



BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Set A

Registration No.....

School of Woodworking Skills

Session: 2020-21 (Summer Semester)

B. Voc. Program, 1st Semester,

1st In-Sem. Examination

Course Code: SCS1101

Time: 1 Hour

Course Name: Hand Skill and transfer of measurement

Max. Marks: 20

Instruction:

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

Section A

05X01 = 05 Marks

- Q 1. Which one is not a cutting tool?
(A) Japanese saw (C) Rip Saw
(B) Jack Planner (D) None of the them
- Q 2. Which tool is used for 90° angle measurement?
(A) File (B) Double Meter
(C) Try Square (D) Marking Gauge
- Q 3. One Meter is equivalent to how many millimeter?
(A) .001mm (B) 1000mm
(C) 100mm (D) .01mm
- Q 4. Which one sand paper will give a better surface finish?
(A) P220 (B) P180
(C) P100 (D) P150
- Q 5. One millimeter is equivalent to how much centimeter?
(A) 100cm (B) 1cm
(C) .01cm (D) 0.1Cm

Section B

03X02 = 06 Marks

- Q 6. What is Lap and Butt Joint Define it with proper Diagram?
- Q 7. What do you mean by Try square and also draw the Diagram?
- Q 8. Write any two difference between Rip Saw and Cross Cut Saw.

Section C

03X03 = 09 Marks

- Q 9. Discuss any six kind of marking symbols and their significance.
- Q 10. What is Jack planner? Write down its parts name with Diagram.
- Q 11. What do you understand by Sand paper? Discuss about grit size and their significance.





BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Set A

Answer Key

School of Woodworking Skills (SWS)

Session: 2020-21 (Summer Semester)

B. Voc. Program, 1st Semester,

1st In-Sem. Examination

Course Code: SCS 1101

Time: 1 Hour

Course Name: Hand Skill & transfer of Measurement

Max. Marks: 20

Instruction:

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

Section A

05X01 = 05 Marks

Q 1. Which one is not a cutting tool?

- (A) Japanese saw (C) Rip Saw
(B) Jack Planner (D) None of the them

Ans. D

Q 2. Which tool is used for 90° angle measurement?

- (A) File (B) Double Meter
(C) Try Square (D) Marking Gauge

Ans. C

Q 3. One Meter is equivalent to how many millimeter?

- (A) .001mm (B) 1000mm
(C) 100mm (D) .01mm

Ans. B

Q 4. Which one sand paper will give a better surface finish?

- (A) P220 (B) P180
(C) P100 (D) P150

Ans. A

Q 5. One millimeter is equivalent to how much centimeter?

- (A) 100cm (B) 1cm
(C) .01cm (D) 0.1Cm

Ans. D

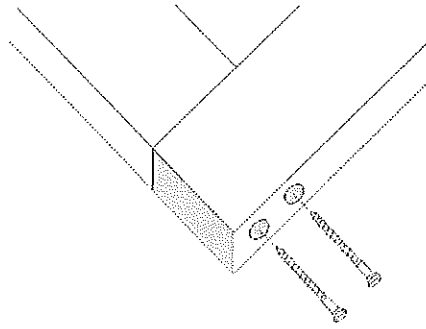
Section B

03X02 = 06 Marks

Q 6. What is Lap and Butt Joint Define it with proper Diagram?

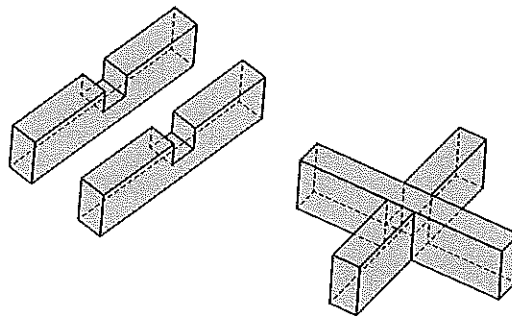
Ans. **Butt Joint**

A butt joint is a joint when one piece of wood butts into another (most often at a right angle, or square to the other board) and is fastened using mechanical fasteners.



