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*Islamabad*

# FURNITURE TECHNICIAN


## LEARNER GUIDE

National Vocational Certificate Level 3

Version 1 - June, 2019

NAVTTC

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**Document Version**
June, 2019
**Islamabad, Pakistan**

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## Introduction

Welcome to your Learner's Guide for the Furniture Technician Programme. It will help you to complete the programme and to go on to complete further study or go straight into employment.

The Furniture Technician programme is to engage young people with a programme of development that will provide them with the knowledge, skills and understanding to start this career in Pakistan. The programme has been developed to address specific issues, such as the national, regional and local cultures, the manpower availability within the country, and meeting and exceeding the needs and expectations of their customers.

The main elements of your learner's guide are:

- **Introduction:**
  - This includes a brief description of your guide and guidelines for you to use it effectively
- **Modules:**
  - The modules form the sections in your learner's guide
- **Learning Units:**
  - Learning Units are the main sections within each module
- **Learning outcomes**:
  - Learning outcomes of each learning units are taken from the curriculum document
- **Learning Elements:**
  - This is the main content of your learner's guide with detail of the knowledge and skills (practical activities, projects, assignments, practices etc.) you will require to achieve learning outcomes stated in the curriculum
  - This section will include examples, photographs and illustrations relating to each learning outcome
- **Summary of modules**:
  - This contains the summary of the modules that make up your learner's guide
- **Frequently asked questions**:
  - These have been added to provide further explanation and clarity on some of the difficult concepts and areas. This further helps you in preparing for your assessment.
- **Multiple choice questions for self-test**:
  - These are provided as an exercise at the end of your learner's guide to help you in preparing for your assessment.

# FURNITURE TECHNICIAN


Module-3

LEARNER GUIDE

National Vocational Certificate Level 3

Version 1 - June, 2019

## Module 3: 072200892 Make Furniture Joints

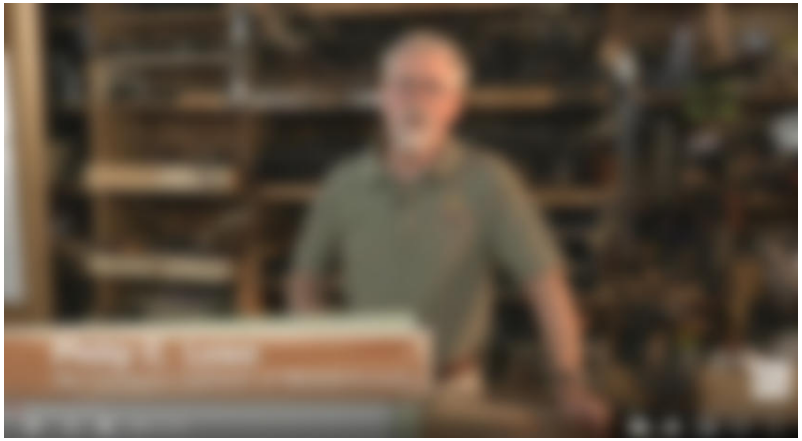
**Objective of the module: :** The aim of this module to be develop knowledge, skills and understanding of making different types of joints being used for furniture manufacturing.

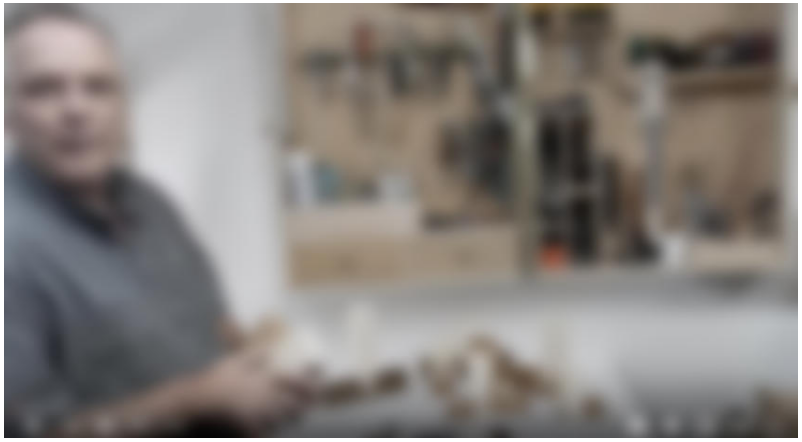
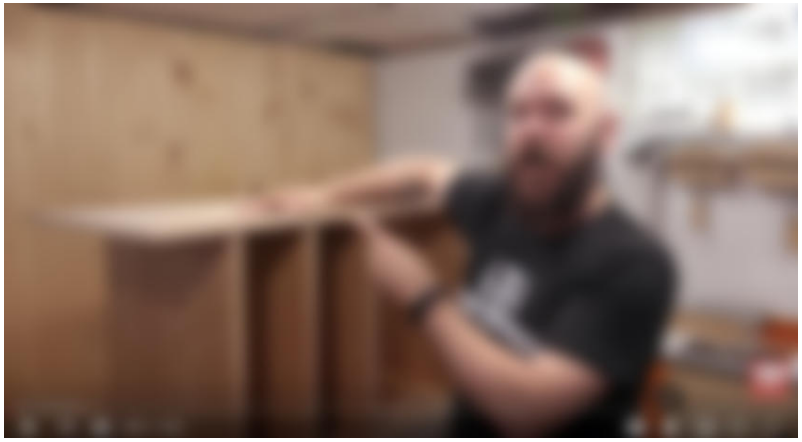
**Duration** 200 hours **Theory:** 40 hours **Practical:** 160 hours

