



BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Answer key

School of Woodworking Skills
Session: 2021-22 (Summer Semester)
B. Voc. Program, 3rd Semester,
2nd In-Sem. Examination

Course Code: SCS1302

Time: 1 Hours

Course Name: Advanced Stationary Machines

Max. Marks: 20

Instruction:

- All questions from section A, each question carries one marks.
- All questions from section B, each question carries two marks.
- All questions from section C, each question carries three marks.

Section – A

05X01 = 05 Marks

Q.1. Which one of the following running direction of scoring saw?

- (a) Down of the main saw (c) Opposite to the main saw
(b) Same direction of the main saw (d) All of them (c)

Q.2. Which one of the following is the working table width of surface planer?

- (a) 620 (c) 560
(b) 420 (d) None of them (d)

Q.3. Which one of the following is the minimum length of work piece to be machined in Thickness planer?

- (a) 360 mm (c) 260 mm
(b) 150 mm (d) None of them (c)

Q.4. Which one of the following material we use for the table insert in band saw machine?

- (a) Iron (c) Wood
(b) Steel (d) Rubber (c)

Q.5. Which one of the following machine is use for profile moulding?

- (a) Panel saw (c) Band saw
(b) Multi boring (d) None of these (d)

Section – B

03X02 = 06 Marks

Q.6. Write down the function of riving knife.

Ans.

- The riving knife is fastened behind the saw blade.
- Its keeps the kerf open in separating cuts.
- If the riving knife is missing, the joint can be closed by the compression in the wood.
- Riving knife allows the ascending part of the sprocket to grasp the work piece.
- Riving knife must be thinner than the cutting width (tooth thickness) of the cutting blade.



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Q.7. Write down the working process of thickness planer.

Ans.

- Make sure that top cover is closed.
- Make sure that the emergency button is released, otherwise turn them in the arrow direction.
- Make sure that the dust collector is on.
- Turn main switch on.
- Turn starter to star position, after some second turn it to delta position.
- To lift or to lower the thickening table operate on selector, the table moves at high speed to the direction indicated by the selector.
- Reach the right position with micrometric shiftments of the thickening table by pressing button, which will carry shiftments at low speed only upwards.

Q.8. Explain Crosscut fence and Extraction hood in Panel Saw.

Ans. **Crosscut fence** - The robustly mounted crosscut fence enables precise cutting of 90 degree angles. All setting is easy to read off the slanted scales. The flip stops are robust, free of play and are easy to slide individually along the full crosscutting range.

Extraction hood - The riving knife mounted protection and extraction hood allows a maximum saw blade diameter of 315mm with a maximum cutting height of 82mm.

Section – C

03X03 = 09 Marks

Q.9. Explain the difference between a high and low saw position of the Panel saw blade.

Ans.

Effect	High saw blade position	Low saw blade position
Cut cleanness	If saw blade is in high position, then more chip out will be produce on the bottom side.	If saw blade is in low position then the chip out on the bottom side will be less.
Security	Lower risk of kickback / cutting pressure directed down to the machine table.	Greater risk of kick back / cutting pressure tend to be directed towards the operator(feed resistance increases)
Service life of saw blade	Higher due to shorter cutting path in work piece.	Lower due to longer cutting path in work piece and more cutting pressure.



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Q.10. Describe any four types of saw blade used in Panel Saw.

Ans. Four types of blades used in panel saw are –

1. Universal blade - This blade is used for cutting both solid wood and panels. This blade has 48 tooth.
2. Solidwood cross cut - This blade is used for cutting solid wood cross cuts. This blade has 96 tooth.
3. Solidwood along grains - This blade is used for cutting solid wood along grains with chip thickness limitation. This blade has 28 tooth.
4. Razor cut - This blade is used for cutting hard materials such as acrylic, HPL, laminates. This blade is not used for solid wood. This blade has 72 tooth.

Q.11. What are the general safety rules that you should follow in the workshop?

Ans. **General information about safety rules -**

Before attempting any work or using any power tool or machines there are general safety rules which everyone should follow in order to keep himself and others safe in workshop.

