AUTOMOBILE ENGINEERING TECHNICIAN
First Year
Paper-I: Workshop Practice

Time: 3hr **Max.Marks: 50**

Section - I **1X20=20**

1. Prepare a rectangular shape from a given 5 mm thick M.S flat of size 90mmX45mm.

Aim: To fabricate a rectangular shape from a 5mm thick Mild Steel (M.S) flat of size 90mm x 45mm.

Material:

Mild Steel flat (M.S) of size 90mm x 45mm x 5mm
Marking tools (scriber, chalk, or soapstone)
Measuring tools (steel rule)
Cutting tools (hacksaw or power saw)
Filing tools (flat file, square file)
Deburring tools (file or deburring tool)
Safety equipment (safety glasses, gloves)

Tools:

Hacksaw or power saw
Bench vice
Files (flat file, square file)
Steel rule
Scriber or marking tool
Deburring tool
Safety equipment (safety glasses, gloves)

Procedure:

Marking:

- Place the M.S flat in the bench vice, ensuring it is securely held.

- Use a steel rule and a scriber to mark the dimensions of the rectangular shape on the M.S flat. Mark 90mm along one edge and 45mm along the adjacent edge.
- Connect the marks using straight lines.

Cutting:

- Secure the marked M.S flat in the bench vice.
- Use a hacksaw or power saw to carefully cut along the marked lines.
- Ensure a smooth and straight cut.

Filing:

- After cutting, use a flat file to remove any burrs and sharp edges.
- Use a square file to refine the corners and edges of the rectangular shape.
- Check for accuracy by measuring the dimensions with a steel rule.

Deburring:

- Use a deburring tool or a file to remove any remaining burrs or sharp edges on both the cut surfaces.
- Smooth the edges for a finished appearance.

Inspect and Safety:

- Inspect the fabricated rectangular shape for accuracy in dimensions and a smooth finish.
- Ensure that all safety precautions are followed, such as wearing safety glasses and gloves during cutting and filing processes.

Results:

A rectangular shape has been successfully fabricated from the 5mm thick M.S flat, achieving the specified dimensions of 90mm x 45mm. The edges are smooth, and the piece is free from burrs, meeting the desired quality standards.

Note: *The marking, cutting, filing, and deburring processes should be carried out carefully to achieve accurate dimensions and a neat finish.*

2. Prepare T shape from a given 5 mm thick M.S for given sizes.

Aim:

To fabricate a T-shaped component from a 5mm thick Mild Steel (M.S.) sheet, with specified dimensions.

Material:

5mm thick Mild Steel (M.S.) sheet
Marker/Pencil

Ruler/Scale
Square
Hacksaw
Bench Vice
File
Center Punch
Hammer
Protractor (if needed)
Deburring tool

Tools:

Measuring tape
Hacksaw
Bench Vice
File
Center Punch
Hammer
Deburring tool

Procedure:

Measurement and Marking:

- Using a ruler or scale, measure and mark the required dimensions of the T-shaped component on the 5mm thick M.S. sheet.
- Double-check the measurements to ensure accuracy.

Cutting:

- Secure the M.S. sheet in the bench vice.
- Using a hacksaw, carefully cut along the marked lines to shape the T component.
- Ensure straight and clean cuts.

Squaring Edges:

- Use a file to square the cut edges to achieve precision.
- Ensure that the T component has the desired dimensions.

Marking for Hole (if needed):

- If the T component requires a hole, use a center punch to mark the center of the hole.
- This should be done precisely to avoid any misalignment.

Drilling (if applicable):

- Secure the T component in the bench vice.
- Drill the marked hole using an appropriate drill bit size.

Deburring:

- Use a deburring tool to remove any sharp edges or burrs on the cut surfaces.
- This step is crucial for safety and a neat finish.

Final Inspection:

- Measure the final T-shaped component to ensure it matches the specified dimensions.
- Check for any imperfections and make adjustments if necessary.

Result:

- A T-shaped component fabricated from a 5mm thick M.S. sheet, meeting the specified dimensions.
- The edges are squared, and if applicable, the hole is drilled precisely at the marked position.
- The component is free from burrs, ensuring a smooth and safe finish.

Note: The accuracy and precision in marking, cutting, and shaping are crucial to achieving the desired result. Safety measures such as wearing safety glasses and gloves should be followed throughout the process.

3. Prepare L shape from a given 5 mm thick M.S for given sizes.

Aim:

To fabricate an L-shaped component from a 5mm thick Mild Steel (M.S.) sheet, following specified dimensions.