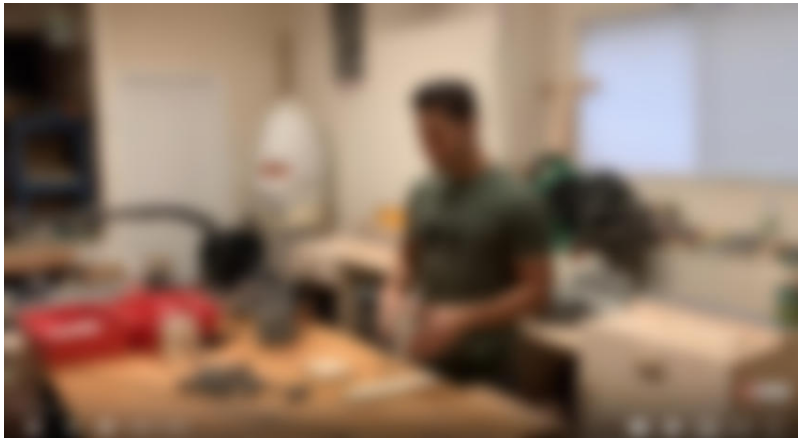
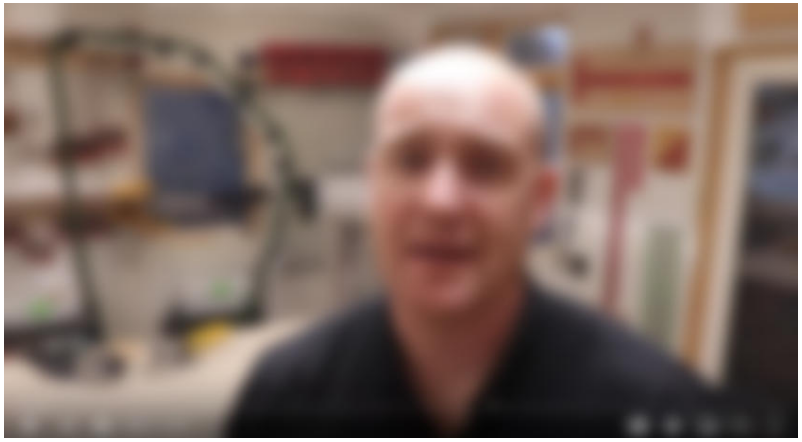
| Learning Unit | Learning Outcomes | Learning Elements | Materials Required |
|---|---|---|---|
| **LU1:**<br>Perform Cutting | **The student will be able to:**<br>• Cut the wood/board across the grain as per size<br>• Cut the wood/board along the grain as per size<br>• Cut the wood/board in irregular shapes | Basics of hand tools safety<br>Basic tools required for cutting<br>Basic kind of saws<br>Basics of marking tools | Safety Chart<br>Rip Saw<br>Cross Cut Saw<br>Marking gauge<br>Bench vise<br>Work Bench<br>Woodworker's vise |
| **LU2:**<br>Perform Plaining | **The student will be able to:**<br>• Plane the wood surface<br>• Joint the edge<br>• Plane the piece up to marked thickness<br>• Plane the piece up to marked width | Basics of hand planes<br>Basics of marking tools | Smooth plane<br>Jack Plane<br>Bench vise<br>Work Bench<br>Woodworker's vise<br>Oil stone |
| **LU3:**<br>Prepare joints as per design/ drawing | **The student will be able to:**<br>• Mark joint lines as per drawing<br>• Perform Ripping as per | Elaborate the structure, classification, Properties of trees including the characteristics of various woods<br>Introduction to wood defects, abnormalities | Wooden planks<br>Hand Planes (Smooth Plane,<br>Rabbet plane, Jack plane, Spoke shave, Compass plane, Block plane, Trying |