- Always listen carefully to the trainer and follow instructions.
- Do not run in the workshop, you could 'bump' into another and cause an accident.
- Know where the emergency stop buttons are positioned in the machines. If you see an accident, happening you can use the emergency stop button to stop the machine.
- Always wear safety shoes in the workshop.
- When learning how to use a machine, listen very carefully to all the instructions given by the trainer. Ask questions, especially if you do not fully understand.
- Do not use a machine if you have not been shown how to operate it safely by the trainer.
- Always carry ear plug to the training center.
- Always use ear plug when working on a machine.
- Keep hands away from moving/rotating machinery.
- Use hand tools carefully, keeping both hands behind the cutting edge.
- Report any damage to machines/equipment as this could cause an accident.





BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.:

School of Woodworking Skills
Session: 2021-22 (Summer Semester)
B. Voc. Program, 3rd Semester,
2nd In-Sem. Examination

Course Code: SCS1303

Time: 1 Hour

Course Name: Advance Assembly & Fittings

Max. Marks: 20

Section – A

05X01 = 05 Marks

- Q.1. Which one of the following lock is not permanently attached to anything else?
- (A) mortise Lock (B) cam lock
(C) pad lock (D) knob lock
- Q.2. Which one of the following is a function of the runner?
- (A) used to facilitate fluid motion during opening and closing.
(B) it is produce friction
(C) it provides hard opening
(D) none of them
- Q.3. Which one of the following value is standard distance between two holes in adjustable shelf of a cabinet?
- (a) 30 mm (c) 32 mm
(b) 37mm (d) 33 mm
- Q.4. Which one of the following sign is helpful in assembly?
- (A) snake line (B) circle mark
(C) Cross sign (D) None of these
- Q.5. Which one of the following fitting is permanent fitting?
- (a) Clamex P – 14 (c) Clamex P - 15
(b) Lamello (d) Knock down fitting

Section – B

03X02 = 06 Marks

- Q.6. Write down name of any four type of Screws.
- Q.7. write down the name of any four type of hinges.
- Q.8. What are the reinforced connections? Explain its advantage and disadvantage.

Section – C

03X03 = 09 Marks

- Q.9. What is RTA Fittings? Explain with a neat sketch.
- Q.10. Describe lamello and Clamex fitting used in woodworking Assembly.
- Q.11. Explain Half overlay hinge with a suitable sketch.



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Answer key

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Time: 1 Hour

Course Name: Advance Assembly & Fittings

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Section – A

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- Q.1. Which one of the following lock is not permanently attached to anything else? (B)
- (A) mortise Lock (B) cam lock
(C) pad lock (D) knob lock
- Q.2. Which one of the following is a function of the runner? (A)
- (A) used to facilitate fluid motion during opening and closing.
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(C) it provide hard opening
(D) none of them
- Q.3. Which one of the following value is standard distance between two holes in adjustable shelf of a cabinet? (B)
- (A) 30 mm (B) 32 mm
(C) 37mm (D) 33 mm
- Q.4. Which one of the following sign is helpful in assembly? (D)
- (A) snake line (B) circle mark
(C) Cross sign (D) None of these
- Q.5. Which one of the following fitting is permanent fitting? (C)
- (A) Clamex P – 14 (B) Clamex P - 15
(C) Lamello Biscuits (D) Knock down fitting

Section – B

03X02 = 06 Marks

Q.6. Write down name of any four type of Screws.

- Ans. 1. Universal Screws
2. Chip board Screws
3. Self Drilling Screws
4. Corner Screw



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Q.7. write down the name of any four type of hinges.

Ans.

1. Butt Hinge
2. Flush Hinge
3. Concealed Hinge
4. Butterfly Hinge

Q.8. What are the reinforced connections? Explain its advantage and disadvantage.

Ans

Reinforced Connections –

- Biscuits, dowels, nails, screws, dominos are the reinforced connections and can be used to strengthen butt joint.
- Advantage – Large adhesive area with wooden consumables
Can be produced quickly and efficiently
- Disadvantage – No continuous joints and connections

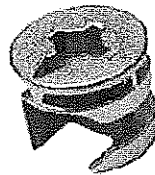
Section – C

03X03 = 09 Marks

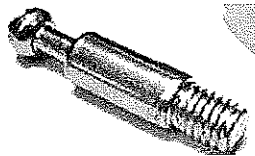
Q.9. What is RTA Fittings? Explain with a neat sketch.

Ans. **Ready To Assembly fitting (RTA)** - It is ready to assemble fitting which is also known as knock down fitting, it become with the assembly of three parts,

- **Cam** - The disk fits into a recess in the first side of the cabinet. It rotates by inserting a screwdriver into the slot in its side. The shaft is screwed into the second side of the cabinet. The collar of the shaft is passed through the hole in the second slot in the disk. When the disk rotates the shaft is locked in position. This keeps both sides of the cabinet locked together.



