bedding fittings, e.g. latex foam, plastic foam, natural fibers, synthetic fibers. Identify and use hand tools used in upholstery	Guide students to : Identify different types of upholstery work. Construct different types of upholstery. Use different types of adhesive Identify and compare the properties of upholstery and bedding fittings. Identify and use hand tools used in upholstery work Demonstrate the use of the following power tools: Carry out sewing operation in u	Drawings Cutting list Jigs

	2.6 Name the main types of adhesive and fasteners used in upholstery e.g. rubber-based solution, polyurethane, tack nails, stud, staple pin, etc. 2.7 State the types of hand tools used in upholstery, e.g. hammer, scissors, web stretcher, needles and awls, ripping chisels, mallet stapler, knife, measuring tape, rule, etc. 2.8 State the use of the following power hand tools, stapling gun (pneumatic and electric, powered cutters, electric iron, foam cutter, drills (pneumatic and electric), bottom mould. 2.9 List the main parts of the sewing machine, 2.10 State the use of a sewing machine	fasteners used in upholstery 2.6 Describe the hand tools used in upholstery work 2.7 Explain the operational principles and use of the following power tools: stapling gun (pneumatic and electric, powered cutters, electric iron, foam cutter, drills (pneumatic and electric) 2.8 Describe the main parts of the sewing machine, 2.9 Explain the function of a sewing machine in upholstery work		work e.g. hammer, scissors, web stretcher, needles and awls, ripping, chisels, mallet staple, knife, measuring tape rule., Demonstrate the use of the following power tools: Stapling gun (pneumatic and electric), powered cutters, electric iron, foam cutter drills (pneumatic and electric). Carry out sewing operation in upholstery work		

General Objective 3.0: Understand upholstery fabrics and leather materials.						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**		**Learning Resources**
7-9	3.1 Explain the need for accurate measurement and correct sewing tolerance. 3.2 Explain the behaviour of covering materials under the cutting process and recommend the necessary tolerance for shrinkage or overstretching.	State the importance of accurate measurement and the provision of correct sewing allowances.	Fabrics & leatherettes materials. Tools and equipment. Whiteboard Marker Projector Computer	Cut fabric and leatherette to size and shape as per template. Identify the parts of a sewing machines. Identify and attach the following: pipe foot, gathering foot, zip fastener foot. Select the correct type of needle and thread for given kinds of materials. Adjust the sewing machine to suit the fabric or leatherette. Sew, pipe and hem the fabric or leatherette to size and shape.		• Template • Sewing machine • Fabrics. Etc.

General Objective 4.0: Know the process of fixing upholstery material.						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
10	4.1 Identify the required type material 4.2 State the process of fixing upholstery fabric or leatherette.	• Explain suitable material for different purposes Demonstrate the process and describe methods of fixing upholstery fabrics or leatherette.	Rubber web, spring, tack nail.	Measure and cut material to required size and shape Stretch fabric or leatherette to and tack them. Check for correct fitting. Assemble to all the parts e.g. arm rest, seat and back. Cover bottom and fix castors.	• Guide the students to: measure and cut material to required size and shape Stretch fabric or leatherette at the appropriate places and tack them. Check for correct fitting. Assemble to all the parts e.g. arm rest, seat and back. • Cover bottom and fix castors.	
General Objective 5.0: Understand the design of upholstered furniture						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
11-12	5.1 State the sequence of upholstery construction such as: Framing, webbing, springing, stuffing, fabric covering and fox edging	Explain the steps in carrying out upholstery construction such as: framing, webbing, springing, stuffing, and fabric covering and fox edging.	Materials Tools Lesson notes Whiteboard Marker Projector Computer	Design and upholstered furniture e.g. Arm chair. Apply webbing, e.g. spacing, weaving, etc.	Guide students to: design and construct upholstery furniture to factory standard. Guide them to also apply webbing, fix spring and apply lacing, stitching, stuffing and burlap.	Upholstery tools & equipment

	5.2 State the sequence of assembling the carcase. 5.3 State the methods of fixing webbing, material.	Outline the sequence of assembling the carcase. Describe the methods of applying webbing,		Fix spring and apply lacing, stitching, stuffing and burlap. Cut and sew to pattern. Cover with fabric or leatherette, etc., observing Y-cut, notching, etc.		
13	**Examination: Practical: - 70%: Theory - 30%**					