Half Lap Joint

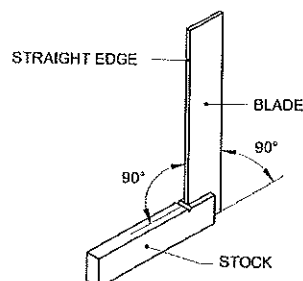
The half-lap joint is where half of each of the two boards being joined is removed so that the two boards join together flush with one another. This type of wood joinery can obviously weaken the strength of the two adjoining boards, but also is a stronger joint than butt joints.



Q 7. What do you mean by Try square draw the Diagram?

Ans. **Try Square** It is a marking tool that used to mark and check the 90° on pieces of wood. The square in the name refers to the 90° angle and try refers to check the wood edges, faces are straight or not with one another.

A try square is so called because it is used to try how square the workpiece is.





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Q 8. Write any two difference between Rip Saw and Cross Cut Saw?

Ans. Difference between Rip Saw and Cross Cut Saw

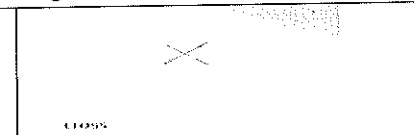

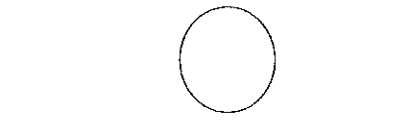

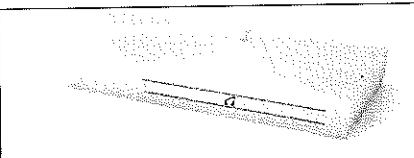
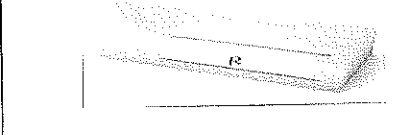
S.No.	Rip Saw	Cross Cut Saw
1.	It is best suitable for Cutting the wood parallel to the direction of wood grain (i.e. for along the grain Cutting)	It is best suitable for Cutting the wood against the direction of wood grain (i.e. Cross the grain cutting)
2.	It create wider Kerf as compare to Cross cut saw.	It create narrower Kerf as compare to Rip Saw.

Section C

03X03 = 09 Marks

Q 9. Discuss any six kind of marking symbol and their significance?

Ans. Marking Symbols are as follows:

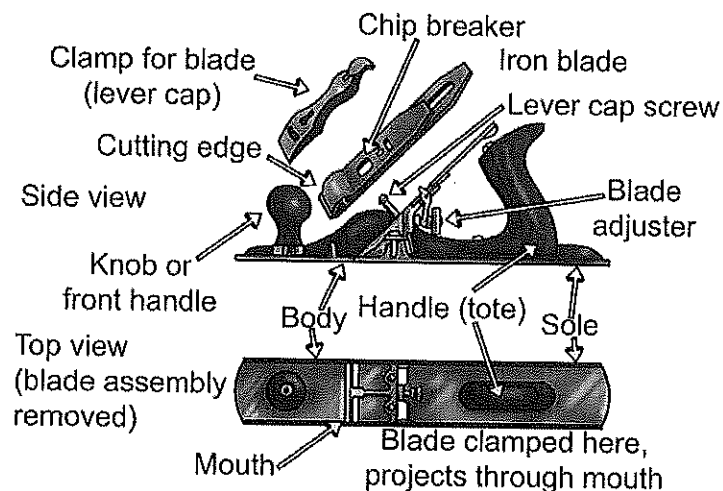
S.No.	Designation	Diagram	Significance
1.	Cross		It means throughout cut.
2.	Wavy line		It means material has to be removed throughout.
3.	Circle		It means end of cutting or material removal.
4.	Triangle		It is an assembly symbol. It is used to avoid the confusion during the assembly.
5.	Groove		The edge of the groove is symbolically indicated by lines. The G denotes the groove
6.	Rebate		The edge of the rebate is symbolically indicated by lines and R denotes the rebate.

Q 10. What is Jack planner write down its parts name with Diagram?

Ans. **Jack Planner:** It is a cutting tool that used to flatten, reduce the thickness, and impart a smooth surface to a rough workpiece of lumber or timber.