- **Connecting Screw** – Connecting screw is a cylindrical screw which one end inserts in the socket and another and inserts in the cam. It is used to connect joint and to give strength to it.



- **Socket** – Socket is assembling in second part of assembly. It is used to provide grip to the connecting screw.

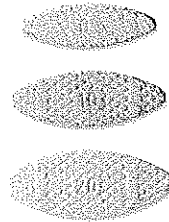


Q 10. Describe lamello and Clamex fitting used in woodworking Assembly.

Ans.

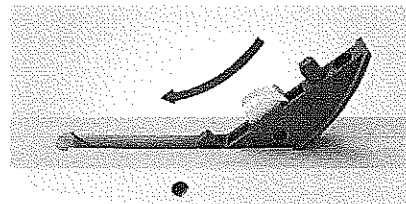
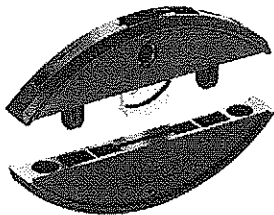
1. Lamello biscuits -

- An oval-shaped, highly dried and compressed wooden biscuit is covered with glue, or glue is applied in the slot. The biscuit is immediately placed in the slot, and the two boards are clamped together.
- The wet glue expands the biscuit, further improving the bond.
- General sizes of Biscuits are –
 - i. Lamello 0 – 47 x 15 x 4 mm
 - ii. Lamello 10 – 53 x 19 x 4 mm
 - iii. Lamello 20 – 56 x 23 x 4 mm



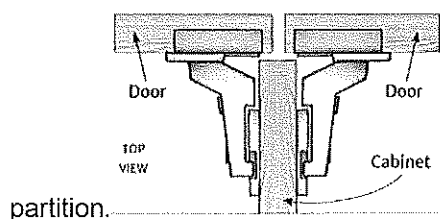
2. Clamex – These are the detachable connecting fittings.

- Clamex P is a detachable furniture fitting on the basis of the P-System is connected with a lever.
- Clamex P is not required glue
- Practically wear-free knock down fitting
- General sizes of Biscuits are –
 - iv. Clamex P 10 – 52 x 19 x 9.7 mm
 - v. Lamello 10 – 66 x 27 x 9.7 mm



Q.11. Explain Half overlay hinge with a suitable sketch.

Ans. Half overlay hinges are intended for pairs of doors in the middle of a run of cabinets, where two doors have their hinges mounted on opposite sides of a shared middle





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Registration No.:

School of Woodworking Skills

Session: 2021-22 (Summer)

B. Voc. Program, 3rd Semester,

2nd In-Sem. Examination

Course Code: SCS1304

Time: 1 Hour

Course Name: Carpenter Mathematics

Max. Marks: 20

Instruction: Calculator without storage is permitted.

Section – A

05X01 = 05 Marks

1) The area of a rhombus is 240 cm² and one of the diagonals is 16 cm. The length of another diagonal is

- a) 15 cm b) 30 cm c) 32 cm d) 12 cm

2) The lateral surface area of cone is

- a) $\pi r l$ b) $2\pi r l$ c) πr d) πl

3) The property of material by virtue of which it can be beaten or rolled up in sheets

- a) Ductility b) Hardness c) Malleability d) Stiffness

4) The temperature at which moisture present in the air begins to condense is known as

- (a) Dry bulb (b) Wet bulb (c) Dew point (d) Wet bulb depression

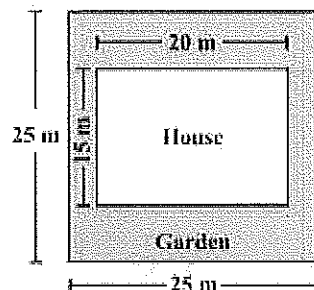
5) The lateral surface area of sphere is

- a) $4\pi r^2$ b) $4\pi r$ c) $2\pi r^2$ d) πr^2

Section – B

03X02 = 06 Marks

Q 6) Mohit has a square plot with the measurement as shown in the figure. He wants to construct a house in the middle of the plot. A garden is developed around the house. Find the total cost of developing a garden around the house at the rate of 55 per m².