LIST OF EQUIPMENT FOR FURNITURE MAKING AND UPHOLSTERY

S/NO	MACHINES	QUANTITY REQUIRED
1	Pull-Over Cross Cutting Machine	4
2	Circular Bench Saw	4
3	Dimension Saw	4
4	Surface Planer	4
5	Combined Planer Thicknesser	2
6	Narrow Band Saw	4
7	CNC Router	2
8	Mortising Machine	4
9	Tenoning Machine	4
10	Pedestal Drill	2
11	Disc Sander	2
12	Wood Turning Lathe Machine	2
S/NO	**PORTABLE POWER TOOLS**	**QUANTITY REQUIRED**
1	Portable Power saw	4
2	Portable Power planer	4
3	Portable Power drill	4
4	Portable Power orbital sander	4
5	Portable Power drum sander	4
6	Portable Power jig saw	4
7	Portable Power router	4
1	Complete Electrical Spray equipment	4 sets
2	Completer Petrol Operated Spray Equipment	2 sets
S/NO	**TOOLS**	**QUANTITY REQUIRED**
1	Paint brushes (sets)	10
2	Putty knives	10

3	Marking gauge	20
4	Mortise gauge	20
5	Marking knives	30
	Squares	
6	Try square	25
7	Mitre square	25
8	Sliding bevel	25
9	Tape (metric) rule	30
10	Jack plane	25
11	Smoothing plane	25
12	Block plane	10
13	Rebate plane	10
14	Grooving/plough plane	10
15	Bull-nose plane	10
16	Jointing plane	5
17	Router Plane	5
18	Rip Saw	15
19	Crosscut/Hand saw	25
20	Tenon saw	20
21	Pane saw	15
22	Coping saw	20
23	Nest of saw/compass saw	15
24	Key-hole saw	10
25	Fret Saw	6
26	Dovetail/back saw	15
27	Firmer Chisel	20 sets
28	Bevel-edge Firmer Chisel	20 “
29	Mortise (set) chisel	20 “
30	Turning chisel	10 “
31	Centre Bits	5 sets

32	Auger Bits	5 sets
33	Twist Bits	10 “
34	Countersink	5 “
35	Rose	5 “
36	Gimlet	5 “
37	Ratchet braces	20 “
38	Breast drills	20 “
39	Drills Bits	20 “
40	Screw Driver (set of 6)	10 “
41	Mallet	20 “
42	Claw-hammer	10
43	Ball pein hammer	10
44	Warrington hammer	10
45	Bradawl	20
46	Pincers	20
47	‘F’ Cramp	10
48	Sash cramp	10
49	Gee (‘G’) cramp	20
50	Hand cramp	10
51	Corner cramp	10
52	Bench-hold fast	20
53	Triangular files (set)	15
54	Flat files	20
55	Scraper (flat)	30
56	Dividers	15
57	Round files (set)	10
58	½ Round files	10
59	Scraper (cabinet)	10
60	Dowelling Jig	5

S/NO	TOOLS	QUANTITY REQUIRED
61	Rasps	10
62	Sewing machine	2
63	Scissors	10
64	Staplers	10
65	Needles (set) curved and straight	20
66	Tack hammer	10
67	Gimlets	5
68	Pliers	5
69	Magnetic hammer	10
70	Knives	5
71	Ripping chisel	10
72	Mallets	10
73	Screw drivers	2 sets
74	Tape measures	10
75	Webbing strainer	20
76	Spring cutter	5
77	Spanners & Wrenches	2 sets
78	Work benches	5
79	Storage cub boards	2
80	Button making machines	1

PRATICAL MANUAL FOR NTC FURNITURE MAKING AND UPHOLSTERY

S/N	MOUDULE TITTLE/CODE	PRACTICAL CONTENT
1	Fundamentals of Woodworking I (**CMW 11**)	Mount and dismount the machine correctly. E.g. Saw blade.
		Sharpen the blade correctly.
		Set up and use the machine to carry out cutting operations such as crosscutting, miter cutting, trenching.
		Observe safety measures when using the machine.
		Carry out routine service and maintenance such as cleaning, periodic greasing and oiling on the machine
		Mount and dismount saw blades correctly.
		Fix and adjust the riving knife correctly.
		Set up and use the circular saw for the following operations: a. Label sawing using canting fence. b. Grooving, c. Rebating, d. Tenoning, mitering
		Set and sharpen saw blade correctly
		Mount and dismount saw blade correctly
		Set up and use dimension saw to carry out the following operations to specification: a. Cross cutting to length b. Mitering c. Tongue and groove d. Chamfering e. Levelling f. Tenoning g. Compound angular cutting h. Rebating i. Ripping, etc.
		Undertake routine servicing and maintenance of the dimension saw. E.g. cleaning and lubricating
		Perform the following operations with the surface plane a. Surfacing and edging b. Tapering c. Chamfering d. Through and stopped rebating