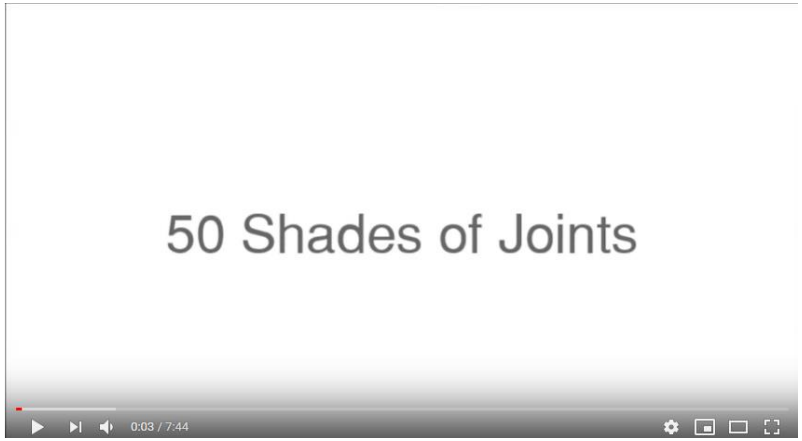
| Learning Unit | Learning Outcomes | Learning Elements | Materials Required |
|---|---|---|---|
| | joint requirement<br>• Perform Chiselling as per joint requirement<br>• Perform Cross Cutting as per joint requirement<br>• Perform Boring as per joint requirement<br>• Perform Rabbeting / Grooving as per joint requirement<br>Perform Sizing of joint as per drawing | and to preserve them.<br>Getting enough knowledge about hand tools to suit various jobs including the (Hand saw, planes, chisels, boring braces & bits, squaring, marking tools, clamps, files & rasps, mallet & hammers, sharpening stones etc.)<br>Basics of sawing, cutting and plaining wood to the required size as per the drawing<br>Introduction to various kinds of joints such as (Lap joints, mortise & tenon joints, dowel, domino, pin dovetail, biscuit, tongue & groove joints, knock down, mitre, nail & screw joint, cross boar joint etc.)<br>Prepare joints practically step by step to have hands on experience about the very basics of the technology. This section will guide to take up any project further. | plane)<br>Hand Saws (Rip Saw, Cross cut saw, back saw, mitre saw, compass saw, copying saw, fret saw, veneer saw, Saw vice)<br>Chisels (Bevel edge chisel, Mortise chisel)<br>Marking Tools (Marking gauge, Mortise guage, Marking awl, Utility knife)<br>Squaring Tools (Try square, Framing square, Spirit level, Combination square)<br>Clamps (Bar clamp, F-clamp, C-clamp, Quick action clamp, edge clamp, wooden clamp)<br>Carpenter's mallet, Claw Hammer<br>Oil stone, Pincer, Nail punch<br>Files & Rasps (Half round file, triangular file, round file, Half round rasps)<br>Mitre box<br>K. D. fittings |
| **LU4:**<br>Assemble Joints | **The student will be able to:**<br>• Join components to prepare furniture parts as per design<br>• Apply reinforcements (Spline, Pins, Nails, Dowels etc.) as per joint requirement | Clear the concept about the use of screwdrivers, pneumatic nailer & screwdrivers.<br>Basics & importance of adhesives used including their properties, so to use plan selection of glue as per project<br>Basic understanding of the important hardware associated with the joint reinforcement in detail | Nails (Different Sizes)<br>Wooden/Steel Screws (Different Sizes)<br>Wooden Dowels & Dominos<br>Corrugated fasteners & splines<br>Multi Boring Machine<br>Adhesives (White glue, Hot melt glue, urea formaldehyde, Phenol Formaldehyde, Contact cement)<br>Screws Drivers (Standard screwdriver, Ratchet screwdriver, Philips head screwdriver)<br>Pneumatic Nailer & Screwdriver |

**Examples and illustrations**

| | |
|---|---|
|  | Woodworking 101 - Common Woodworking Joinery<br>https://www.youtube.com/watch?v=zqXLYe783qw |
|  | Chisel Tricks for Hand-Cut Joinery<br>https://www.youtube.com/watch?v=73Neq8EoQdY |

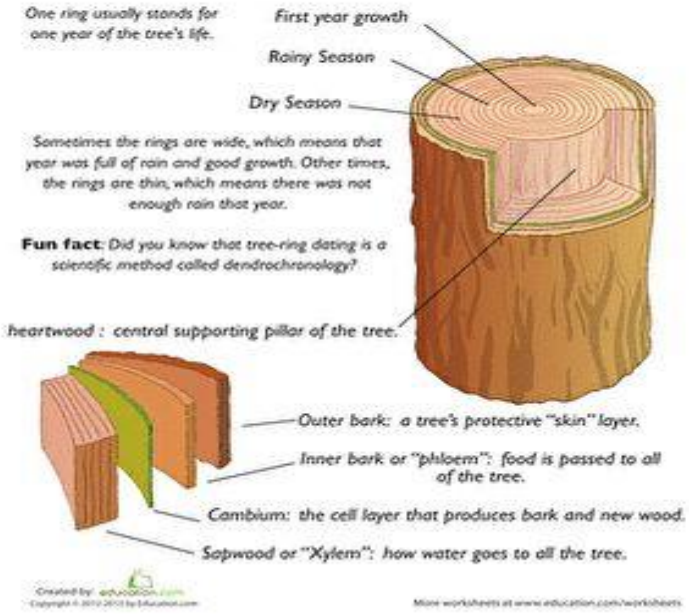
| | |
|---|---|
|  | 7 Flawless Woodwork Joints That You Can Make Easily<br>https://www.youtube.com/watch?v=UDQ_aS8qvaU |
|  | Dowel Joinery Technique and Tips \| Woodworking<br>https://www.youtube.com/watch?v=AVqI9lGepjs |

| | |
|---|---|
|  | Biscuits Or Dowels<br>https://www.youtube.com/watch?v=N6knz9wbbxw |
|  | Biscuit Joiner vs Festool Domino<br>https://www.youtube.com/watch?v=7GTbnJrXlaI |