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Q7) A flooring tile has the shape of a parallelogram whose base is 24 cm and the corresponding height is 10 cm. How many such tiles are required to cover a floor of area 1080 m²?

Q8) Define: a) Stiffness b) Humidity ratio

Section – C

03X03 = 09 Marks

Q 9) In a building there are 24 cylindrical pillars. The radius of each pillar is 28 cm and height is 4 m. Find the total cost of painting the curved surface area of all pillars at the rate of INR 8 per m².

Q 10) The pillars of a temple are cylindrically shaped. If each pillar has a circular base of radius 20 cm and height 10 m, how much concrete mixture would be required to build 14 such pillars?

Q 11) Explain the physical properties of Wood.



BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Answer key

School of Woodworking Skills

Session: 2021-22 (Summer)

B. Voc. Program, 3rd Semester,

2nd In-Sem. Examination

Course Code: SCS1304

Time: 1 Hour

Course Name: Carpenter Mathematics

Max. Marks: 20

Instruction: Calculator without storage is permitted.

Section – A

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- a) 15 cm b) 30 cm c) 32 cm d) 12 cm

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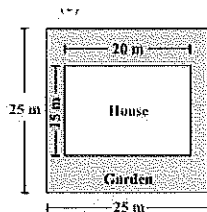
- a) $4\pi r^2$ b) $4\pi r$ c) $2\pi r^2$ d) πr^2

Section – B

03X02 = 06 Marks

Q 6) Mohit has a square plot with the measurement as shown in the figure. He wants to construct a house in the middle of the plot. A garden is developed around the house. Find the total cost of developing a garden around the house at the rate of 55 per m².

Solution:



Solution:

$$\text{Area of the plot} = \text{side} \times \text{side} = 25 \text{ m} \times 25 \text{ m} = 625 \text{ m}^2$$

$$\text{Area of the house} = l \times b = 20 \text{ m} \times 15 \text{ m} = 300 \text{ m}^2$$

$$\text{Area of the garden to be developed} = \text{Area of the plot} - \text{Area of the house} = 625 \text{ m}^2 - 300 \text{ m}^2 = 325 \text{ m}^2$$

$$\text{Cost of developing the garden} = ₹ 325 \times 55 = ₹ 17875$$



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Q7) 2. A flooring tile has the shape of a parallelogram whose base is 24 cm and the corresponding height is 10 cm. How many such tiles are required to cover a floor of area 1080 m²?

Solution:

Solution:
Area of the floor = 1080 m² = 1080 × 10000 cm² = 10800000 cm² [∵ 1 m² = 10000 cm²]
Area of 1 tile = 1 × base × height = 1 × 24 × 10 = 240 cm²
Number of tiles required
$$= \frac{\text{Area of the floor}}{\text{Area of 1 tile}}$$
$$= \frac{10800000}{240}$$
$$= 45000 \text{ tiles}$$

Q8) Define: a) Stiffness b) Humidity ratio

Solution:

- It is the mass of water vapour present in 1 kg of dry air, and is generally expressed in terms of gram per kg of dry air (g/kg of dry air). It is also called specific humidity or humidity ratio.
- It is the mass of water vapour present in 1 kg of dry air, and is generally expressed in terms of gram per kg of dry air (g/kg of dry air). It is also called specific humidity or humidity ratio.

Section – C

03X03 = 09 Marks

Q 9) In a building there are 24 cylindrical pillars. The radius of each pillar is 28 cm and height is 4 m. Find the total cost of painting the curved surface area of all pillars at the rate of INR 8 per m².

Solution:

Solution: Radius of cylindrical pillar, $r = 28 \text{ cm} = 0.28 \text{ m}$
height, $h = 4 \text{ m}$
curved surface area of a cylinder = $2\pi rh$
curved surface area of a pillar = $2 \times \frac{22}{7} \times 0.28 \times 4 = 7.04 \text{ m}^2$
curved surface area of 24 such pillar = $7.04 \times 24 = 168.96 \text{ m}^2$
cost of painting an area of 1 m² = ₹ 8
Therefore, cost of painting 1689.6 m² = $168.96 \times 8 = ₹ 1351.68$

Q 10) The pillars of a temple are cylindrically shaped. If each pillar has a circular base of radius 20 cm and height 10 m, how much concrete mixture would be required to build 14 such pillars?