Material:

5mm thick Mild Steel (M.S.) sheet
Marker/Pencil
Ruler/Scale
Square
Hacksaw
Bench Vice
File
Center Punch
Hammer
Protractor (if needed)
Deburring tool

Tools:

Measuring tape

Hacksaw
Bench Vice
File
Center Punch
Hammer
Deburring tool

Procedure:

Measurement and Marking:

- Using a ruler or scale, measure and mark the required dimensions of the L-shaped component on the 5mm thick M.S. sheet.
- Ensure precise measurements for accurate fabrication.

Cutting:

- Secure the M.S. sheet in the bench vice.
- Use a hacksaw to carefully cut along the marked lines, shaping the L component.
- Pay attention to maintaining straight and clean cuts.

Squaring Edges:

- Utilize a file to square the cut edges, ensuring precision and a neat finish.
- Confirm that the L component has the specified dimensions.

Marking for Hole (if needed):

- If the L component requires a hole, use a center punch to mark the center of the hole.
- Marking should be precise to prevent misalignment.

Drilling (if applicable):

- Secure the L component in the bench vice.
- Drill the marked hole using an appropriate drill bit size.

Deburring:

- Use a deburring tool to remove any sharp edges or burrs on the cut surfaces.
- This step is essential for safety and to achieve a polished appearance.

Final Inspection:

- Measure the final L-shaped component to verify conformity with specified dimensions.
- Inspect for any imperfections and make adjustments if needed.

Result:

- An L-shaped component fabricated from a 5mm thick M.S. sheet, meeting the specified dimensions.

- Cut edges are squared, and if applicable, the hole is precisely drilled at the marked position.
- The component is free from burrs, ensuring a smooth and safe finish.

Note: Precision in marking, cutting, and shaping is critical to achieving the desired result. Adhering to safety measures, such as wearing safety glasses and gloves, is essential throughout the fabrication process.

4. Make two dill holes of given material.

Aim:

To create two drilled holes in a given material, ensuring accuracy and precision.

Material:

Workpiece (specify the material, e.g., Mild Steel, Aluminum, etc.)
Marker/Pencil
Ruler/Scale
Center Punch
Hammer
Drill Machine
Drill Bits (appropriate sizes for the desired holes)
Bench Vice
Safety Glasses

Tools:

Measuring tape
Marker/Pencil
Ruler/Scale
Center Punch
Hammer
Drill Machine
Drill Bits
Bench Vice
Safety Glasses

Procedure:

Measurement and Marking:

- Measure and mark the positions for the two holes on the workpiece using a ruler or scale.
- Ensure precise measurements and accurate positioning.

Center Punching:

- Place the tip of the center punch at the marked positions.
- Use a hammer to strike the center punch, creating small indentations (center punch marks) at the center of the holes.
- Center punching helps to guide the drill bit and prevents it from wandering during drilling.

Workpiece Securing:

- Secure the workpiece in the bench vice to ensure stability during drilling.
- Ensure that the area around the drilling location is free from any obstructions.

Selecting Drill Bit:

- Choose a drill bit of an appropriate size for the desired holes.
- Ensure that the drill bit matches the specifications of the material being drilled.

Drilling:

- Insert the selected drill bit into the drill machine.
- Align the drill bit with the center punch marks on the workpiece.
- Start the drill machine and slowly apply downward pressure to begin drilling.
- Maintain a steady hand and drill at a controlled speed to avoid overheating and ensure a clean hole.

Repeat for Second Hole:

- After drilling the first hole, measure and mark the position for the second hole.
- Repeat the center punching and drilling process for the second hole.

Safety Precautions:

- Wear safety glasses to protect your eyes from any debris during drilling.
- Follow proper safety protocols for using the drill machine.

Final Inspection:

- Inspect the drilled holes for alignment, depth, and cleanliness.
- Ensure that the holes meet the specified requirements.

Result:

- Two accurately drilled holes in the specified material, meeting the dimensional and positional requirements.
- The holes are clean, without any burrs or deformities.

- The workpiece remains stable and secure in the bench vice.

Note: Precision in marking, center punching, and drilling is essential for a successful outcome. Adhering to safety measures is crucial to ensure the well-being of the operator during the drilling process.

5. Make a rectangular tray of size 10mmX6mmX3mm with GI sheet.
Aim:
To fabricate a rectangular tray with dimensions 10mm x 6mm x 3mm using a

Galvanized Iron (GI) sheet, ensuring accuracy and precision.