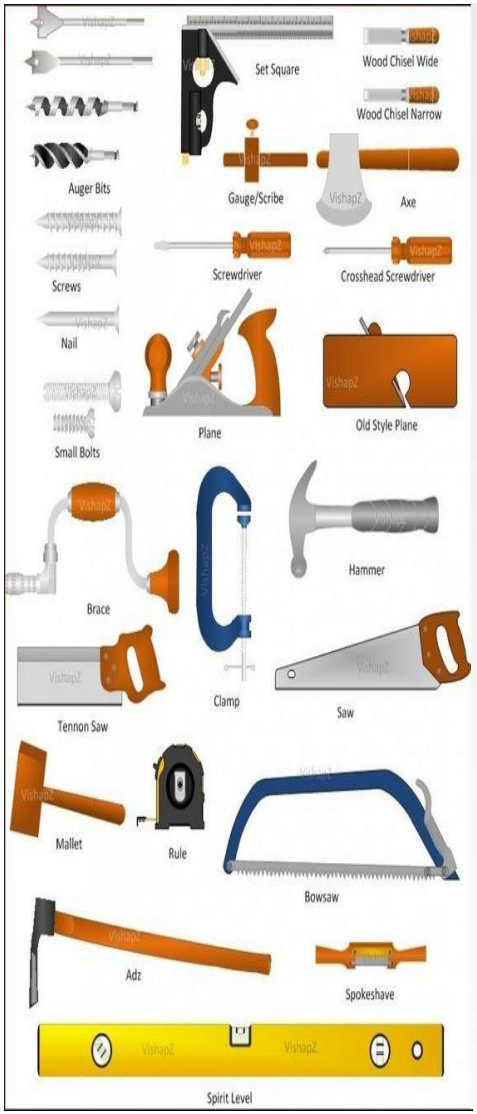
| | |
|---|---|
|  | Furniture Cam Lock and Nut<br>https://www.youtube.com/watch?v=7a6X-_q2vo0 |
|  | 50 digital joints real assembly<br>https://www.youtube.com/watch?v=PzTpfLcL1Y8 |