Solution:

Radius of base of a cylinder = 20 cm
Height of the cylindrical pillar = 10 m = 1000 cm
So, volume of each cylinder = $\pi r^2 h$
$$= \frac{22}{7} \times 20 \times 20 \times 1000 \text{ cm}^3$$
$$= \frac{8800000}{7} \text{ cm}^3$$
$$= \frac{8.8}{7} \text{ m}^3 \text{ (Since } 1000000 \text{ cm}^3 = 1 \text{ m}^3)$$
Therefore, volume of 14 pillars = volume of each cylinder × 14
$$= \frac{8.8}{7} \times 14 \text{ m}^3$$
$$= 17.6 \text{ m}^3$$

Q 11) Explain the physical properties of Wood.

Solution:

Humidity: It is the mass of water vapour present in 1 kg of dry air, and is generally expressed in terms of gram per kg of dry air (g/kg of dry air). It is also called specific humidity or humidity ratio.



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Absolute humidity: It is the mass of water vapour present in 1 m³ of dry air, and is generally expressed in terms of gram per cubic metre of dry air (g /m³ of dry air). It is also expressed in terms of grains per cubic metre of dry air. Mathematically, one kg of water vapour is equal to 15 430 grains.

Relative humidity: It is the ratio of actual mass of water vapour in a given volume of moist air to the mass of water vapour in the same volume of saturated air at the same temperature and pressure. It is briefly written as RH(ϕ).

Density: Mass of any substance per unit volume of material is known as density or absolute density of material. It is expressed as "kg/m³"

Relative Density: Ratio of density of any substance at particular pressure and temperature to the density of air or water at same pressure and temperature.

It is expressed as "%".

Bulk Density: In the case of porous substances, the ratio between mass and volume can vary greatly. the decisive factor is how much material and how much air or gas is in the volume. That is why the term density is used instead of density for such substances.





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Registration No.:

School of Woodworking Skills
Session: 2021-22 (Summer Semester)
B. Voc. Program, 3rd Semester,
2nd In-Sem. Examination

Course Code: SCS1305

Time: 1 Hour

Course Name: Wood Working CNC Machines

Max. Marks: 20

Section – A

05X01 = 05 Marks

Q.1. Which one of the following is the required compressed air for connections in CNC Router?

- (A) 9-10 bar (B) 2-5 bar
(C) 6-7 bar (D) 10-11 bar

Q.2. All the programs can be started from _____?

- (A) CNC Board (B) Techno Manager
(C) Program Editor (D) Tool Arch

Q.3. Which one of the following axis is known as 4th axis?

- (A) X axis (B) Y axis
(C) Z axis (D) C axis

Q.4. Which one of the following is the face where machining is not possible?

- (A) Face 1 (B) Face 2
(C) Face 3 (D) Face 4

Q.5. The working order of the individual programs can be defined in list form from _____?

- (A) CNC Board (B) Techno Manager
(C) Program Editor (D) Tool Arch

Section – B

03X02 = 06 Marks

Q.6. What are the functions of Suction Cup?

Q.7. Name all the faces on CNC router with diagram.

Q.8. Write Down All the operations performed on CNC router and Edge bander.

Section – C

03X03 = 09 Marks

Q.9. What are the requirements for connections and buildings of CNC Router?

Q.10. Write Down edge banding stages on edge bander machine.

Q.11. Write down any three major difference between CNC machines and stationary machines.



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Answer Key

School of Woodworking Skills
Session: 2021-22 (Summer Semester)
B. Voc. Program, 3rd Semester,
2nd In-Sem. Examination

Course Code: SCS1305

Time: 1 Hour

Course Name: Woodworking CNC Machines

Max. Marks: 20

Section – A

05X01 = 05 Marks

- Q.1. Which one of the following is the required compressed air for connections in CNC Router? (C)
- (A) 9-10 bar (B) 2-5 bar
(C) 6-7 bar (D) 10-11 bar
- Q.2. All the programs can be started from _____? (A)
- (A) CNC Board (B) Techno Manager
(C) Program Editor (D) Tool Arch
- Q.3. Which one of the following axis is known as 4th axis? (D)
- (A) X axis (B) Y axis
(C) Z axis (D) C axis
- Q.4. Which one of the following is the face where machining is not possible? (B)
- (A) Face 1 (B) Face 2
(C) Face 3 (D) Face 4
- Q.5. The working order of the individual programs can be defined in list form from ____? (A)
- (A) CNC Board (B) Techno Manager
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Section – B