Parts of the Jack Planner

1. **Sole** is the bottom face of the plane.
2. **Mouth** is an opening in the sole of the plane through which the blade extends, and through which wood shavings rise.
3. **Iron** is a steel blade which cuts the wood.
4. **Cap iron** or **chip breaker** reinforces the iron and curls and breaks apart wood shavings as they pass through the mouth.
5. **Lever Cap** secures the cap iron and iron firmly to the frog.
6. **Depth adjustment knob** controls the cutting depth of the iron.
7. **Lateral adjustment lever** skews the iron so that the depth of cut is uniform across the mouth.
8. **Backward Handle or Tote** is the principal handle for gripping the plane.
9. **Forward handle or Knob** allows a second hand to guide the plane.





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Q 11. What do you understand by Sandpaper? Discuss about grit size and their significance.

Ans. Sand paper is a special thick paper with a rough abrasive surface that is used to remove stains caused due to glue and scratches, similarly for finishing and for roughing operation (before doing paint and gluing the parts together).

Roughing is inversely proportional to grit size

- Larger grit size suitable for better surface finish.
- Smaller grit size suitable for roughing operation.

Sand paper comes in different grit size depending upon the abrasive particle size.

According to FEPA standard grit size for sand paper are as follows.

S.No.	FEPA Grit Designation	Significance
1.	P12 to P36	Extra coarse (very Fast removal of material)
2.	P40 to P50	Coarse (Fast removal of material)
3.	P60 to P80	Medium removal of material
4.	P100 to P120	Fine (sanding bare wood in preparation for finishing, not suitable for removing varnish or paint from wood, use for cleaning plaster and water stain from wood)
5	P150 to P220	Very Fine removal of Material
6	P220 to P360	Very Fine (sanding finishes between coats)
7.	P400 to P600	Extra fine, start polishing of wood





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School of Woodworking Skills (SWS)

Session: 2020-21 (Summer Semester)

Set- A

B. Voc. Program, 1st Semester,

1st In-Sem. Examination

Code: SCS1102

Course Name: Power Tools

Time: 1 Hour

Max. Marks: 20

Instruction:

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

Section A

05X01 = 05 Marks

- Q1. In the given option which accessories is used for straight cutting in hand circular saw.
- (A) Guide Rail (B) Riving Knife
(C) Side Stops (D) None of these.
- Q2. Which one of the following is the angular range of hand circular saw?
- (A) 1 to 45 (B) -1 to 47
(C) A&B Both (D)None of them
- Q3. Which one of the following accessories is used in hand router?
- (A) Collet (B) Centering mandrel
(C) Copying ring (D) All of these
- Q4. Which of the following diameter of cutter is used for 4x20 domino?
- (A) 10 mm (B) 4 mm
(C) 8mm (D) 5 mm
- Q5. What is the maximum depth of domino machine?
- (A) 12 mm (B) 8 mm
(C) 15 mm (D) 28mm

Section B

03X02 = 06 Marks

- Q6. What are the two ways for guiding the Jig saw?
- Q7. Draw the diagram of router bit with its parts name.
- Q8. What are the function of Riving knife?

Section C

03X03 = 09 Marks

- Q9. What are the steps for Making the groove of 20mm deep on 35 mm thick MDF Piece by hand router?
- Q10. What are the criteria for selection of router bit and what are the material used for router bit?
- Q11. Explain the procedure to change the blade of circular saw.





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Answer Key

Set - A

School of Woodworking Skills (SWS)

Session: 2020-21 (Summer Semester)

B. Voc. Program, 1st Semester,

1st In-Sem. Examination

Code: SCS1102

Course Name: Power Tools

Time: 1 Hour

Max. Marks: 20

Instruction:

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

Section A

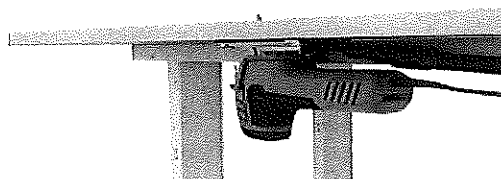
05X01 = 05 Marks

- Q1. In the given option which accessories used for straight cutting in hand circular saw.
- (A) Guide Rail (B) Riving Knife
(C) Side Stops (D) None of these. Ans. A
- Q2. Which one of the following is the angular range of hand circular saw?
- (A) 1 to 45 (B) -1 to 47
(C) A&B Both (D)None of them Ans. B
- Q3. Which one of the following accessories used in hand router?
- (A) Collet (B) Centering mandrel
(C) Copying ring (D) All of these Ans. D
- Q4. Which of the following diameter of cutter used for 4x20 domino?
- (A) 10 mm (B) 4 mm
(C) 8mm (D) 5 mm Ans. B
- Q5. What is the maximum depth of domino machine?
- (A) 12 mm (B) 8 mm
(C) 15 mm (D) 28mm Ans. D

Section B

03X02 = 06 Marks

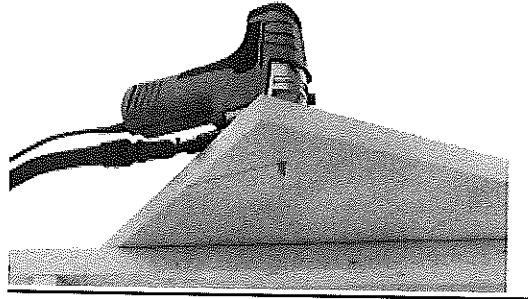
- Q6. What are the two ways for guiding the Jig saw?
- Ans. (a) From bottom of the workpiece:- Guide the machine to the bottom of the workpiece, if only one side of a workpiece is visible. The jig saw is usually rotated and inserted from below. In this way, we can see the cutting line when sawing.



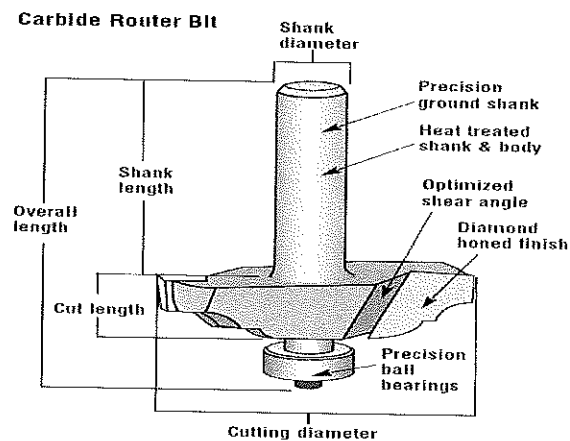


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(b) From top of the workpiece:- If the quality of the cut does not matter much, it is usually easier to cut at the top.



Q7. Draw the diagram of router bit with its parts name.
Ans.



Q8. What are the function of Riving knife?

Ans. Function of riving knife are as follows:

1. It Prevents the kick back while Cutting.
2. It keeps the kerf open in separating cut.

Section C

03X03 = 09 Marks

Q9. Q9. What are the steps for Making the groove of 20mm deep on 35 mm thick MDF Piece by hand router?

Ans. Steps for Making the groove of 20 mm deep.

1. Mark the required dimension on work piece
2. Set the depth of cut 4mm in router.
3. Set the guide rod and adapter on router.
4. Set the guide rail on work piece.



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5. Plug in the electric chord and dust collection chord on router.
6. Now cut it with 4 mm depth of cut in one pass and repeat it 5 times till 20mm depth is reached.

Q10. What are the criteria for selection of router bit and what are the material used for router bit ?

Ans. Router bit selection is based upon several factors such as

1. Cutter shape and size
2. Shank diameter
3. Cutter diameter
4. Cutter length
5. Material of router bit etc.

Material for router bit

1. Tungsten Carbide (HW)

It is best suited for hardwood such as oak, beech etc and men made material such as panels due its less wear and tear tendency.

2. High speed steel (HSS)

It is best suited for soft wood such as pine and spruce and having less life as compare to HW tool.

Q11. Explain the procedure to change the blade of circular saw.

Ans. Steps to change the blade of circular saw are as follows:

1. Take out the Allen key which is placed at the top of the circular saw.
2. Tilt up the fast fix from its position and take the saw blade below from its zero position.
3. Rotate the nut and loosen it
4. Carefully take out the blade from its position.
5. Put the new saw blade according to the work piece.
6. Tight it with the help of Allen key.