		Mount and dismount cutters correctly
		Grind, hone and set cutters.
		Undertake routine service and maintenance of the surface planer
		Sharpen and set cutters using: - a. Patent device b. Wooden straight edge
		Mount and dismount the cutters correctly.
		Undertake routine service and maintenance on the machines.
		Set-out rods for common woodwork items such as doors stool, kitchen unit, bookshelves, etc.
		Prepare route sheets for the production and joinery and furniture items.
		Produce setting-out rods for common woodwork/joinery/furniture items such as door, bookshelves, etc.
		Mount and dismount the saw blade on the wheels correctly.
		Set up and use the machine for various band sawing operations.
		Produce and use simple jig for various band sawing operations.
		Calculate the length of the band saw blades.
		Set and sharpen saw blade (manually or with sharpening machine).
		Braze or butt-weld band saw blade.
		Undertake routine service and maintenance of the narrow bad sawing machine.
		Perform the following operations with the CNC router. a. designs (decorations) on panel doors b. design on beds etc.
2	Fundamentals of Woodworking II (**CMW 12**)	Install and remove cutters correctly 1.2 Set up the machine for normal and repetitive mortising operation.
		Carry out mortising operations to given specifications.
		Apply routine safety and operational precautions related to the use of the machine.
		Grind and sharpen mortise chisel/chain.
		Set vertical and horizontal head adjustments.
		Apply the safety and operational precautions related to the use of the tenoning machine.
		Grind and sharpen mortise chisels chains.
		Set scribing cutters to produce the mould 2.5 Adapt the machine for trenching, square tenoning and comb joints, turn tenon.
		Set up tenoning machine and produce mitre tenons.

		Design and produce suitable jig that is safe for use on the machine
		Balance each pair of cutters on the tenoning machine.
		Undertake routine servicing and maintenance on the machine.
		Select bits suitable for given jobs
		Mount and dismount bits correctly
		Mark out work pieces for drilling operations 3.4 Make simple jigs and fixtures for repetitive drilling operations.
		Set machine for various drilling operations such as single holes, double holes, stopped or blind holes, through holes etc.
		Carry out drilling operations to factory specification.
		Sharpen bits to correct profile and keenness.
		Replace worn belts.
		Undertake routine service and maintenance on the drilling machine.
		Select the correct size of drill bit and fix on chuck.
		Set up drilling machine and drill holes on timber accurately
		Identify all the component parts of the potable power tools.
		Carry out the following operations on: a. Ripping, bevel cutting and mitre cutting on a portable saw b. Surfacing, chamfering, etc. with a planer c. Stopped hole, through hole, etc. with a power drill d. Sanding operation with portable sander e. Cut curved surfaces with a jig saw f. Grooves and chamfer a with power router
		Identify all the component parts of the overhead travelling belt sanding machine and explain the functions of the weighted lever.
		Use the fence or the table and pressure pad.
		Mount the belt, stain and track correctly on the overhead sander
		Adjust the worktable to convenient working height.
		Apply the belt to the face of the job using one of the following: e. Hand pad f. Travelling pressure pad
		Perform the following operations with the surface planer” a. Surfacing and edging. b. Tapering

		c. Chamfering d. Through and stopped rebating
		Mount and dismount cutters correctly
		Grind, hone and set cutters.
		Undertake routine service and maintenance of the surface.
		Carry out the following operations on a circular sawing machines: - ripping stock to width - cutting stock to length - grooving - trenching - bevel cutting - miter cutting
		Construct angle and widening joints using hand tools.
		Make woodwork items based on carcase construction - small bathroom cabinets, trinket box, etc.
		Test carcase for squareness and out of wind
		Lip edges of man-made boards
		Using: veneer solid piece (plain or moulded) etc. Make simple carcase moulding, e.g., simple-edged moulding, chamfer, nosing and rounding.
		Sketch common carcase construction joints. h. Assemble frame.
		Test the frame for squareness and out of wind.
		Make projects using the joints listed in 8.1 picture, frame cabinet door etc.
		Select tools and demonstrate frame installation required.
		Produce the joints using hand and machines.
		Apply hand tools correctly in accordance with instructions given for the construction of frames
		Perform edge banding.
3	**Wood and Metal Finishing (CPD 12)**	Prepare a layout sketch of a standard spray boot showing standard structural requirements e.g. lighting, types and sizes of work stations, safety installations, storage facilities, etc.
		Make outline sketches showing the layout features of a typical low bake and make conveyor ovens.
		Identify necessary considerations for effective spraying and describe methods of their attainment e.g. pure air, adequate temperature and humility, proper lighting.
		Dry the prepared surfaces by using air duster or chamois leather.
		Mask up job prior to spray painting using:(i) masking paste(ii) masking tape(iii) masking paper.
		Spray test area taking care to adjust:(i) material setting(ii) pressure.