03X02 = 06 Marks

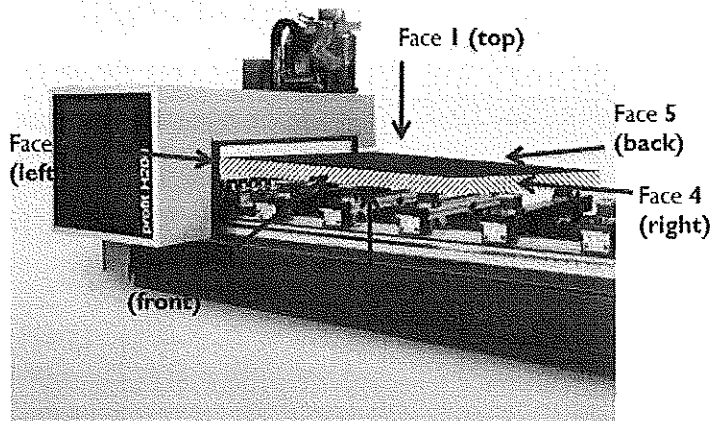
Q.6. What are the functions of Suction Cup?

Ans. Tables with brackets, on which vacuum cups are placed arbitrarily, are used to clamp work pieces. Due to the adjustability of the brackets in the X-axis and the adjustability of the suction cups in the Y-axis different sized work pieces can be tensioned. Falling chips fall between the consoles and so hinder the operation a little. There are also plain tables with the corresponding vacuum blocks, grid tables and clamping templates.

Q.7. Name all the faces on CNC router with diagram.

Ans.

1. Face 1
2. Face 2
3. Face 3
4. Face 4
5. Face 5
6. Face 6



Q.8. Write Down All the operations performed on CNC router and Edge bander.

Ans.

1. Operations performed on CNC router - Routing, Drilling, Milling, Grooving, Carving, Profile Cutting, Squaring, Cutting etc.
2. operations performed on Edge bander- Edge Banding, Woodlipping, Trimming.

Section – C

03X03 = 09 Marks

Q.9. What are the requirements for connections and buildings of CNC Router?

Ans. Requirements for connections and buildings:

1. Electrical connection value, 20 to 30 kW
2. Compressed air, 7bar
3. Suction power, 4000 to 5000 m / h
4. Floor load, 2000 kg / m²
5. Sufficient floor space

Q.10. Write Down edge banding stages on edge bander machine.

Ans.

Edge Banding stages:

1. Glue application unit- Applies glue to workpiece.
2. Clipping unit- Clips the tape at workpiece trailing edge.
3. Pressure zone- Presses edge banding tape onto workpiece.
4. End –trimming unit- Chamfer/straight trims.
5. Flush trimming unit- Trims top and bottom tape overhang.
6. Scraping unit- Removes trimming marks on rough-trimmed edges.
7. Contour unit- Adapts tape to work piece shape and Chamfers/profiles corners.
8. Buffing unit- Polish the edges



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Q.11. Write down any three major difference between CNC machines and stationary machines.

Ans.

Stationary machines	CNC machines
Manually working machines.	It is computer numerical control machine.
Manually tool changing.	Automatically tool changer.
Require more man power	Require less man power.
No requirement of software for operation.	It require software for operation.



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Registration No.:

School of Woodworking Skills

Session: 2021-22 (Summer)

B. Voc. Program, 3rd Semester,

2nd In-Examination

Course Code: SCS1307

Time: 1 Hours

Course Name: Advanced Carpenter Materials

Max. Marks: 20

Instruction: All the questions are compulsory.

Section – A

5X01 = 5 Marks

Q1. The property of material by which it can drawn in wires or sheets

- | | |
|----------------|-----------------|
| (a) Strength | (b) Ductility |
| (c) Durability | (d) Brittleness |

Q2. The process of removing moisture from freshly cut down trees is known as

- | | |
|-------------------|---------------|
| (a) De-moistening | (b) Seasoning |
| (c) Drying | (d) None |

Q3. When material deforms permanently without failure. It is called as

- | | |
|-------------|-------------|
| (a) Solid | (b) Melted |
| (c) Elastic | (d) Plastic |

Q4. When material absorb the energy of force or load imposed on it, characteristic is called

- | | |
|---------------|-------------|
| a) Impact | b) Hardness |
| c) Resilience | d) None |

Q 5. Treatment of wood resulted in

- | | |
|---------------|--------------------------|
| a) Distortion | b) Improves the strength |
| c) shrinkage | d) None |

Section – B

03X02 = 6 Marks

Q 6) Define Following: i) Humidity ii) Wet bulb temperature.