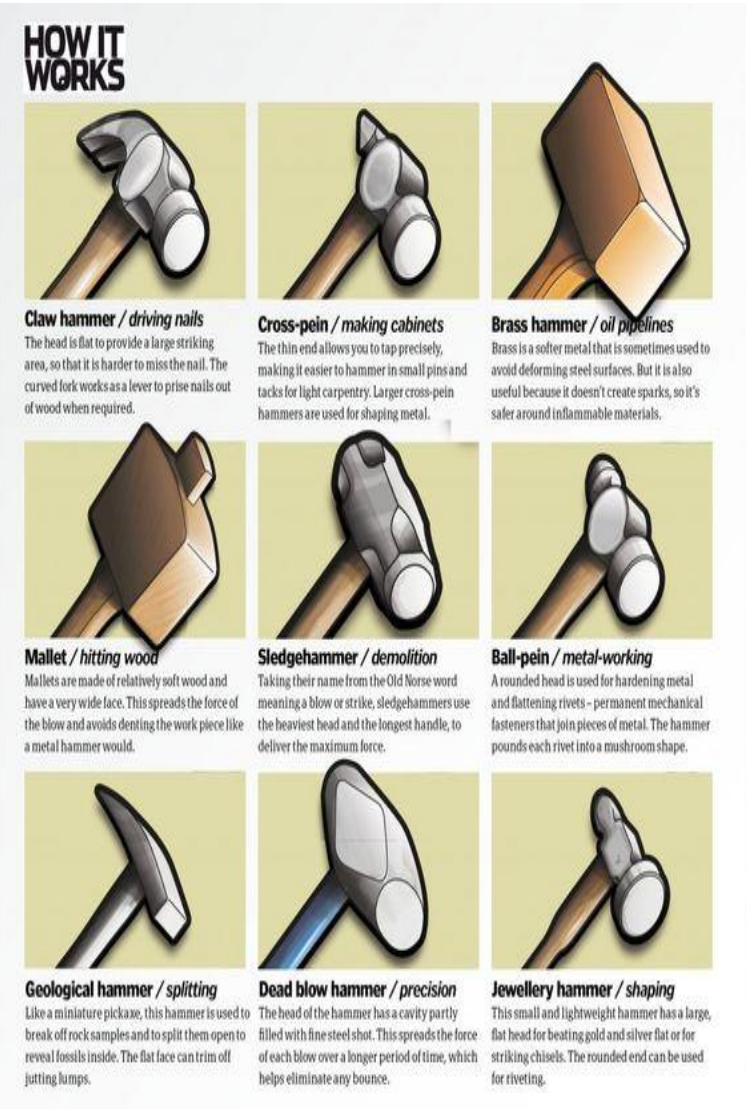
# TREE RINGS

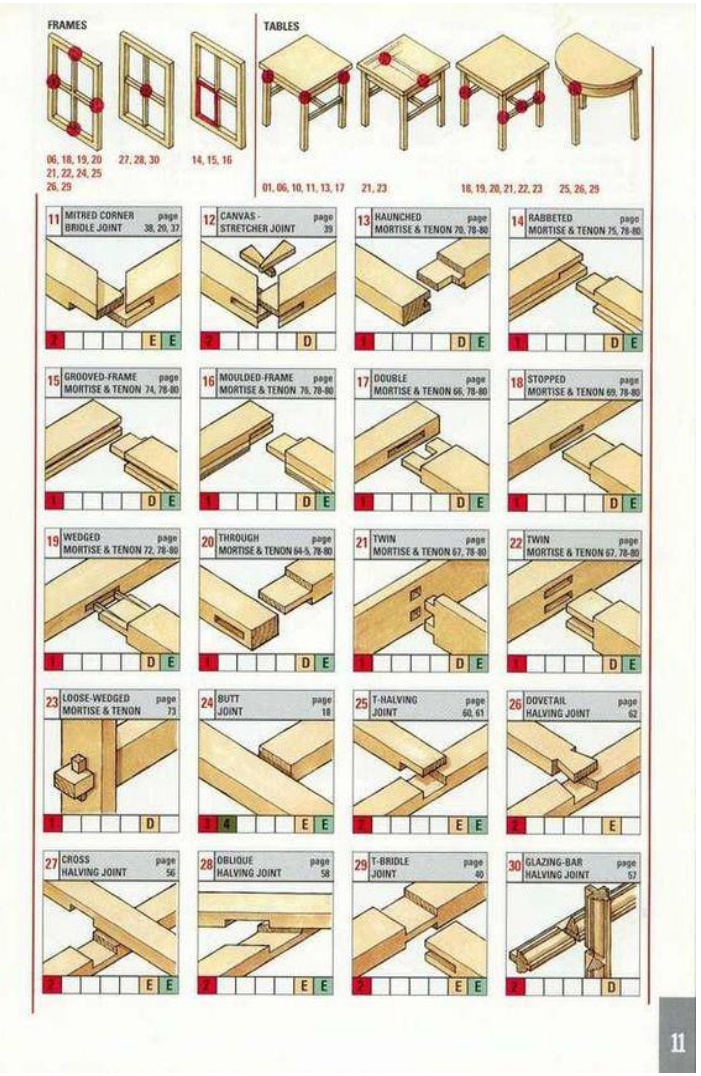
We can find out a lot about a tree by looking at the rings in its trunk. To see the rings, we must look at a cross section of the trunk, just like this!






Set Square
Wood Chisel Wide
Wood Chisel Narrow
Auger Bits
Gauge/Scribe
Axe
Screwdriver
Crosshead Screwdriver
Screws
Nail
Plane
Old Style Plane
Small Bolts
Brace
Hammer
Clamp
Tennon Saw
Saw
Mallet
Rule
Bowsaw
Adz
Spokeshave
Spirit Level


HOW IT WORKS
Claw hammer / driving nails
The head is flat to provide a large striking area, so that it is harder to miss the nail. The curved fork works as a lever to prise nails out of wood when required.
Cross-pein / making cabinets
The thin end allows you to tap precisely, making it easier to hammer in small pins and tacks for light carpentry. Larger cross-pein hammers are used for shaping metal.
Brass hammer / oil pipelines
Brass is a softer metal that is sometimes used to avoid deforming steel surfaces. But it is also useful because it doesn't create sparks, so it's safer around inflammable materials.
Mallet / hitting wood
Mallets are made of relatively soft wood and have a very wide face. This spreads the force of the blow and avoids denting the work piece like a metal hammer would.
Sledgehammer / demolition
Taking their name from the Old Norse word meaning a blow or strike, sledgehammers use the heaviest head and the longest handle, to deliver the maximum force.
Ball-pein / metal-working
A rounded head is used for hardening metal and flattening rivets – permanent mechanical fasteners that join pieces of metal. The hammer pounds each rivet into a mushroom shape.
Geological hammer / splitting
Like a miniature pickaxe, this hammer is used to break off rock samples and to split them open to reveal fossils inside. The flat face can trim off jutting lumps.
Dead blow hammer / precision
The head of the hammer has a cavity partly filled with fine steel shot. This spreads the force of each blow over a longer period of time, which helps eliminate any bounce.
Jewellery hammer / shaping
This small and lightweight hammer has a large, flat head for beating gold and silver flat or for striking chisels. The rounded end can be used for riveting.