Set - A

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.:

School of Woodworking Skills
Session: 2020-21 (Summer Semester)
B. Voc. Program, 1st Semester,
1st In-Sem. Examination

Course Code: SCS1105

Course Name: Carpenter Materials

Instruction: All the questions are compulsory.

Time: 1 Hour

Max. Marks: 20

Section – A

05X01 = 05 Marks

- Q1. Speed at which a work-piece is fed to the tool cutting edge
- (a) Cutting speed (b) Feed rate
(c) Impregnation (d) None of these
- Q2. Which part of the trunk stores the nutrients?
- (a) Core (b) Sapwood
(c) Cambium (d) Bast
- Q3. In which season wood grows very quickly?
- (a) Summer (b) Autumn
(c) Spring (d) None of these
- Q4. The colour of cellulose fibres is?
- (a) Gray (b) Black
(c) Brown (d) White
- Q5. When the cell (bound) water is released from wood, the wood has
- (a) Constant volume and decreased weight
(b) Constant volume and Constant weight
(c) Decreased volume and decreased weight
(d) Decreased volume and constant weight

Section – B

03X02 = 06 Marks

- Q6. Write the processing principles to avoid tears in solid wood.
- Q7. List the points help you to determine types of wood.
- Q8. Write the functions of the forest.



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Section – C

03X03 = 09 Marks

Q9. Explain the tree rings and its growth pattern.

Q10. Explain the various components of the tree (trunk) with diagram.

Q11. Write a note on the building materials of the wood.



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Registration No.:

School of Woodworking Skills
Session: 2020-21 (Summer Semester)
B. Voc. Program, 1st Semester,
1st In-Sem. Examination

Course Code: SCS1105

Course Name: Carpenter Materials

Instruction: All the questions are compulsory.

Time: 1 Hour

Max. Marks: 20

Section – A

05X01 = 05 Marks

Q1. Speed at which a work-piece is fed to the tool cutting edge

- (a) Cutting speed (b) Feed rate
(c) Impregnation (d) None of these

Q2. Which part of the trunk stores the nutrients?

- (a) Core (b) Sapwood
(c) Cambium (d) Bast

Q3. In which season wood grows very quickly?

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Q4. The colour of cellulose fibres is?

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Q5. When the cell (bound) water is released from wood, the wood has

- (a) Constant volume and decreased weight
(b) Constant volume and Constant weight
(c) Decreased volume and decreased weight
(d) Decreased volume and constant weight

Section – B

03X02 = 06 Marks

Q6. Write the processing principles to avoid tears in solid wood.

Ans.

Avoid tears



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In order to avoid tearing out and the associated elaborate patching or sanding work, you should note the following points when working with solid wood:

- Use sharp tools
- Work wood in the direction of the tree ring
- Use splinter wood / cut wood
- Carry out cross machining before longitudinal machining

Q7. List the points help you to determine types of wood.

Ans.

The following points help you to determine types of wood:

- Wood color
- Pores and structure
- Hardness and weight
- Resin
- Tree branches
- Smell

Q8. Write the functions of the forest.

Ans.

Functions of the forest

- Oxygen supplier
- Protection against natural forces (landslides, avalanches, floods)
- Living and recreation space
- Firewood supplier
- Raw material supplier for paper production
- Wood supplier for carpentry

Section – C

03X03 = 09 Marks

Q9. Explain the tree rings and its growth pattern.

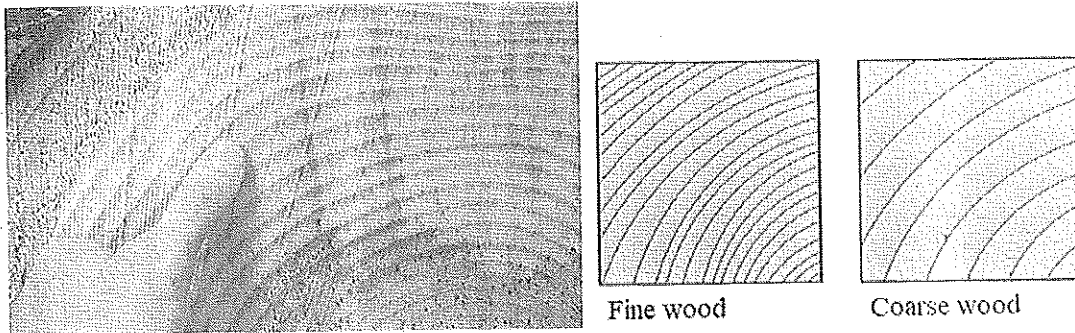
Ans.