		Prepare newly fabricated and rusted (old) ferrous metal surfaces, aluminium alloy surface, glass fibre reinforced plastics and resinous and oily woods for spray finishing.
		Carry out masking operation.
		Organize and execute operations involved in spray finishing such as cellulose synthetic (half-hour enamel), acrylic enamel and other classes of metallic paints:(i) complete spray from bare metal(ii) refinishing over an existing finish(iii) local repair.
		Identify the essential operations after spraying and explain their importance e.g. removal of masks, burnishing, polishing, removal of over-spray, cleaning and refitting of parts removed from machine, vacuum cleaning of the interior, lining work.
		Spot defects in finished spray work and explain their possible causes, preventive and repair measures e.g. blistering, blooming, brushing, bridging, cob-webbing dry spray, excessive overspray, lifting, orange peel, pin-holing, runs, sags, curtains, shelving, discoloration, etc.
		Execute final detailed operations after spraying. 1.13 Inspect finishing and refinishing job and certify that it is good enough to factory standard.
		Check for defects and take preventive or remedial measures against such defects in furniture spraying work.
		Identify and replace defective parts of the spray gun.
		Dismantle the gun.
		Clean up the spray gun components with appropriate solvent.
		Grease and oil spray gun components to prevent rusting.
		Re-assemble spray gun components for storage.
		Maintain other tools used in spray painting.
		Tidy up work and work environment/premises
4	**General Metal Work I (CME 11)**	Using and handling hand tools, portable power tools and machine
		Lifting, moving and storing materials or job
		Demonstrate first aid application in cases of minor cuts, electric shock, burns
		Describe the essential features and use of the following a Micrometer b Vernier caliper c Venier height gauge d Combination Set
		Maintain and care for the instruments listed above

		Perform marking out exercise on plane surfaces including profiles
		File a piece of metal to given specifications using any of the following: Cross filing, draw filing, filing square and flat surfaces
		Test surface for flatness using surface plate and try square and state precautions to be taken to avoid pinning
		Maintain files in good working conditions
		Apply various hammers and mallets e.g. ball pen, rubber mallets, etc. for engineering purposes
		Select and insert hacksaw blade correctly
		Cut metal and other engineering materials to given specification using the adjustable hacksaws, junior hacksaws, piercing saw, etc. drills and Drilling.
		Setting up and operate a drilling machine in given situations
		Note Setting up drilling machine should include a) change of spindle speed b) adjustment of drilling table to required height and angle, holding of work on drilling table to required height and angle, using appropriate clamping device. c) Install the drill bit in chuck
		Sharpen a twist drill correctly to manufacturers' specification
		Perform with facility the following operations: - drilling blind holes - drilling round stock - counter-drilling and countersinking - drilling large diameter holes
		List the operation sequence and cut internal (through and blind) and external threads by hand method and state precautions to be taken when taping on the bench
		Rivet metals together in any given situations
		Mark out only given bench work using datum points, datum lines, datum faces, chalk or marking solution, center or dot, punch, scribing block or measurement transfer.
		Sharpen cutting tool for plain turning, shouldering, parting off and facing operations
		Set up rough and turned stock in 3-jaw-chuck
		Select appropriate cutting tool and set them up to Centre height for turning or facing operations
		Carryout chuck work involving facing, step turning, undercutting radios using, chamfering, parting off and knurling Note, components should be produced to specified tolerance and finish.
		Produce simple components involving taper turning using the compound slide

5	**General Metal Work II (CME 12)**	Carry out the following heat treatment processes Hardening, tempering, annealing, normalizing, case hardening on given plain carbon steel, engineering component or tool.
		Anneal copper, brass and aluminium for various purposes
		Select appropriate forging tools and produce to specification given engineering components by forging processes e. Upsetting – drawing down f. Setting down – twisting g. Forge welding (scarf and spice welds) h. Bending, turning closed ring i. Forming an eye
		Set up and operate gas or metal arc welding equipment in given situations. Note: Equipment operation should include choice of correct nozzles or electrode. Adjustment for correct gas pressure/flame or voltage.
		Prepare joints for welding in given situations.
		Weld given components by arc or gas welding methods, and state safety precautions to be observed
6	**Furniture Design and Construction I (CFC 11)**	Carry out a simple design of furniture item of own choice.
		Carry out some design work applying specific design principles to the various design elements.
		Use the anthropometrics principles to determine various sizes of different types of furniture e.g. chairs, stools, tables, etc.
		Saw timber to given length and width
		Use hand tools to make simple joint
		Plane timber to size by following the proper sequence:
		i. Plan the face side and mark ii. Plan face edge square to the face size and mark.
		Gauge to correct width and remove waste.
		Select tools for marking out: a. Try square. b. Pencil. c. Rule d. Gauges e. Compasses f. Marking knife.
		Mark-out stock accurately to given specifications. Prepare materials.
		Select and apply various grades of abrasive paper to prepare specified surfaces for finishing.