FRAMES
TABLES
06, 18, 19, 20 21, 22, 24, 25 26, 29
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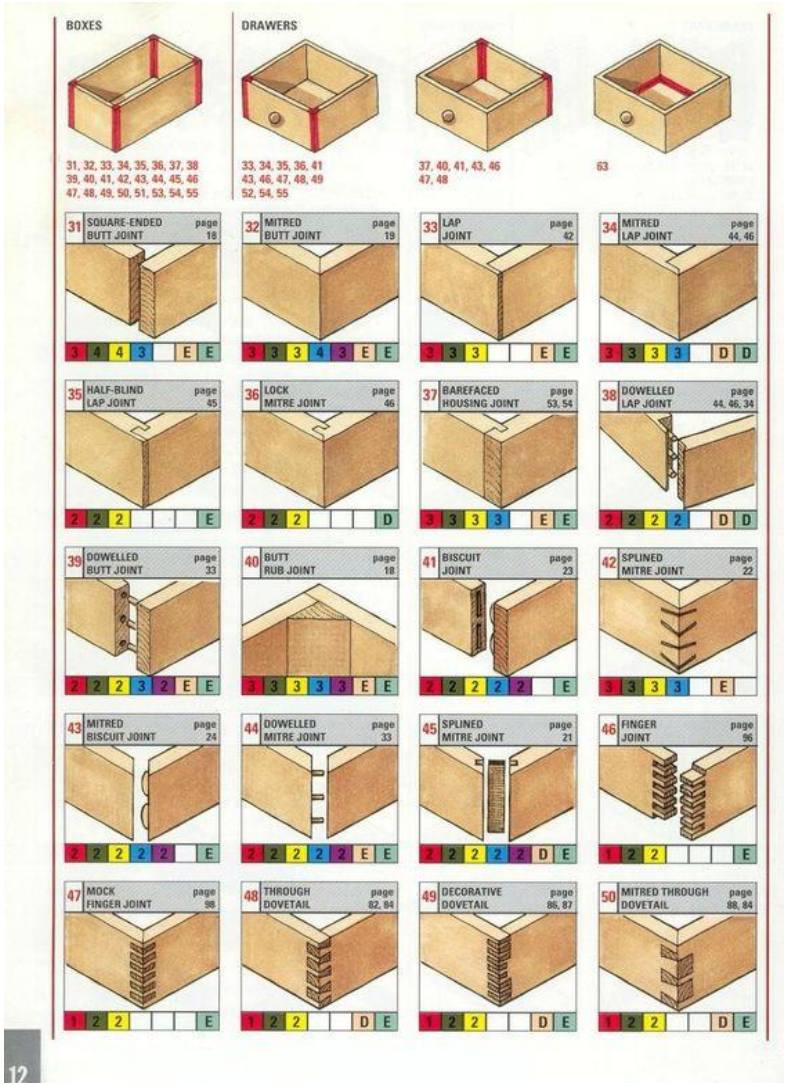
26 DOVETAIL HALVING JOINT page 62
27 CROSS HALVING JOINT page 56
28 OBLIQUE HALVING JOINT page 58
29 T-BRIDLE JOINT page 40
30 GLAZING-BAR HALVING JOINT page 57
11


Bois de violette
Eucalyptus
Pin
Cèdre rouge
Amboine
Merisier
Noyer
Chêne
Bois de roses
Noyer noir
Cerisier
Sapin
Cocobolo
Tilleul
Acajou
Érable
Érable piqué
Olivier
Pruche
Ébène


FESTOOL





Source: www.pintrest.com

## Module summary

| **Course:** <*Furniture Technician*> | **Total Course Duration:** 1200 Hrs |
|---|---|
| **Course Overview:** | |
| The purpose of these qualifications is to set high professional standards for furniture industry.<br>• Improve the professional competence of the trainees<br>• Shift from informal and non-formal to formal technical and vocational training<br>• Provide opportunities for recognition of skills attained through non-formal or informal pathways<br>• Improve the quality and effectiveness of training and assessment for furniture sector<br>• Enable the existing workforce to capacitate themselves in new technologies and methods | |

| Module | Learning Unit | Duration |
|---|---|---|
| **Module 1: Develop drawings of furniture products manually**<br>**Aim:** The aim of this module to be develop knowledge, skills and understanding to develop drawings of furniture products manually. | **LU1:** Develop component and size chart<br>**LU2:** Prepare 2D Multiview drawing of Furniture<br>**LU3:** Prepare 2D Multiview drawing of Furniture Components<br>**LU4:** | 140 hours |

| Module | Learning Unit | Duration |
|---|---|---|
| **Module 2: Prepare wooden components of the furniture**<br>**Aim:** The aim of this module to be develop knowledge, skills and understanding of preparing wooden components of the furniture. | **LU1:** Cut wood logs into Planks<br>**LU2:** Prepare templates for furniture components<br>**LU3:** Cut wood planks into furniture components<br>**LU4:** Cut board/ panels into furniture components<br>**LU5:** Plain surfaces of wooden components<br>**LU6:** Finalize the size of wooden components | 60 hours |
| **Module 3: Make Furniture Joints**<br>**Aim:** The aim of this module to be develop knowledge, skills and understanding of making different types of joints being used for furniture manufacturing. | **LU1:** Perform Cutting<br>**LU2:** Perform Plaining<br>**LU3:** Prepare joints as per design / drawing<br>**LU4:** Assemble joints | 200 hours |
| **Module 4: Apply surface aesthetics**<br>**Aim:** The aim of this module to be develop advanced knowledge, skills and understanding to apply surface aesthetics on the furniture. | **LU1:** Perform profiling of components<br>**LU2:** Perform turning of components<br>**LU3:** Perform Carving Manually<br>**LU4:** Perform Marquetry/Parquetry Manually | 100 hours |
| **Module 5: Assemble Furniture Products**<br>**Aim:** The aim of this module to be develop basic knowledge, skills and understanding required to assemble the furniture products. | **LU1:** Pre-Assemble Furniture Products parts<br>**LU2:** Assemble Furniture Products parts<br>**LU3:**<br>**LU4:** | 20 hours |