Q 7) Differentiate between absolute humidity and relative humidity.

Q.8) Define strength and its types acting on object under load.

Section – C

03X03 = 9 Marks

Q 9) Explain briefly major influence of moisture content in the wood product.

Q 10) Define any three mechanical properties of wooden product.

Q 11) Define thermal properties of wood.





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Answer key

School of Woodworking Skills

Session: 2021-22 (Summer)

B. Voc. Program, 3rd Semester,

2nd In-Examination

Course Code: SCS1307

Time: 1 Hours

Course Name: Advanced Carpenter Materials

Max. Marks: 20

Instruction: All the questions are compulsory.

Section – A

05X01 = 05 Marks

Q1. The property of material by which it can drawn in wires or sheets

- | | |
|----------------|-----------------|
| (a) Strength | (b) Ductility |
| (c) Durability | (d) Brittleness |

Q2. The process of removing moisture from freshly cut down trees is known as

- | | |
|-------------------|---------------|
| (a) De-moistening | (b) Seasoning |
| (c) Drying | (d) None |

Q3. When material deforms permanently without failure. It is called as

- | | |
|-------------|-------------|
| (a) Solid | (b) Melted |
| (c) Elastic | (d) Plastic |

Q4. When material absorb the energy of force or load imposed on it, characteristic is called

- | | |
|---------------|-------------|
| a) Impact | b) Hardness |
| c) Resilience | d) None |

Q 5. Treatment of wood resulted in

- | | |
|---------------|--------------------------|
| a) Distortion | b) Improves the strength |
| c) shrinkage | d) None |

Section – B

03X02 = 6 Marks

Q 6) Define Following: i) Humidity ii) Wet bulb temperature

Humidity: It is the mass of water vapour present in 1 kg of dry air, and is generally expressed in terms of gram per kg of dry air (g/kg of dry air). It is also called specific humidity or humidity ratio.

Wet bulb temperature: It is the temperature of air recorded by a thermometer, when its bulb is surrounded by a wet cloth exposed to the air. Such a thermometer is called *wet bulb thermometer. The wet bulb temperature (briefly written as WBT) is generally denoted by t_{wp} or t_{wb} . At 100% relative humidity, the wet-bulb temperature is equal to the air temperature (dry-bulb temperature) and is lower at lower humidity.

Q 7) Differentiate between absolute humidity and relative humidity.

Answer: Absolute humidity: It is the mass of water vapour present in 1 m³ of dry air, and is generally expressed in terms of gram per cubic metre of dry air (g /m³ of dry air). It is also expressed in terms of grains per cubic metre of dry air. Mathematically, one kg of water vapour is equal to 15 430 grains.



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Relative humidity: It is the ratio of actual mass of water vapour in a given volume of moist air to the mass of water vapour in the same volume of saturated air at the same temperature and pressure. It is briefly written as $RH(\phi)$.

Q.8) Define strength and its types acting on object under load.

Answer: Strength: The property of material by virtue of it can sustain the load or forces without failure.

1. **TENSILE STRENGTH:** The tensile strength of wood parallel to the grain depends upon the strength of the fibers and is affected not only by the nature and dimensions of the wood elements but also by their arrangement.
2. **COMPRESSIVE OR CRUSHING STRENGTH:** Is very closely related to hardness and transverse shear. □
There are two ways in which wood is subjected to stress of this kind, namely, (1) with the load acting over the entire area of the specimen, and (2) with a load concentrated over a portion of the area.
3. **SHEARING STRENGTH:** Whenever forces act upon a body in such a way that one portion tends to slide upon another adjacent to it the action is called a shear. In wood this shearing action may be (1) along the grain, or (2) across the grain.

Section – C

03X03 = 9 Marks

Q 9) Explain briefly major influence of moisture content in the wood product.