Material:

Galvanized Iron (GI) sheet (appropriate size)
Marker/Pencil
Ruler/Scale
Square
Hacksaw
Bench Vice
File
Measuring Tape
Deburring tool

Tools:

Measuring tape
Marker/Pencil
Ruler/Scale
Square
Hacksaw
Bench Vice
File
Deburring tool

Procedure:

Measurement and Marking:

- Measure and mark the dimensions of the rectangular tray on the GI sheet using a ruler or scale.

- Mark the lengths of 10mm, 6mm, and 3mm accurately.

Square the Edges:

- Use a square to ensure that the marked lines are perpendicular and the corners are square.
- This step is crucial for the tray to have straight edges and right angles.

Cutting:

- Secure the GI sheet in the bench vice.
- Use a hacksaw to carefully cut along the marked lines.
- Ensure precision to achieve straight and accurate cuts.

Squaring and Smoothing:

- Use a file to square the cut edges and remove any roughness.
- Smooth the edges to achieve a clean and neat finish.

Bending the Tray:

- Using the measurements, carefully bend the GI sheet to form the rectangular tray.
- Use the bench vice to assist in achieving accurate bends.

Ensuring Dimensions:

- Verify the dimensions of the tray using a measuring tape.
- Confirm that the lengths are 10mm, 6mm, and 3mm as specified.

Deburring:

- Use a deburring tool to remove any sharp edges or burrs on the cut and bent surfaces.
- Ensure that the tray is safe to handle.

Final Inspection:

- Inspect the rectangular tray for accuracy in dimensions and overall quality.
- Ensure that the corners are square, and the tray is free from defects.

Result:

- A rectangular tray fabricated from a GI sheet with dimensions 10mm x 6mm x 3mm.
- The edges are straight, the corners are square, and the tray meets the specified dimensions.
- The tray is free from burrs, ensuring a safe and polished finish.

Note: Attention to precision in marking, cutting, and bending is crucial for the successful fabrication of the rectangular tray. Safety measures, including the use of a bench vice and deburring tool, should be followed throughout the process.

Section - II 1X10=20

6. Prepare a rectangular shape from a given 5 mm thick M.S flat of size 90mmX45mm.

Aim:

To fabricate a rectangular shape from a given 5mm thick Mild Steel (M.S.) flat of specified dimensions.

Material:

5mm thick Mild Steel (M.S.) flat (specified size)

Tools:

Marker/Pencil
Ruler/Scale
Square
Hacksaw
Bench Vice
File
Deburring tool

Procedure:

Measurement and Marking:

- Measure and mark the dimensions of the rectangular shape on the 5mm thick M.S. flat using a ruler or scale.
- Ensure precise measurements for accuracy.

Square the Edges:

- Use a square to ensure that the marked lines are straight and the corners are square.
- This step is crucial for achieving a rectangular shape with right angles.

Cutting:

- Secure the M.S. flat in the bench vice.
- Use a hacksaw to carefully cut along the marked lines, shaping the flat into a rectangular form.
- Ensure straight and accurate cuts.

Squaring and Smoothing:

- Use a file to square the cut edges and remove any roughness.
- Smooth the edges to achieve a clean and neat finish.

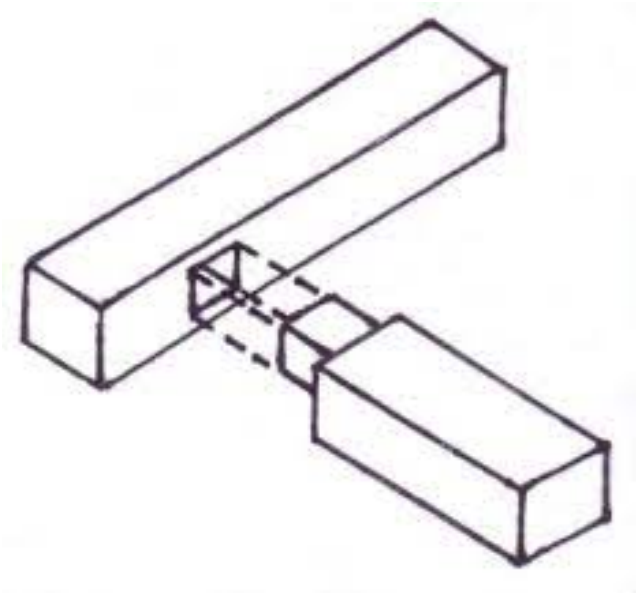
Deburring:

- Use a deburring tool to remove any sharp edges or burrs on the cut surfaces.
- Ensure that the rectangular shape is safe to handle.