| Module | Learning Unit | Duration |
|---|---|---|
| **Module 6: Perform Finishing Operations on Furniture**<br>**Aim:** The aim of this module to be develop advanced knowledge, skills and understanding required to perform finishing operations on furniture. | **LU1:** Prepare the surfaces<br>**LU2:** Perform staining on surfaces<br>**LU3:** Perform sealing<br>**LU4:** Perform top finishing<br>**LU5:** Apply powder coating on metal furniture | 120 hours |
| **Module 7: Perform Upholstery**<br>**Aim:** The aim of this module to develop advanced knowledge, skills and essential understanding of materials, techniques needed to perform upholstery on furniture. | **LU1:** Apply Tapestry on the furniture<br>**LU2:** Apply Canning on the furniture<br>**LU3:**<br>**LU4:** | 100 hours |
| **Module 8: Prepare Metal Furniture Products**<br>**Aim:** The aim of this module to be develop advanced knowledge, skills and essential understanding required to prepare metal furniture products | **LU1:** Cut required components from raw material<br>**LU2:** Prepare furniture components as per design<br>**LU3:** Assemble the furniture components using welding<br>**LU4:** Assemble the furniture components using Knockdown method | 110 hours |
| **Module 9: Handle Logistics**<br>**Aim:** The aim of this module to develop basic knowledge, skills and understanding needed to handle the logistics at warehouse | **LU1:** Pack the furniture<br>**LU2:** Load the furniture for delivery and transportation<br>**LU3:**<br>**LU4:** | 20 hours |

| Module | Learning Unit | Duration |
|---|---|---|
| **Module 10: Develop drawings of furniture products using CAD/CAM**<br>**Aim:** The aim of this module is to develop advanced knowledge, skills and understanding needed develop drawings of furniture products using CAD/CAM. | **LU1:** Draw 2D Multiview drawing of Furniture Components on CAD<br>**LU2:** Develop 3D model of Furniture Components<br>**LU3:** Convert CAD drawing into CAM Code | 140 hours |
| **Module 11: Apply surface aesthetics using CNC Machines**<br>**Aim:** The aim of this module to develop advanced knowledge, skills and understanding needed to apply surface aesthetics using CNC machines | **LU1:** Perform Turning of components on CNC Turning Centre<br>**LU2:** Perform Carving on CNC Machining Centre<br>**LU3:** Perform Marquetry/Parquetry on CNC Laser Machine | 190 hours |

## Frequently Asked Questions

| | |
|---|---|
| 1. What is Competency Based Training (CBT) and how is it different from currently offered trainings in institutes? | Competency-based training (CBT) is an approach to vocational education and training that places emphasis on what a person can do in the workplace as a result of completing a program of training. Compared to conventional programs, the competency based training is not primarily content based; it rather focuses on the competence requirement of the envisaged job role. The whole qualification refers to certain industry standard criterion and is modularized in nature rather than being course oriented. |
| 2. What is the passing criterion for CBT certificate? | You shall be required to be declared “Competent” in the summative assessment to attain the certificate. |
| 3. What are the entry requirements for this course? | The entry requirement for this course is 8th Grade or equivalent. |
| 4. How can I progress in my educational career after attaining this certificate? | You shall be eligible to take admission in the National Vocational Certificate Level-3 in Furniture Technician (Finisher, Upholster, Metal Fabricator). You shall be able to progress further to National Vocational Certificate Level-4 in Furniture Technician (Furniture Designer); and take admission in a level-5, DAE or equivalent course. In certain case, you may be required to attain an equivalence certificate from The Inter Board |

| | |
|---|---|
| | Committee of Chairmen (IBCC). |
| 5. If I have the experience and skills mentioned in the competency standards, do I still need to attend the course to attain this certificate? | You can opt to take part in the Recognition of Prior Learning (RPL) program by contacting the relevant training institute and getting assessed by providing the required evidences. |
| 6. What is the entry requirement for Recognition of Prior Learning program (RPL)? | There is no general entry requirement. The institute shall assess you, identify your competence gaps and offer you courses to cover the gaps; after which you can take up the final assessment. |
| 7. Is there any age restriction for entry in this course or Recognition of Prior Learning program (RPL)? | There are no age restrictions to enter this course or take up the Recognition of Prior Learning program |
| 8. What is the duration of this course? | The duration of the course work is 1,510 hrs. (approx. 11 months) |
| 9. What are the class timings? | The classes are normally offered 25 days a month from 08:00am to 01:30pm. These may vary according to the practices of certain institutes. |
| 10. What is equivalence of this certificate with other qualifications? | As per the national vocational qualifications framework, the level-4 certificate is equivalent to Matriculation. The criteria for equivalence and equivalence certificate can be obtained from The Inter Board Committee of Chairmen (IBCC). |