		Apply base coating, e.g., wood filler, undercoat and sanding sealer.
		Apply lacquer or paint by spraying or by hand brush.
		Maintain and clean spray equipment.
		Identify the types of common manufactured boards: Plywood, laminboard, etc.
		State the structural properties each type of manufactured board.
		Handle and store board materials correctly
7	**Furniture Design and Construction II (CFC 12)**	Construct the following joints: a. Bare-faced mortised and tenon joints b. Butt joints c. Dowelling d. Housing joints e. Dovetailed joint f. Carry out the following operations: g. Pocket screwing h. Counter-boned screwing and pelleting Rebating and mitring.
		Design and prepare production drawings of chosen model.
		Prepare cutting list from nominal sizes to finish sizes e.g. legs, top rails, stretcher rails, tops, etc.
		Select and mark out joints e.g. mortise and tenon joint, dowelling, tongue and groove, pocket screwing and counter-drilling with nails bits.
		Produce the required joints
		Assemble the units with adhesives and fasteners
		Scrape and sandpaper the stool in readiness for finishing
		Finish in spray or polish.
		Use templates for marking-out and shaping with ring fence on spindle moulder.
		Select and mark out joints e.g. mortise and tenon and dowelling joint.
		Assemble the units with adhesive and fasteners
		Use angle brackets for fortifying the joints.
		Scrape and sand paper in readiness for finishing
		Finish in spray, polish or decorative paper.
		Prepare cutting list of the chosen table from the design.
		Prepare working drawing using scale 1:10, 1:20; 1:50 etc.
		Produce the components and their joint e.g. mortise & tenon

		Assemble components.
		Finish with French polish, spray or paint by hand brush, etc.
		Prepare the wood surface for finishing by scrapping, sandpapering.
		Apply wood finish by hand
8	**Furniture Design and Construction III (CFC 13)**	--------
9	**Upholstery Design and Construction (CFC 12)**	Translate pictorial drawings into production drawings.
		Interpret blueprints.
		prepare blueprints.
		Select and prepare cutting list from nominal to finished sizes; arm front and back, arm top, arm bottom, back top and bottom, seat front, spring or web bearer, seat sides, side and back panels (arm).
		Use templates for marking out and shaping of necessary parts on the band-saw machine, dowelling, butt joints, mortise and tenon joint with fasteners.
		Assemble backrest, armrest and the seat separately.
		Remove arise where necessary
		Apply preservatives to the assembled parts.
		Select springs and webs e.g. single cone, double one, serpentine (zigzag) helical, tension spring, rubber, canvass, jutes, etc.
		Identify and compare the properties of upholstery and bedding fittings, e.g. latex foam, plastic foam, natural fibres, synthetic fibres.
		Identify and use hand tools used in upholstery work e.g. hammer, scissors, webstretcher, needles and awls, ripping, chisels, mallet staple, knife, measuring tape rule.
		Demonstrate the operational principles and use of the following power hand tools, stapling gun (pneumatic and electric), powered cutters, electric iron, foam cutter drills (pneumatic and electric), bottom mould.
		Cut fabric and leatherette to size and shape as per template.
		Identify the parts of a sewing machines 3.3 Identify and attach the following: pipe foot, gathering foot, zip fastener foot.
		Select the correct type of needle and thread for given kinds of materials.
		Adjust the sewing machine to suit the fabric or leatherette
		Sew, pipe and hem the fabric or leatherette to size and shape.
		Stretch fabric or leatherette to remove arises and tack them.

		Check for correct fitting
		Assemble the parts e.g. arm rest to seat and back
		Cover bottom and fix castors and guide.
		Design and upholstered furniture e.g. Arm chair, poof etc.
		Apply webbing, e.g. spacing, weaving, etc.
		Demonstrate knowledge of spring lacing, stitching, stuffing and burlap.
		Cut and sew to patter.
		Cover with fabric or leatherette, etc., observing Y-cut, notching, etc.

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