Result:

- A rectangular shape fabricated from a 5mm thick M.S. flat, meeting the specified dimensions.
- The edges are straight, the corners are square, and the shape conforms to the specified size.
- The rectangular piece is free from burrs, ensuring a safe and polished finish.

7. Prepare a plain tenon joint with given wood.



Aim:
To construct a plain tenon joint using given wood.

Material:

Wood (specified type and size)

Tools:

Marking Gauge
Tenon Saw
Chisel Set
Mallet
Try Square

Procedure:

Marking:

- Use a marking gauge to mark the width and depth of the tenon on the end of one piece of wood.
- Mark the shoulders and cheeks of the tenon accurately.

Cutting the Tenon:

- Secure the wood piece in a vice.
- Use a tenon saw to make the shoulder cuts, defining the length of the tenon.
- Make multiple cuts within the marked area.
- Create the cheeks by making vertical cuts connecting to the shoulder cuts.
- Be precise to achieve a clean and well-defined tenon.

Waste Removal:

- Use a chisel and mallet to remove the waste wood between the cuts on the cheeks.
- Ensure a flat and smooth surface for a snug fit.

Fitting:

- Test the tenon's fit in the corresponding mortise (if available).
- Trim or adjust the tenon as needed to achieve a proper fit.
- The tenon should fit snugly without gaps.

Final Inspection:

- Use a try square to verify the squareness of the shoulders and cheeks.
- Inspect the overall joint for tightness and precision.
- Ensure that the tenon is flush with the surface.

Result:

- A plain tenon joint successfully crafted from the given wood.
- The tenon is accurately marked, cut, and fitted.
- The joint exhibits a tight fit and is well-constructed for a secure connection.

Note: Attention to accurate marking and careful cutting is crucial for the success of the tenon joint. Regular checking and adjustments during the fitting process help ensure a proper fit.

8. Prepare a ring given a round M.S rod.

Aim:

To prepare a ring from a given round Mild Steel (M.S.) rod.

Material:

Round Mild Steel (M.S.) rod (specified diameter and length)

Tools:

Marker/Pencil
Measuring Tape
Hacksaw
Bench Vice

Procedure:

Marking:

- Measure and mark the desired length of the ring on the round M.S. rod using a measuring tape and marker.

Securing the Rod:

- Secure the M.S. rod in the bench vice to ensure stability during cutting.

Cutting:

- Use a hacksaw to carefully cut the rod at the marked point, creating the desired length for the ring.
- Ensure a straight and clean cut for accurate results.

Forming the Ring:

- Once the rod is cut to the desired length, manipulate the two ends to form a circular shape, bringing them together to create the ring.
- Ensure that the ends meet accurately for a seamless joint.

Final Inspection:

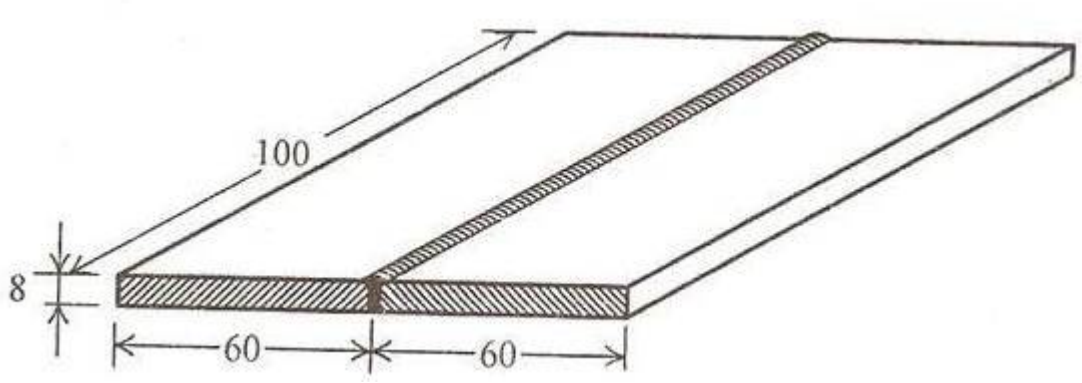
- Inspect the formed ring for accuracy in dimensions and overall quality.
- Verify that the ring has the intended size and shape.
- Ensure that the ends are securely joined.

Result:

- A ring successfully prepared from the given round Mild Steel (M.S.) rod.
- The ring meets the specified dimensions and exhibits a clean, accurate cut.
- The joint is well-formed, resulting in a seamless circular shape.