| | |
|---|---|
| 11. What is the importance of this certificate in National and International job market? | This certificate is based on the nationally standardized and notified competency standards by National Vocational and Technical Training Commission (NAVTTC). These standards are also recognized worldwide as all the standards are coded using international methodology and are accessible to the employers worldwide through NAVTTC website. |
| 12. Which jobs can I get after attaining this certificate? Are there job for this certificate in public sector as well? | You shall be able to take up jobs in the Furniture making companies in the functions of cutting, assembly and finishing of furniture artcles. |
| 13. What are possible career progressions in industry after attaining this certificate? | You shall be able to progress up to the level of supervisor after attaining sufficient experience, knowledge and skills during the job. Attaining additional relevant qualifications may aid your career advancement to even higher levels. |
| 14. Is this certificate recognized by any competent authority in Pakistan? | This certificate is based on the nationally standardized and notified competency standards by National Vocational and Technical Training Commission (NAVTTC). The official certificates shall be awarded by the relevant certificate awarding body. |
| 15. Is on-the-job training mandatory for this certificate? If yes, what is the duration of on-the-job training? | On-the-job training is not a requirement for final / summative assessment of this certificate. However, taking up on-the-job training after or during the course work may add your chances to get a job afterwards. |
| 16. How much salary can I | The minimum wages announced by the |

| | |
|---|---|
| get on job after attaining this certificate? | Government of Pakistan in 2019 are PKR 17,500. This may vary in subsequent years and different regions of the country. Progressive employers may pay more than the mentioned amount. |
| 17. Are there any alternative certificates which I can take up? | There are some short courses offered by some training institutes on this subject. Some institutes may still be offering conventional certificate courses in the field. |
| 18. What is the teaching language of this course? | The leaching language of this course is Urdu and English. |
| 19. Is it possible to switch to other certificate programs during the course? | There are some short courses offered by some training institutes on this subject. Some institutes may still be offering conventional certificate courses in the field. |
| 20. What is the examination / assessment system in this program? | Competency based assessments are organized by training institutes during the course which serve the purpose of assessing the progress and preparedness of each student. Final / summative assessments are organized by the relevant qualification awarding bodies at the end of the certificate program. You shall be required to be declared “Competent” in the summative assessment to attain the certificate. |
| 21. Does this certificate enable me to work as freelancer? | You can start your small business of stitching Furniture making, upholstery or finishing or other products. You may need additional skills on entrepreneurship to support your initiative. |

## Short Question & Answers

| | |
|---|---|
| **What are the main saws used for cutting?** | Generally two main saws are used.<br>1. Rip Saw<br>2. Cross cut Saw |
| **What planes are used mostly for plaining?** | 1. Smooth Plane<br>2. Jack plane<br>3. Compass plane |
| **Narrate the specialized planes used in the technology?** | Following special planes are used in the technology<br>1. Compass plane<br>2. Rabbet plane<br>3. Spoke shave plane<br>4. Router plane<br>5. Combination plane |
| **How many joints being used in the technology?** | In general normally 10-20 joints are being used. But on the whole more than 100 joints are there to used where appropriate. |
| **What are the basic kinds of joints** | Following are the important benefits achieved as a result of seasoning.<br>1. Lap Joints<br>2. Mortise & Tenon Joint<br>3. Pin Joint<br>4. Dowel Joint<br>5. Dovetail Joints<br>6. Mitre Joints<br>7. Tongue & Groove Joint |

| | |
|---|---|
| | 8. Cross Bar Joint<br>9. Biscuit Joint |
| **Is it possible to make detachable furniture?** | Yes it is possible to have detachable furniture by utilizing the knock down fittings of various kinds. Some of it is of basic kinds and others are of advance level. |

## Test Yourself (Multiple Choice Questions)

**MODULE 2**

**Question 1** The saw used to cut with the grain is

A Cross Cut Saw

B Compass Saw

C Rip Saw

D None of the above

**Question 2** The sharpening angle of the plane iron is

A $30^0$

B $45^0$

C $60^0$

D None of the above

**Question 3** The most important joint considered in carpentry is

A Dowel Joint

B Dovetail Joint

C Mortise & Tenon Joint

D None of the above

**Question 4** The most advanced knock down joint fitting is

A Cam fittings

B Domino Fittings

C Plate Fittings

D None of the above

**Question 5** The best joint for drawers is

A Dowel Joint

B Dovetail Joint

C Mortise & Tenon Joint

D Screw Joint

**National Vocational and Technical Training Commission (NAVTTC)**

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