The tree rings

The cross-section of a tree trunk provides information about the age of a tree, its location and the structure of the wood. This is termed as dendrochronology.

As you already know, the pith lies in the middle of the trunk. The tree rings are arranged around this. A tree ring corresponds to the amount of wood that has grown in a year. Tree rings consist of a lighter and a darker wood layer. The lighter and softer layer forms in spring when the tree grows very quickly. This tree ring layer is called early wood. The darker and

harder layer grows in summer and autumn when the tree grows less quickly. This tree ring layer is called late wood.



Wood is easier to split and process across the tree rings than along the tree rings. This can lead to problems, so-called tearing, during processing. In order to avoid tearing out, you have to pay special attention to the tree ring course during woodworking.

Q10. Explain the various components of the trunk (trunk) with diagram.

Ans.

The trunk

The base layers

If you look at the cross-section of a trunk, you will see that it consists of different zones or layers.

The marrow / marrow tube lies at the center of the trunk and is responsible for the tree growing tall.

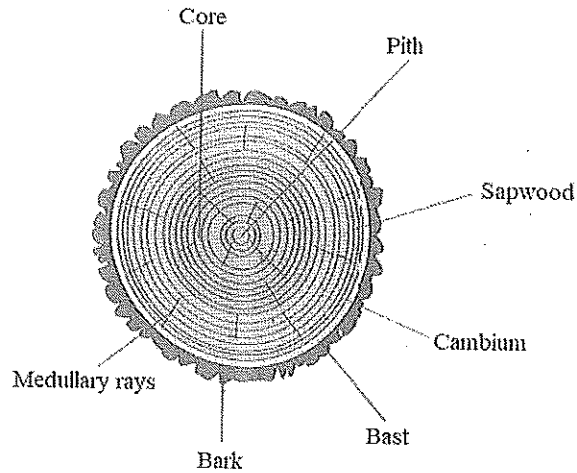
The core (the heartwood) lies in the inner part of the trunk. Heritage comes from old wooden cells that store nutrients. Most of the wood you use as a carpenter comes from this part of the tree because heartwood is more resistant than sapwood. Heartwood can be a darker color than sapwood. This varies depending on the type of wood.

The sapwood (sapwood) has the task of transporting water and nutrients from the roots to the leaves. Sapwood is less durable than heartwood. Sapwood can be lighter in color than the heartwood. This varies depending on the type of wood.

The cambium is the growth layer of the tree. It is a thin, sensitive layer. The cambium is responsible for the production of new wood during the growing season of the tree (spring and summer).

The bast is under the bark. It transports the nutrients produced in the leaves into the tree trunk.

The bark is the outermost layer of the tree. Their function is to protect the tree against extreme temperatures, pests and diseases. The bark is called bark together with the bast.



Q11. Write a note on the building materials of the wood.

Ans.

Building materials of the wood

Wood consists of the two main building materials cellulose and lignin.

Cellulose is fibrous. Cellulose fibers are used for paper production or as insulation material. Cellulose has a gray color.

Lignin is solid to brittle. It can be compared to an adhesive that holds the cellulose fibers together and provides strength. The lignin has a light to dark brown color.

If wood is exposed to the weather, the lignin on the wood surface is released from the wood by the sun and washed out by the rain. What remains is the gray cellulose, as you can see from the following examples:

Other important building materials (ingredients) of wood are:

- Resins
- Oils / Fats
- Dyes
- Minerals

Depending on the type of wood, the wood consists of a different composition of these building materials (ingredients). The mix of building materials determines the appearance and properties of the different types of wood.



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Registration No.....