Solution: Wood is a material that continually absorbs or releases moisture until it reaches a balance with its surroundings. In normal use the moisture content of wood varies between 8% and 25% by weight, depending on the relative humidity of the air. On the other hand, an excess of moisture in wood can cause other problems, including, but not limited to: Preventing adhesives from making a secure bond (Less strength) and Shrinkage as the excess moisture leaves the wood:

Shrinkage occurs as moisture content decreases, while swelling takes place when it increases. Volume change is not equal in all directions. The greatest dimensional change occurs in a direction tangential to the growth rings. Shrinkage from the pith outwards, or radially, is usually considerably less than tangential shrinkage, while longitudinal (along the grain) shrinkage is so slight as to be usually neglected. The longitudinal shrinkage is 0.1% to 0.3%, in contrast to transverse shrinkages, which is 2% to 10%. Tangential shrinkage is often about twice as great as in the radial direction, although in some species it is as much as five times as great. The shrinkage is about 5% to 10% in the tangential direction and about 2% to 6% in the radial direction.

Q 10) Define any three mechanical properties of wooden product.

Answer:

1. **STIFFNESS:** The property by means of which a body acted upon by external forces tends to retain its natural size and shape, or resists deformation. TMThus a material that is difficult to bend or otherwise deform is stiff; one that is easily bent or otherwise deformed is flexible. Flexibility is not the exact counterpart of stiffness, as it also involves toughness and pliability.
2. **Strength:** The property of material by virtue of it can sustain the load or forces without failure.
3. **TENSILE STRENGTH :**The tensile strength of wood parallel to the grain depends upon the strength of the fibers and is affected not only by the nature and dimensions of the wood elements but also by their arrangement.



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COMPRESSIVE OR CRUSHING STRENGTH :Is very closely related to hardness and transverse shear. TM

There are two ways in which wood is subjected to stress of this kind, namely, (1) with the load acting over the entire area of the specimen, and (2) with a load concentrated over a portion of the area.

5. **SHEARING STRENGTH** : Whenever forces act upon a body in such a way that one portion tends to slide upon another adjacent to it the action is called a shear. In wood this shearing action may be (1) along the grain, or (2) across the grain.

6. **TRANSVERSE OR BENDING STRENGTH: BEAMS**: When external forces acting in the same plane are applied at right angles to the axis of a bar so as to cause it to bend, they occasion a shortening of the longitudinal fibers on the concave side and an elongation of those on the convex side

7.. **TOUGHNESS: TORSION**: Wood that is difficult to split is said to be tough

- Toughness includes flexibility and is the reverse of brittleness, in that tough woods break gradually and give warning of failure.
- Toughness is dependent upon the strength, cohesion, quality, length, and arrangement of fiber, and the pliability of the wood.

8. **HARDNESS**: The term hardness is used in two senses, namely: (1) resistance to indentation, and (2) resistance to abrasion or scratching TMIn the latter sense hardness combined with toughness is a measure of the wearing ability of wood and is an important consideration in the use of wood for floors, paving blocks, bearings, and rollers.

9. **RESILIENCE**: Is the amount of work done upon a body in deforming it. Within the elastic limit it is also a measure of the potential energy stored in the material and represents the amount of work the material would do upon being released from a state of stress.

Q 11) Define thermal properties of wood.

Answer:

1. **Thermal conductivity** represents the wood property to conduct heat. Thermal conductivity is property by which we are able to distinguish wood as heat insulator or pure heat conductor. Wood exhibits a low thermal conductivity (high heat-insulating capacity) compared with materials such as metals, marble, glass, and concrete. Thermal conductivity is highest in the axial direction and increases with density and moisture content; thus, light, dry woods are better insulators.
2. **Thermal diffusivity**: Thermal diffusivity is a measure of how quickly a material can absorb heat from its surroundings. It is defined as the ratio of thermal conductivity to the product of density and heat capacity. Therefore, conclusions regarding its variation with temperature and density are often based on calculating the effect of these variables on heat capacity and thermal conductivity. Because of the low thermal conductivity and moderate density and heat capacity of wood, the thermal diffusivity of wood is much lower than that of other structural materials, such as metal, brick, and stone.
3. **Specific heat of wood/Heat capacity** : Specific heat capacity is defined as the amount of heat that a kilogram of a given substance is required to absorb in order to increase its temperature by one degree. The heat capacity of wood depends on the temperature and moisture content of the wood but is practically independent of density or species.
4. **Coefficient of Thermal Expansion** : The coefficient of thermal expansion is a measure of the relative change of dimension caused by temperature change. The thermal expansion coefficients of completely dry wood are positive in all directions; that is, wood expands on heating and contracts on cooling.