Note: Attention to precision in marking and cutting is crucial for achieving the desired dimensions and a well-formed ring. Using a bench vice helps stabilise the rod during the cutting process.

9. Prepare a square butt joint with ARC welding.



Aim:
To create a square butt joint using Arc welding.

Material:

Mild Steel (M.S.) plates (specified size and thickness)
Welding Electrodes
Welding Machine
Welding Helmet
Welding Gloves

Tools:

Angle Grinder
Clamps

Procedure:

Preparation:

- Ensure that the surfaces of the Mild Steel plates to be joined are clean and free from any contaminants.
- Use an angle grinder to bevel the edges of the plates at a 45-degree angle to create a V-groove for better weld penetration.

Clamping:

- Secure the plates in position using clamps to form the square butt joint. Ensure the plates are aligned properly for a tight fit.

Welding Setup:

- Set up the welding machine according to the specifications of the welding electrodes and the thickness of the material.
- Put on a welding helmet and gloves for safety.

Welding:

- Strike an arc by bringing the electrode close to the joint and then withdrawing it slightly to create the arc.
- Move the electrode along the joint, filling the V-groove with molten metal.
- Ensure a consistent and even bead along the entire length of the joint.

Cooling and Inspection:

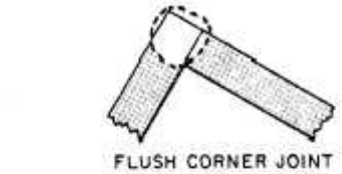
- Allow the welded joint to cool naturally.
- Inspect the weld for any defects such as cracks or incomplete penetration.
- Ensure that the weld is uniform and meets the specified quality standards.

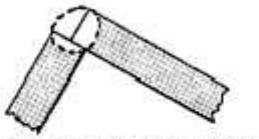
Result:

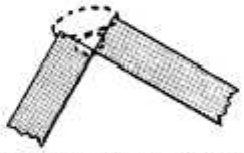
- A square butt joint successfully created using Arc welding.
- The joint is strong, with good penetration and fusion between the plates.
- The weld is free from defects and meets the required quality standards.

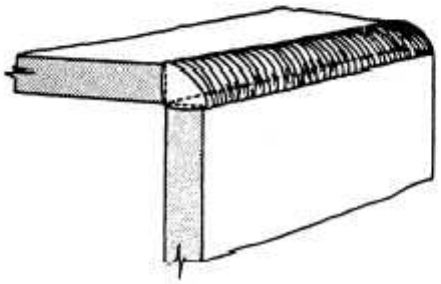
Note: Safety precautions, including the use of appropriate personal protective equipment and proper welding machine setup, are essential during the welding process. Regular inspection ensures the quality and integrity of the welded joint.

10. Prepare a corner joint with ARC welding.


FLUSH CORNER JOINT
A


HALF-OPEN CORNER JOINT
B


FULL-OPEN CORNER JOINT
C



Aim:
To create a corner joint using Arc welding.

Material:

Mild Steel (M.S.) plates (specified size and thickness)
Welding Electrodes
Welding Machine
Welding Helmet
Welding Gloves

Tools:

Angle Grinder
Clamps

Procedure:

Preparation:

- Ensure that the surfaces of the Mild Steel plates to be joined are clean and free from any contaminants.
- Use an angle grinder to bevel the edges of the plates at a 45-degree angle to create a V-groove for better weld penetration.

Clamping:

- Secure the plates in position using clamps to form the corner joint. Ensure the plates are aligned properly for a tight fit.

Welding Setup:

- Set up the welding machine according to the specifications of the welding electrodes and the thickness of the material.
- Put on a welding helmet and gloves for safety.

Welding:

- Strike an arc by bringing the electrode close to the joint and then withdrawing it slightly to create the arc.
- Move the electrode along the joint, filling the V-groove with molten metal.
- Ensure a consistent and even bead along the entire length of the joint, forming a solid connection at the corner.

Cooling and Inspection:

- Allow the welded joint to cool naturally.
- Inspect the weld for any defects such as cracks or incomplete penetration.
- Ensure that the weld is uniform and meets the specified quality standards.

Result:

- A corner joint successfully created using Arc welding.
- The joint is strong, with good penetration and fusion between the plates.
- The weld is free from defects and meets the required quality standards.

Note: Safety precautions, including the use of appropriate personal protective equipment and proper welding machine setup, are essential during the welding process. Regular inspection ensures the quality and integrity of the welded joint.