School of Woodworking Skills

Session: 2020-21 (Summer Semester)

B. Voc. Program, 1st Semester,

1st In-Sem. Examination

Course Code: SCS1106
Course Name: Hand Drawing
Instruction:

Time: 1 Hour
Max. Marks: 20

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

Section A

05X01 = 05 Marks

- Q1. In the given option which pencil will be the Softer.
 (A) H (B) 2H
 (C) B (D) 2B
- Q2. The Representative factor for enlarging scale is
 (A) Equal to 1 (B) Always greater than 1
 (C) A&B Both (D) None of them
- Q3. SI unit for linear dimension is
 (A) Centimeter (B) Millimeter
 (C) Meter (D) None of them
- Q4. Which one will be the size for A3 Sheet in millimeter?
 (A) 420x297 (B) 29.7x21.0
 (C) 297x210 (D) 594x841
- Q5. What is the significance of alternate long and short dash line in technical drawing?
 (A) Outlines of the object (B) Hidden surface
 (C) A&B Both (D) line of symmetry

Section B

03X02 = 06 Marks

- Q6. An object of length 2 feet is drawn on a size of 20mm calculate the R.F.
- Q7. Write down any two type of line and their application?
- Q8. What do you understand by drawing differentiate artistic drawing and technical drawing?

Section C

03X03 = 09 Marks

- Q9. What do you mean by RF explain with example?
- Q10. Explain the type of drawing sheet used in Technical drawing with Proper Diagram.
- Q11. Discuss any four type of drawing accessories briefly?



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School of Woodworking Skills (SWS)

Session: 2020-21 (Summer Semester)

B. Voc. Program, 1st Semester,

1st In-Sem. Examination

Course Code: SCS1106
Course Name: Hand Drawing
Instruction:

Time: 1 Hour
Max. Marks: 20

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

Section A

05X01 = 05 Marks

- Q1. In the given option which pencil will be the Softer?
(A) H (B) 2H
(C) B (D) 2B Ans. D
- Q2. The Representative factor for enlarging scale is
(A) Equal to 1 (B) Always greater than 1
(C) A&B Both (D)None of them Ans. B
- Q3. SI unit for linear dimension is
(A) Centimeter (B) Millimeter
(C) Meter (D)None of them Ans. C
- Q4. Which one will be the size for A3 Sheet in millimeter?
(A) 420x297 (B) 29.7x21.0
(C) 297x210 (D) 594x841 Ans. A
- Q5. What is the significance of alternate long and short dash line in technical drawing?
(A) Outlines of the object (B) Hidden surface
(C) A&B Both (D) line of symmetry Ans. D

Section B

03X02 = 06 Marks

Q6. An object of length 2 feet is drawn on a size of 20mm calculate the RF

Ans. Representative Factor (RF) = $\frac{\text{Drawing length of an object}}{\text{Actual length of an object}}$

Actual length of an object = 2 feet = 2x12x25.4 mm

Drawing length = 20mm

$$Rf = \frac{20}{2 \times 12 \times 25.4} = 0.0328$$




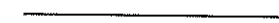

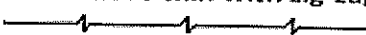
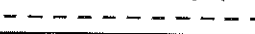


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Q7. Write down any two type of line and their application?

Ans. **Lines**

It is one important aspect of technical drawing. Lines are always used to construct meaningful drawings. Various types of lines are used to construct drawing, each line used in some specific sense. Lines are drawn following standard conventions mentioned in BIS (SP46:2003). A line may be curved, straight, continuous, segmented. It may be drawn as thin or thick. A few basic types of lines widely used in drawings are shown in Table

Types of lines used in engineering drawing.

Illustration	Application
Thick 	Outlines, visible edges, surface boundaries of objects, margin lines
Continuous thin 	Dimension lines, extension lines, section lines leader or pointer lines, construction lines, boarder lines
Continuous thin wavy 	Short break lines or irregular boundary lines – drawn freehand
Continuous thin with zig-zag 	Long break lines
Short dashes, gap 1, length 3 mm 	Invisible or interior surfaces
Short dashes 	Center lines, locus lines Alternate long and short dashes in a proportion of 6:1,
Long chain thick at end and thin elsewhere 	Cutting plane lines

Q8. What do you understand by drawing differentiate artistic drawing and technical drawing?

Ans. A drawing is a graphical representation of an idea or an imagination on a piece of paper with or without technical specification.

An artistic drawing is drawn by free hand it not requires any technical details like (Dimension, tolerances etc.) while in technical drawing technical details such as dimensions, angle of projection, tolerances etc. are required to mention.

Section C

03X03 = 09 Marks

Q9. What do you mean by RF explain with example?

Ans. **Representative factor:** It is a fraction by which an object can be enlarged or reduced on a drawing sheet.



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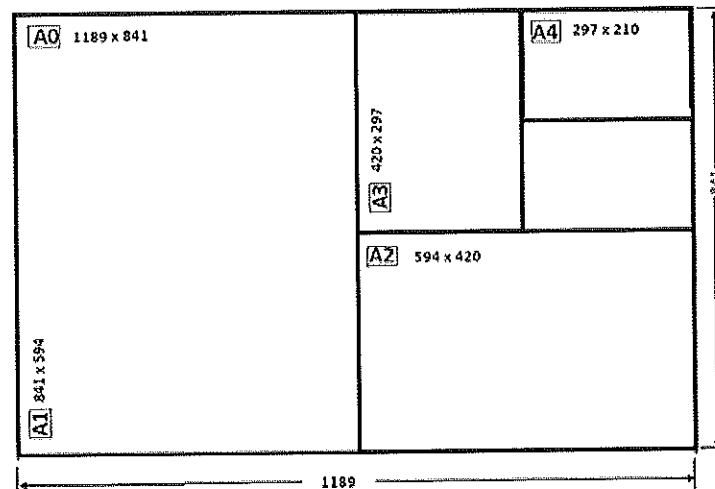
Example There is a wide variation in sizes of engineering objects. Some are very large such as aero plane, rockets, etc. and some are very small such as electrical components, wrist watch etc. so it is very difficult to draw the object to its actual size on a drawing sheet hence it is required to enlarge and reduced an object on a sheet. Some objects can be drawn to its actual size.

Q10 Explain the type of drawing sheet use in Technical drawing with Proper Diagram.

Ans. **Drawing Sheet:** Drawing sheet is the medium on which drawings are prepared by means of pencils or pen.

According to the BIS standard size of drawing sheet are as follows

S. No.	Designation	Size
1.	A ₀	1189x841
2.	A ₁	841x594
3.	A ₂	594x420
4.	A ₃	420x297
5.	A ₄	297x210



Q11. Discuss any four type of drawing accessories briefly?

Ans. **1.Drawing Board**

Drawing board is made of soft wooden platens on which drawing sheets are placed and drawings are drawn with ease.

S. No.	Designation	Size
1.	D ₀	1500x1000
2.	D ₁	1000x700
3.	D ₂	700x500
4.	D ₃	500x500

2.Drawing Sheet



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Drawing sheet is the medium on which drawings are prepared by means of pencils or pen.

S. No.	Designation	Size
1.	A ₀	1189x841
2.	A ₁	841x594
3.	A ₂	594x420
4.	A ₃	420x297
5.	A ₄	297x210

3. Mini-drafter

This is a device used to draw parallel or inclined lines very effectively with ease. This is mounted on the top left corner of the drawing board by means of a clamping mechanism which is an integral part of the device.

4. Set squares

Set squares are a set of 45° set square and 30°-60° set-square, as shown in figure

5. Compasses

These are used to draw arcs or circles. Generally, two sizes of compasses: one large compass and the other a small spring bow compass are commonly found. Each compass consists of a needle point and a pencil point. For drawing very large radius arcs, the pencil point leg can be removed from the knee joint and a lengthening bar can be inserted to increase the radius of the arc. Figure 4 shows the photograph of a compass.

5. Divider

Dividers are used to transfer lengths to the drawings either from scales or from the drawing itself. Similar to the compasses, two sizes of dividers are used in technical drawings. One large divider and the other small spring bow divider.

6. Pencils / lead sticks/ pencil sharpener / eraser/etc: