STATE BOARD OF TECHNICAL EDUCATION & TRAINING::AP, VIJAYAWADA

DIPLOMA IN MECHANICAL ENGINEERING

III SEMESTER

WORKSHOP PRACTICE-1 (M-311)

MANUAL (AS PER C-20 CURRICULUM)

INTRODUCTION

1.0 INTRODUCTION

The Curriculum of Technical Education should invariably provide for knowledge, attitudes and skills required by the technicians /technologists in the country. In this context the laboratory courses form a vital portion in the entire curriculum of technician education. The laboratory courses shall therefore be so designed and delivered that they help the students acquire attitudes and motor skills that are essential to function effectively as technicians/technologists.

The planning, organization and implementation of lab courses need a detailed description of tasks to be performed by the students. Well thought out instructional objectives to a large extent give these descriptions. The analysis of tasks (by identifying the activities the students are expected to do) help prepare the objectives meticulously. In other words the objectives would be clearer, when the task analysis is done to spell out the sub tasks for each objective.

A survey of the practices currently followed in the technical/technician education shows an urgent need to plug in gaps in instructional procedures. The reasons for these gaps are ambiguity in the minds of the teachers regarding tasks to be performed, levels of competency to be achieved by the students and the weightage to be allocated for each task. This aids in scientific design of instructional plan (optimizing the resources, budgeting the time & content).

The task analysis, teaching points and the structured scheme of evaluation are very important in focusing the instruction on specific skill of desired outcome and in evaluating the same. The Instruction and evaluation in Laboratory courses are different from that of cognitive lessons in the sense that adequate importance and hence weightage needs to be given for all three domains of learning viz. cognitive, psychomotor and affective. Since both training and evaluation of traits of affective domain are practically difficult, a few traits (called values) most relevant and essential to occupations/professions after the Course may be identified for the purpose. It is imperative to integrate these values during instruction and evaluation and also overtly notify the same to the students.

A technician, in addition to performing a skill needs to prepare a report of testing that includes the description of procedure, details of measurements made, reasoning based inferences and so on.,. The current practice of record writing has failed to achieve this purpose as most of the time students end up with making copies of available material.

Therefore, for sensitizing the need for the changes in laboratory instruction, the present hand book has been prepared to meet the above requirements. As such the hand book comprises four parts that intend to :

- Present task analysis, teaching points which can be used for effective design of instruction
- provide a scheme of evaluation with rationally allocated weightage to each significant skill component
- offer a set of questions designed at different levels of competencies for assessment enabling the teacher to set the question paper with balanced levels of competencies

- present pre set worksheets that cultivate the habit of systematic recording of observations and writing the technical report.

- Provide all important data related to particular laboratory activity at one point in the form of annexure

1.1. STRUCTURE OF THE BOOK

The hand book is presented in four parts viz., Laboratory sheets, Worksheet, Experimental Methodology and Annexure. The description of each part is given in the following sections

Part I. Laboratory Sheet

The information provided in this part is useful for the teacher for designing the instruction, planning & organization of the experiment and for scientific evaluation of the students. The major features of the Laboratory sheet are further explained below.

1. **Objective**

   It indicates the **Task** to be performed and completed by the student during the specified duration of time.

2. **Task Analysis**

It is the process of identifying the component activities (sub tasks) to be carried out by the student in order to achieve the stipulated objective. As the task analysis aim at fitting the instructional objectives into various classes of behaviour, it would help the teacher to determine any particular type of behaviour the student has learnt / failed to perform.

The task analysis would help the teacher in identifying the specific activities to be performed by the students. This could also be used as some kind of check list to compare with activities planned for the laboratory. Further it would give clue to the teacher to make students think originally & act independently. It includes both psychomotor learning and the related cognitive information and hence the task analysis is presented as Knowledge and skill parts.

A. Knowledge Part: That includes the cognitive aspects of the task.

B. Skill Part: That includes Psychomotor & Affective aspects of the task.

3. **Teaching Points:**

This includes the points based on the SKILL identified with suggested duration for each point and total duration which helps the teacher for the time and content budgeting during instruction.

4. Need and Scope:

The purpose, application and scope of the task to be performed are normally included in this sub section.

5. Planning and Organisation:

It lists actions to be taken to perform various activities and hence useful in planning the instruction and organizing the resources and equipment

6. Scheme of Valuation:

The information provided in this section helps the teacher to devise a tool for rational measurement assessment of the competencies accomplished by the student.

Part II. Work Sheet

It is designed for the student, where in the student enters his personal data of identification, details of the experiment, stepwise procedure, observations made during experiment, a sample calculation, free hand typical graph, graph from experimental data and inference with discussion.

Part III. Experimental Methodology

This section furnishes information with regard to standard procedure to conduct the experiment along with the description of equipment/apparatus and the basic theory/concept involved in the conduct of the experiment. Thus this section is very useful for both teacher and student as well to conduct the experiment systematically. Thus this section is presented in four sub section as described below:

- **Description**

  It gives the detailed description of apparatus / tools / equipment / materials to be used for the task.

- **Theory / Concept**

  It gives the concept of the task to be performed with formulae and units.

- **Procedure**

  It provides the idea of step wise procedure to perform the task.

- **Observation and Calculation**

  It includes sample observation, sample graph, sample calculation for reference

Part IV. Annexure

All important and useful information that may help in accomplishment of tasks like conversion tables for units, technical & scientific data like material properities, standard trend or characteristic curves (graphs) etc are compiled and presented at one place in this section.

1.2. WHO IS TO USE AND HOW TO USE.

The hand book is so designed that it can be beneficially used by different sections of the technical education viz., the teacher, the student, the examiner and the administrator convenient to individual's requirements. A few uses of this hand book each stakeholder could make is outlined in the following sections.

1. Teacher

A. The **laboratory sheet** is designed keeping the teacher in mind for the teacher has key responsibility of imparting the skills to the student and hence the information given in the lab sheets may be useful for planning & organizing the experimental set up and designing an effective instruction. Thus the teacher may

Plan and organize as per *section 4*,

Instruct the students as per *section 2***,**

Demonstrate each sub task as per *section1.B*.and

Evaluate the students as per *section 5***,** according to the level of competency.

Values: The values in a person are an important personality trait that needs to be nurtured in the learning environment. Further it is also a driving component in any individual to deliver the best and hence this component is also included in the evaluation. However only five key dimensions, that are important in the teaching-learning environment, are taken into consideration for nurturing and evaluation. A little information about these five dimensions is given below as a guideline for the teacher while assessing students.

1. Co-operation: It is the voluntary arrangement in which two or more students engage in a mutually beneficial exchange, instead of competition. Cooperation can happen where resources adequate for both students exist or are created by their interaction.

2. Co-ordination: It is the unification, integration, synchronization of the effect of group members so as provide unity of action in the pursuit of common goals. It is an integral element and required in each & every function and at each & every stage & therefore it cannot be separated.

3. Communication; Communication skill is the set of skills that enables a student to convey information so that it is received and understood.

4. Sharing: A part or portion belonging to, distributed to, contributed by, owed by a person or a group **Or** To participate in, use, enjoy or experience jointly or in turns.

s5. Leadership: Students with the following leadership qualities are almost always the ones that rise above the crowd.

1. Trustworthiness: This refers to integrity.

2. Inspiration: Guides, leads and inspiring others to want to participate in the process of moving towards the vision.

3. Self awareness: It is the individual awareness of him or her self – their abilities and the impact that they have on others.

4. Acceptance of responsibility: True leaders are accepting responsibility for all that comes their way and taking ownership and responsibilities for getting things back on track. Blaming, justifying and excuse making just is not in their responsibility.

B. The **Experimental methodology** is designed for both teacher and student. The teacher can refer the experimental methodology for the details of equipment/apparatus/ materials/tools, procedure to be followed, observations to be made, graphs to be drawn and calculations to be done for the task to be performed

2. Student

The Worksheet is designed keeping in view the needs, deficiencies and the adolescent characteristics of the student for student.

The students submit the filled in work sheet given by the teacher on the day of experiment after referring to experimental methodology and listening to instructions of teacher. The design of the worksheet is made user friendly and the contents are so logically sequenced that the student finds it easy to understand and develop the skill of recording and report writing skill. It also helps the student to actively participate in skill learning. More importantly the student gets immediate meaningful feedback of his performance since the competency wise assessment is done and that too on the same day.

3. Examiner

The examiner may find this hand book very useful as Laboratory sheets and Scheme of evaluation provides information with regard to various competencies (skills) the students is expected to acquire during the course of study and the relative weightages of each competency. This information helps him to design a well balance question paper/measurement tool for assessment.

C20 :: M-311 – WORKSHOP PRACTICE - 1

COURSE CONTENT

1 Foundry

Moulding and casting of

1.1 Solid bearing

1.2 Flange coupling

1.3 Split bearing

1.4 Connecting rod

1.5 V – Pulley

1.6 Gear pulley

2 Machine Shop (Turning)

2.1 Plain Turning

2.2 Step Turning

2.3 Taper Turning

2.4 Turning Collars

2.5 Knurling

2.6 Facing

3. Welding

3.1 Layout of Beads

3.2 Lap joints

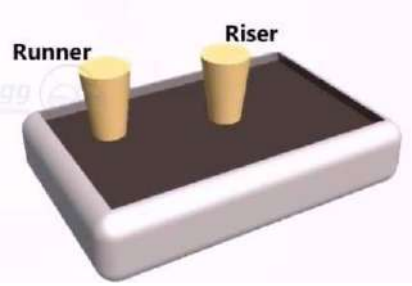
3.3 Butt joints.

3.4 T- joint

NAME OF THE STUDENT		**PIN NO:**	**EXERCISE : 1.1**
FOUNDRY SHOP	**TITLE**	**MOULD PREPARATION FOR SOLID BEARING**	
AIM	To Perform the mould preparation for solid bearing		
OUTCOME	The student shall be able to prepare the mould for solid bearing at work place as per the industry practice.		
MATERIAL REQUIRED	Parting sand, facing sand, Moulding sand and water		
TOOLS AND EQUIPMENT	 **1. Trowels**  **2 core box**  **3. Cope and drag box**  **4. Strikeoff bar**		

5. Rammers

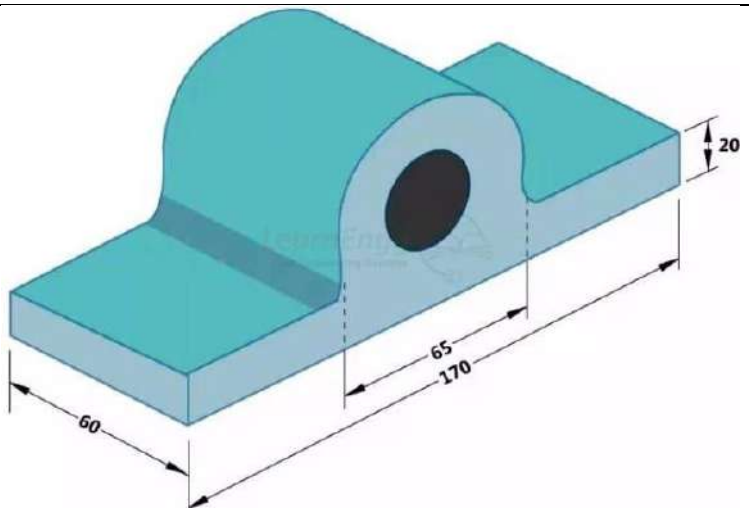
6. sand



7. Runner and Raiser

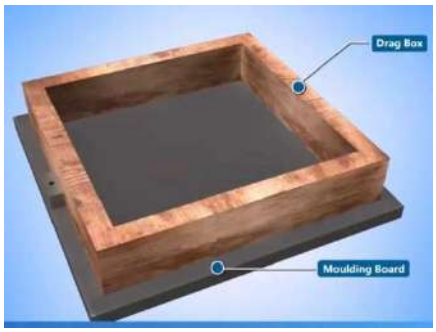
8. Went wire

9. Patteren

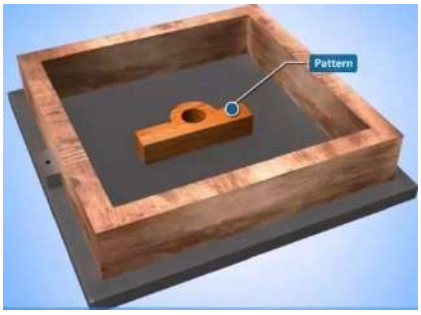
SKETCH	
Tasks	• Clean the moulding board and place the drag box upside down on the moulding board. • Place the pattern inside the box centrally. • Sprinkle parting sand around the pattern and inside the drag box. • Fill the facing sand all around the pattern and ram it with peg and peen rammer. • Fill the molding sand and ram it with peg and peen rammer properly. • Strike of the excess sand and finish the mould with strike off bar. • Make vent holes using vent wire. • Turn over the drag box carefully. • Set the cope on drag • Locate the runner and riser and place it Sprinkle parting sand around the pattern and inside over drag box. • Fill the molding sand and ram it with peg and peen rammer properly • Ram the cope along with runner and riser with peg and peen rammer properly. • Strike of the excess sand and finish the mould with strike off bar. • Cut the pouring basin like funnel shape on the sprue. • Remove the runner and riser carefully • Turn over the cope and remove the solid bearing wood pattern carefully. • Cut the wedge gate on drag mould Sprinkle parting sand around the cavity on drag box and cope box. • Check with instructor. • Assemble the both mould together carefully

WORKING PROCEEDURE

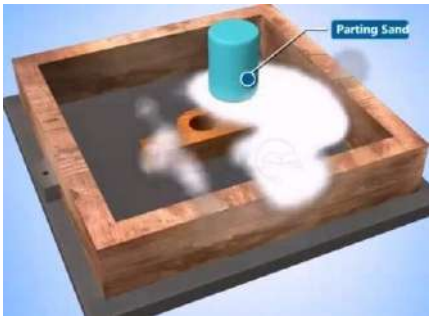
1. Clean the moulding board and place the drag box upside down on the moulding board.



2. Place the pattern inside the box centrally.

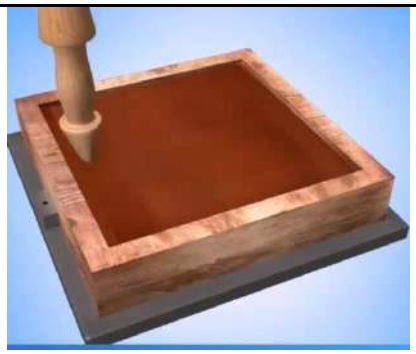


3. Sprinkle parting sand around the pattern and inside the drag box.

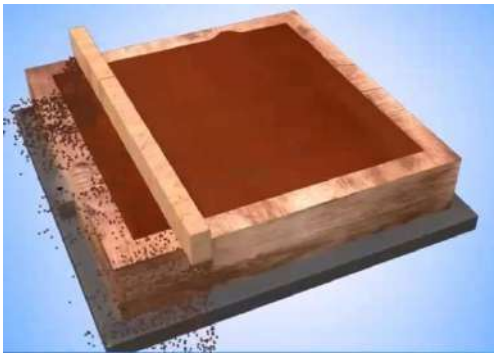


4. Fill the facing sand all around the pattern and ram it with peg and peen rammer.

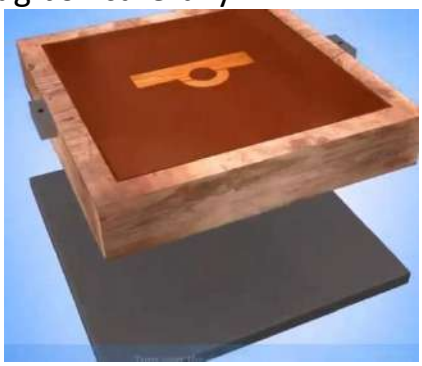
5. Fill the molding sand and ram it with peg and peen rammer properly.



6. Strike of the excess sand and finish the mould with strike off bar.

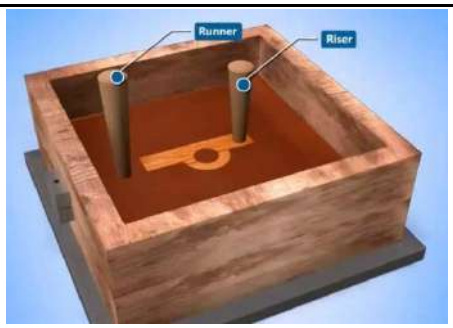


7. Turn over the drag box carefully.



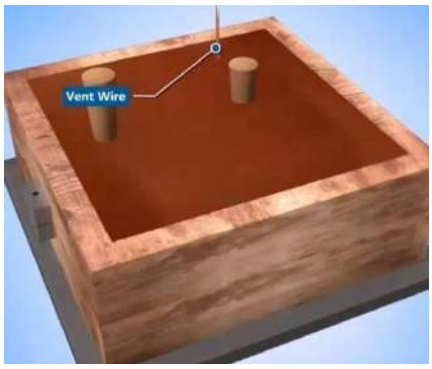
8. Set the cope on drag

9. Locate the runner and riser and place it Sprinkle parting sand around the pattern and inside over drag box.



10. Fill the molding sand and ram it with peg and peen rammer properly. Strike of the excess sand and finish the mould with strike off bar


11. Make vent holes using vent wires



12. Cut the pouring basin like funnel shape on the sprue.

13. Remove the runner and riser carefully

14. Turn over the cope

15. Cut the wedge gate on drag mould Sprinkle parting sand around the cavity on drag box and cope box.

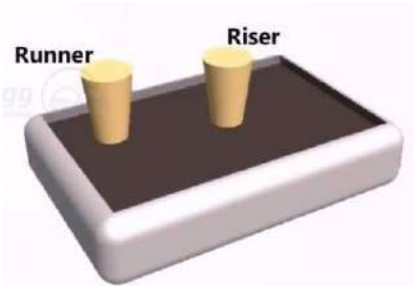
16. Remove the solid bearing wood pattern carefully.

	17.Check with instructor. 
SAFETY PRECAUTIONS	1) Place the pattern in proper position in drag box. 2) Clean the pattern before placing the pattern in moulding box. 3) Care should taken in the removing of pattern otherwise the mould cavity may be damaged. 4) Care should be taken while ramming to avoid blow holes, cracks, hot tears. 5) Place the runner, raiser and cut the gate properly otherwise shrinkage cavity may be occure. 6) Proper venting should be done to avoid blow holes
ACCURACY OF FINISH	±1mm
NAME OF THE STUDENT	SIGNATURE OF STAFF

NAME OF THE STUDENT		**PIN NO:**	**EXERCISE : 1.2**
FOUNDRY SHOP	**TITLE**	**MOULD PREPARATION FOR FLANGE COUPLING**	
AIM	To Perform the mould preparation for Flange Coupling		
OUTCOME	The student shall be able to prepare the mould for Flange Coupling at work place as per the industry practice.		
MATERIAL REQUIRED	Parting sand, facing sand, Moulding sand and water		
TOOLS AND EQUIPMENT	 **1. Trowels**  **2 core box**  **3.Cope and drag box**  **4. Strikeoff bar**		

5. Rammers

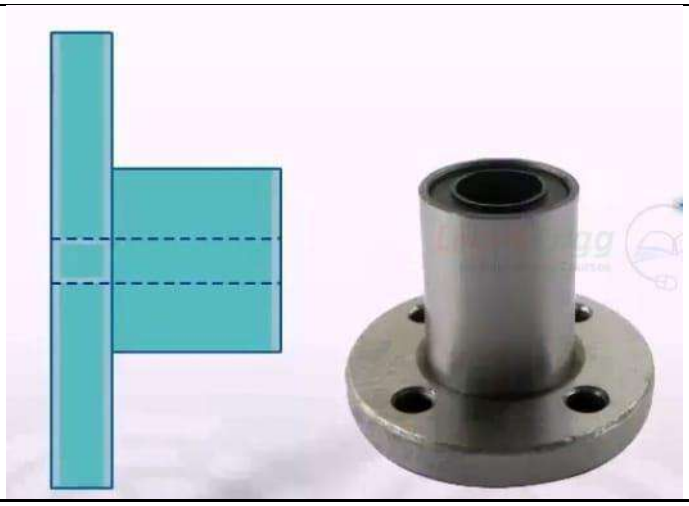
6. sand



7. Runner and Raiser

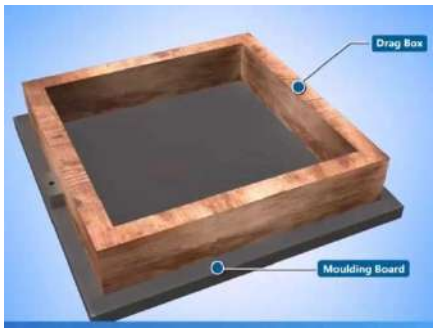
8. Went wire

9. Patteren

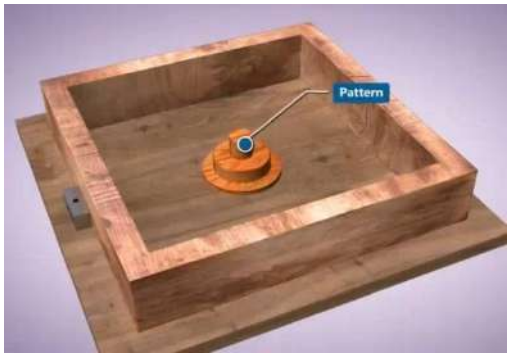
SKETCH	
Tasks	• Clean the moulding board and place the drag box upside down on the moulding board. • Place the pattern inside the box centrally. • Sprinkle parting sand around the pattern and inside the drag box. • Fill the facing sand all around the pattern and ram it with peg and peen rammer. • Fill the molding sand and ram it with peg and peen rammer properly. • Strike of the excess sand and finish the mould with strike off bar. • Make vent holes using vent wire. • Turn over the drag box carefully. • Set the cope on drag • Locate the runner and riser and place it Sprinkle parting sand around the pattern and inside over drag box. • Fill the molding sand and ram it with peg and peen rammer properly • Ram the cope along with runner and riser with peg and peen rammer properly. • Strike of the excess sand and finish the mould with strike off bar. • Remove the runner and riser carefully • Cut the pouring basin like funnel shape on the sprue. • Turn over the cope and remove the solid bearing wood pattern carefully. • Cut the wedge gate on drag mould Sprinkle parting sand around the cavity on drag box and cope box. • Check with instructor. • Assemble the both mould together carefully

WORKING PROCEEDURE

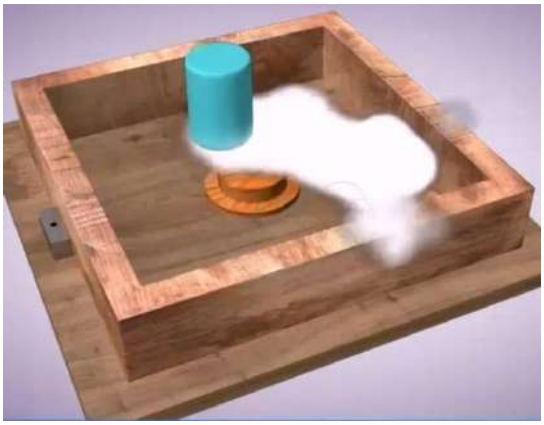
1. Clean the moulding board and place the drag box upside down on the moulding board.



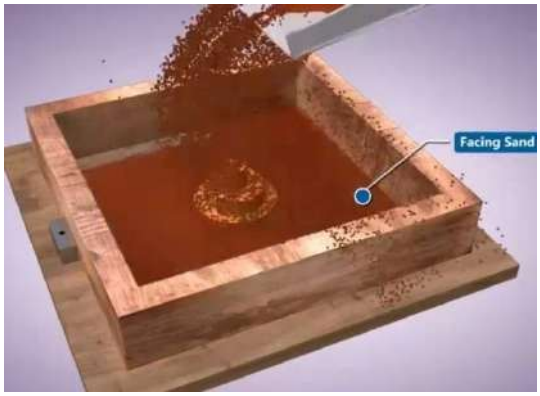
2. Place the pattern inside the box centrally.



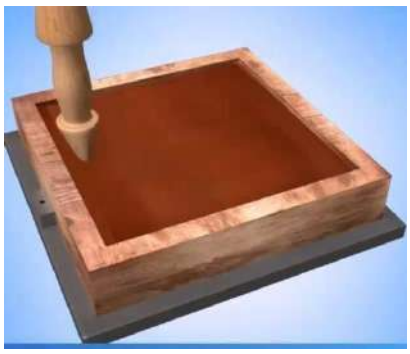
3. Sprinkle parting sand around the pattern and inside the drag box.



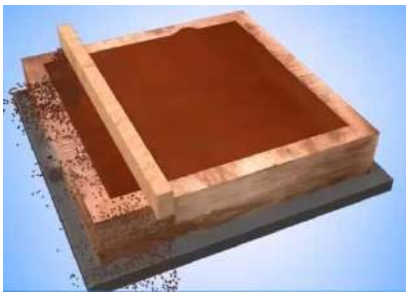
4. Fill the facing sand all around the pattern and ram it with peg and peen rammer.



5. Fill the molding sand and ram it with peg and peen rammer properly.

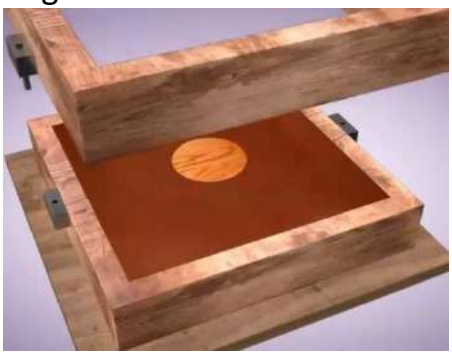


6. Strike of the excess sand and finish the mould with strike off bar.

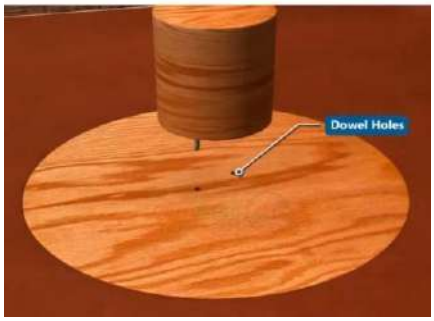


7. Turn over the drag box carefully.

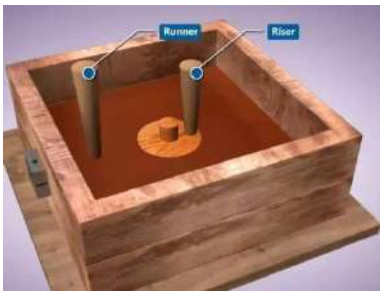
8. Set the cope on drag

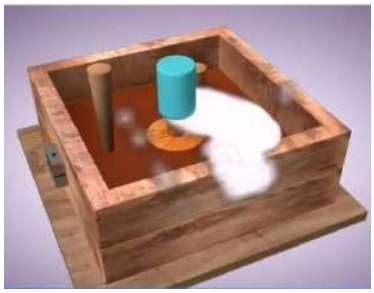


9. Place the another half pattern of split pattern using dowel holes

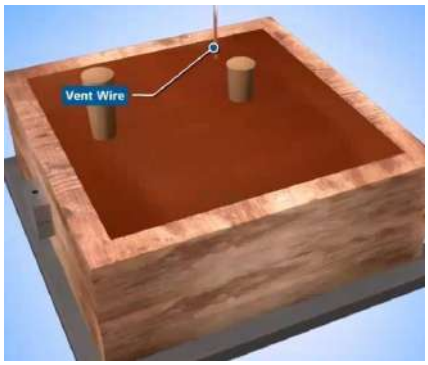


10. Locate the runner and riser and place it Sprinkle parting sand around the pattern and inside over drag box. Fill the molding sand and ram it with peg and peen rammer properly. Remove





11. Make vent holes using vent wires



12. Cut the pouring basin like funnel shape on the sprue.

13. Remove the runner and riser carefully

14. Turn over the cope

15. Cut the wedge gate on drag mould

16. Remove the solid bearing wood pattern carefully.

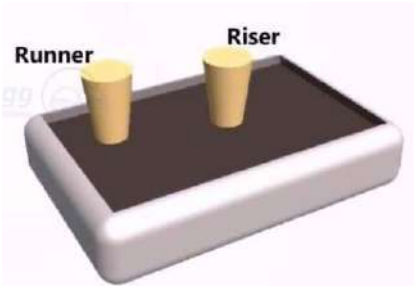
17. Place the core carefully

	
SAFETY PRECAUTIONS	1) Place the pattern in proper position in drag box. 2) Clean the pattern before placing the pattern in moulding box. 3) Care should taken in the removing of pattern otherwise the mould cavity may be damaged. 4) Care should be taken while ramming to avoid blow holes, cracks, hot tears. 5) Place the runner, raiser and cut the gate properly otherwise shrinkage cavity may be occur. 6) Proper venting should be done to avoid blow holes
ACCURACY OF FINISH	±1mm
NAME OF THE STUDENT	SIGNATURE OF STAFF

NAME OF THE STUDENT		**PIN NO:**	**EXERCISE : 1.3**
FOUNDRY SHOP	**TITLE**	**MOULD PREPARATION FOR SPLIT BEARING**	
AIM	To Perform the mould preparation for split bearing		
OUTCOME	The student shall be able to prepare the mould for split bearing at work place as per the industry practice.		
MATERIAL REQUIRED	Parting sand, facing sand, Moulding sand and water		
TOOLS AND EQUIPMENT	 **1. Trowels**  **2. core box**  **3.Cope and drag box**  **4. Strikeoff bar**		

5. Rammers

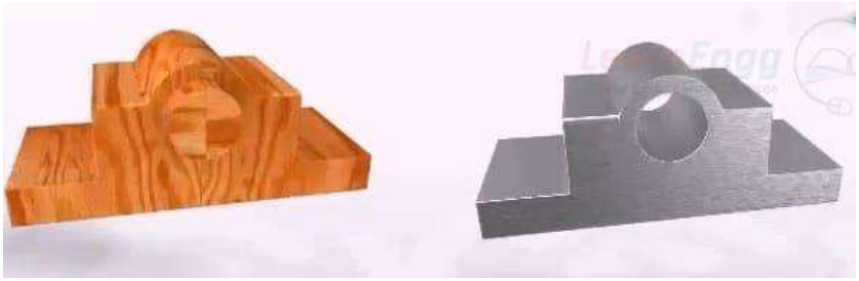
6. sand



7. Runner and Raiser

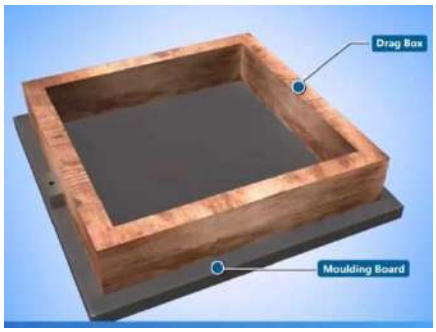
8. Went wire

9. Patteren

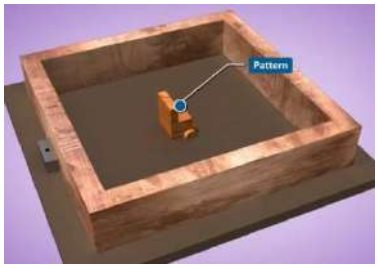
SKETCH	
Tasks	• Clean the moulding board and place the drag box upside down on the moulding board. • Place the pattern inside the box centrally. • Sprinkle parting sand around the pattern and inside the drag box. • Fill the facing sand all around the pattern and ram it with peg and peen rammer. • Fill the molding sand and ram it with peg and peen rammer properly. • Strike of the excess sand and finish the mould with strike off bar. • Make vent holes using vent wire. • Turn over the drag box carefully. • Set the cope on drag • Locate the runner and riser and place it Sprinkle parting sand around the pattern and inside over drag box. • Fill the molding sand and ram it with peg and peen rammer properly • Ram the cope along with runner and riser with peg and peen rammer properly. • Strike of the excess sand and finish the mould with strike off bar. • Remove the runner and riser carefully • Cut the pouring basin like funnel shape on the sprue. • Turn over the cope and remove the solid bearing wood pattern carefully. • Cut the wedge gate on drag mould Sprinkle parting sand around the cavity on drag box and cope box. • Check with instructor. • Assemble the both mould together carefully

WORKING PROCEEDURE

1. Clean the moulding board and place the drag box upside down on the moulding board.



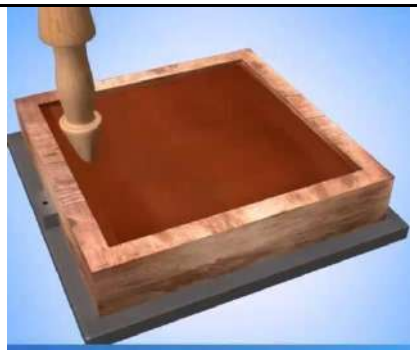
2. Place the half pattern inside the box centrally.



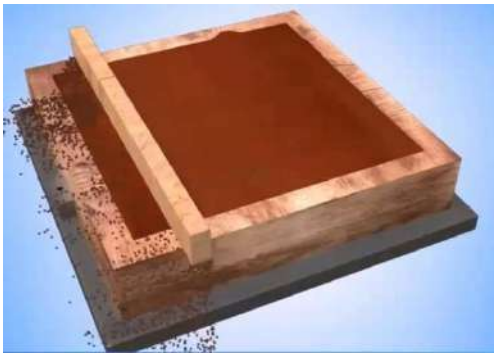
3. Sprinkle parting sand around the pattern and inside the drag box.

4. Fill the facing sand all around the pattern and ram it with peg and peen rammer.

5. Fill the molding sand and ram it with peg and peen rammer properly.

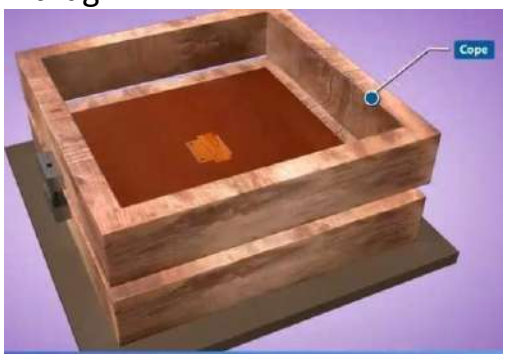


6. Strike of the excess sand and finish the mould with strike off bar.

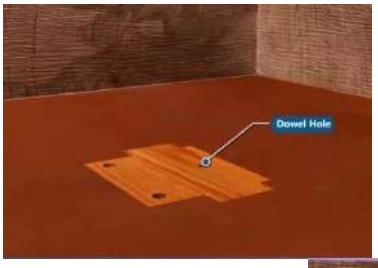


7. Turn over the drag box carefully.

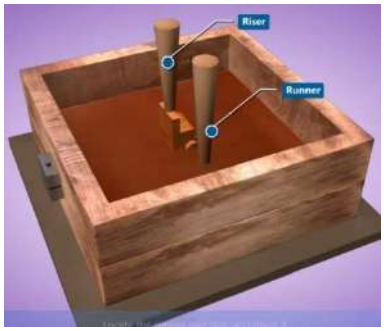
8. Set the cope on drag

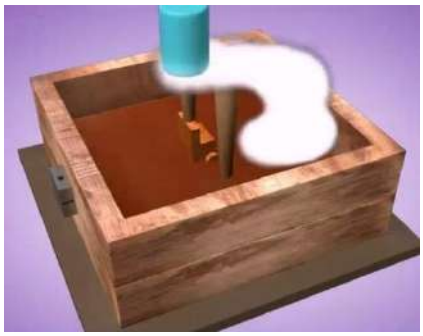


9. Place the another half pattern of split using dowel holes

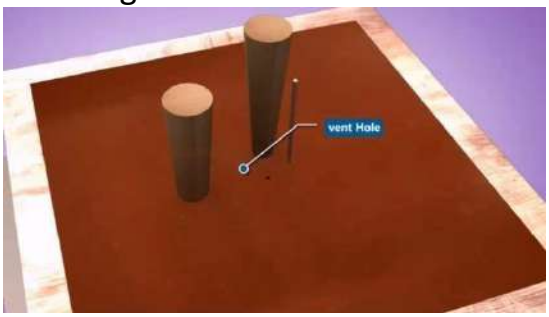


10. Locate the runner and riser, Sprinkle parting sand around the pattern and inside over drag box. Fill the molding sand and ram it with peg and peen rammer properly. Remove excess sand with strike off bar.





11. Make vent holes using vent wire

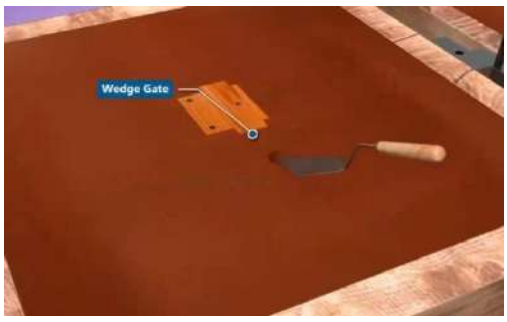


12. Cut the pouring basin like funnel shape on the sprue.

13. Remove the runner and riser carefully

14. Turn over the cope

15. Cut the wedge gate on drag mould.



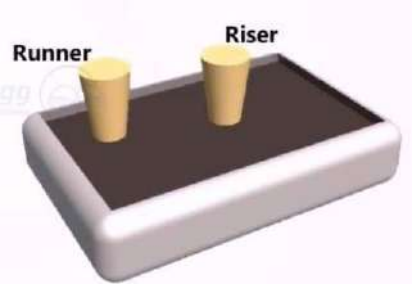
16. Remove the solid bearing wood pattern carefully.

	
SAFETY PRECAUTIONS	1) Place the pattern in proper position in drag box. 2) Clean the pattern before placing the pattern in moulding box. 3) Care should taken in the removing of pattern otherwise the mould cavity may be damaged. 4) Care should be taken while ramming to avoid blow holes, cracks, hot tears. 5) Place the runner, raiser and cut the gate properly otherwise shrinkage cavity may be occure. 6) Proper venting should be done to avoid blow holes
ACCURACY OF FINISH	±1mm
NAME OF THE STUDENT	SIGNATURE OF STAFF

NAME OF THE STUDENT		**PIN NO:**	**EXERCISE : 1.4**
FOUNDRY SHOP	**TITLE**	**MOULD PREPARATION FOR CONNECTING ROD**	
AIM	To Perform the mould preparation for Connecting Rod		
OUTCOME	The student shall be able to prepare the mould for Connecting Rod at work place as per the industry practice.		
MATERIAL REQUIRED	Parting sand, facing sand, Moulding sand and water		
TOOLS AND EQUIPMENT	 **1. Trowels**  **2 core box**  **3.Cope and drag box**  **4. Strikeoff bar**		

5. **Rammers**

6. **sand**



7. **Runner and Raiser**

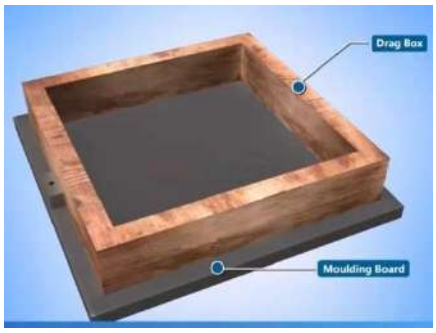
8. **Went wire**

9. **Patteren**

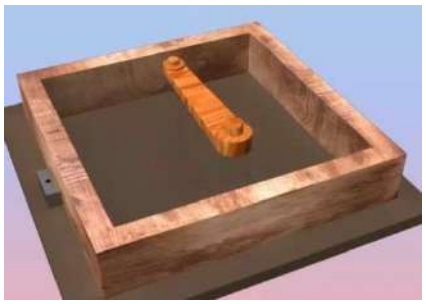
SKETCH	
Tasks	• Clean the moulding board and place the drag box upside down on the moulding board. • Place the pattern inside the box centrally. • Sprinkle parting sand around the pattern and inside the drag box. • Fill the facing sand all around the pattern and ram it with peg and peen rammer. • Fill the molding sand and ram it with peg and peen rammer properly. • Strike of the excess sand and finish the mould with strike off bar. • Make vent holes using vent wire. • Turn over the drag box carefully. • Set the cope on drag • Locate the runner and riser and place it Sprinkle parting sand around the pattern and inside over drag box. • Fill the molding sand and ram it with peg and peen rammer properly • Ram the cope along with runner and riser with peg and peen rammer properly. • Strike of the excess sand and finish the mould with strike off bar. • Remove the runner and riser carefully • Cut the pouring basin like funnel shape on the sprue. • Turn over the cope and remove the solid bearing wood pattern carefully. • Cut the wedge gate on drag mould Sprinkle parting sand around the cavity on drag box and cope box. • Check with instructor. • Assemble the both mould together carefully

WORKING PROCEEDURE

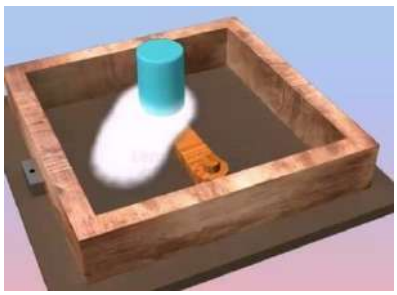
1. Clean the moulding board and place the drag box upside down on the moulding board.



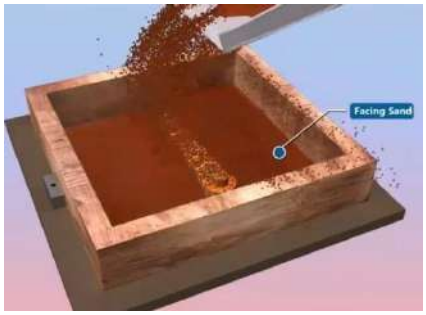
2. Place the pattern inside the box centrally.



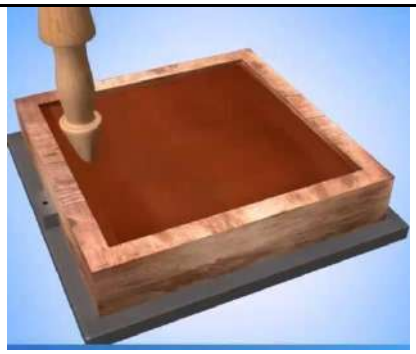
3. Sprinkle parting sand around the pattern and inside the drag box.



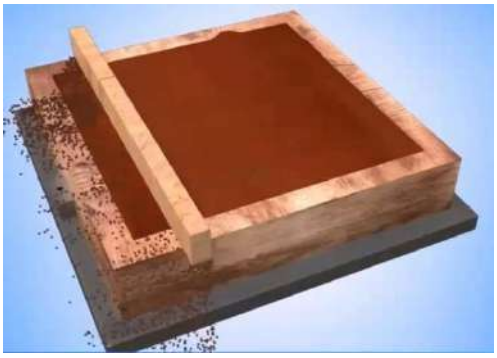
4. Fill the facing sand all around the pattern and ram it with peg and peen rammer.



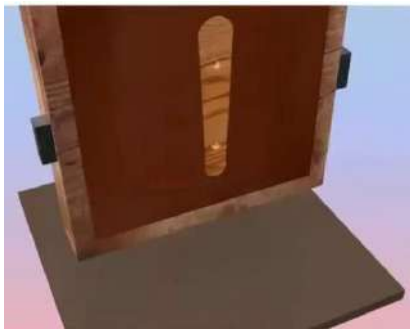
5. Fill the molding sand and ram it with peg and peen rammer properly.



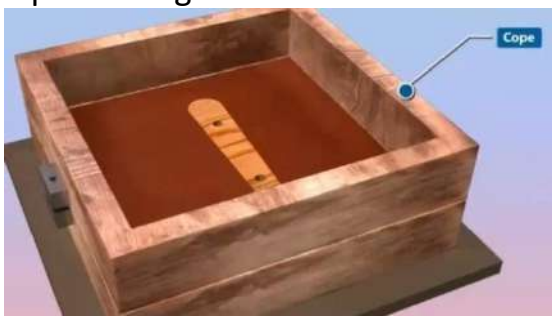
6. Strike of the excess sand and finish the mould with strike off bar.



7. Turn over the drag box carefully.

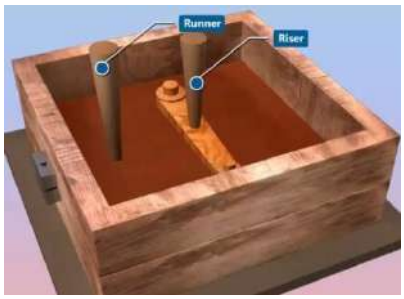


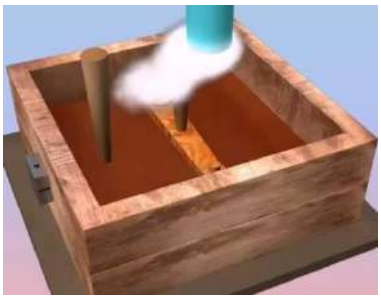
8. Set the cope on drag



9. Place the another half pattern of V-Pulley using dowel holes

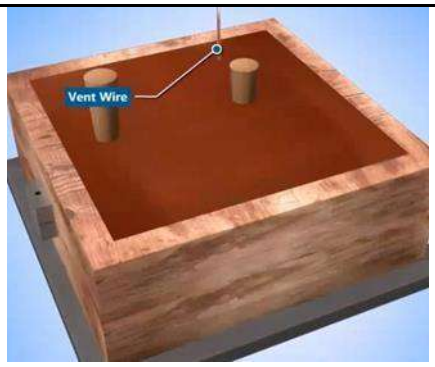
10. Locate the runner and riser and place it Sprinkle parting sand around the pattern and inside over drag box.





11. Fill the molding sand and ram it with peg and peen rammer properly. Strike of the excess sand and finish the mould with strike off bar

12. Make vent holes using vent wires

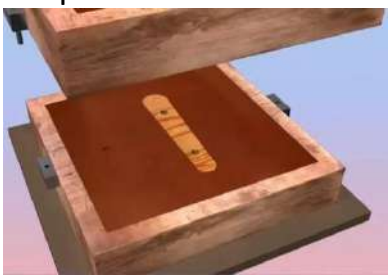


13.Cut the pouring b sprue.

14. 

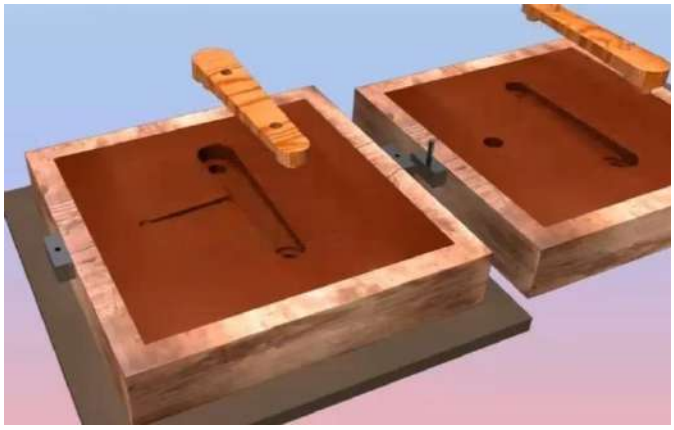
15. Remove the runner and riser carefully

16. Turn over the cope



17. Cut the wedge gate on drag mould

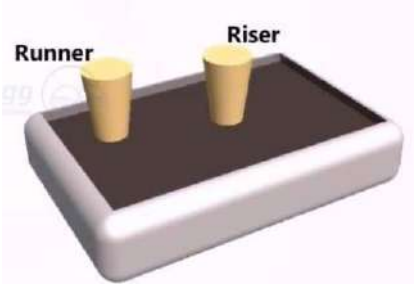
18. Remove the V-Pulley wood pattern carefully.

	
SAFETY PRECAUTIONS	1) Place the pattern in proper position in drag box. 2) Clean the pattern before placing the pattern in moulding box. 3) Care should taken in the removing of pattern otherwise the mould cavity may be damaged. 4) Care should be taken while ramming to avoid blow holes, cracks, hot tears. 5) Place the runner, raiser and cut the gate properly otherwise shrinkage cavity may be occur. 6) Proper venting should be done to avoid blow holes
ACCURACY OF FINISH	±1mm
NAME OF THE STUDENT	SIGNATURE OF STAFF

NAME OF THE STUDENT		**PIN NO:**	**EXERCISE : 1.5**
FOUNDRY SHOP	**TITLE**	**MOULD PREPARATION FOR V-PULLEY**	
AIM	To Perform the mould preparation for V-Pulley		
OUTCOME	The student shall be able to prepare the mould for V-Pulley at work place as per the industry practice.		
MATERIAL REQUIRED	Parting sand, facing sand, Moulding sand and water		
TOOLS AND EQUIPMENT	 **1. Trowels**  **2 core box**  **3.Cope and drag box**  **4. Strikeoff bar**		

5. **Rammers**

6. **sand**



7. **Runner and Raiser**

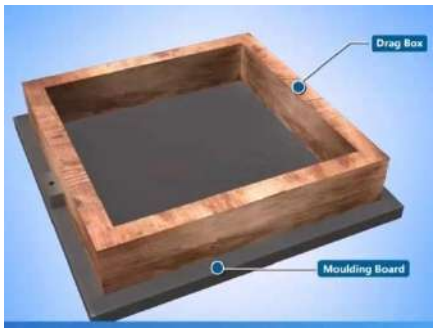
8. **Went wire**

9. **Patteren**

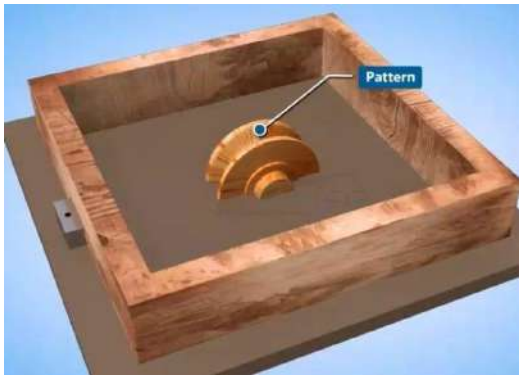
SKETCH	
Tasks	• Clean the moulding board and place the drag box upside down on the moulding board. • Place the pattern inside the box centrally. • Sprinkle parting sand around the pattern and inside the drag box. • Fill the facing sand all around the pattern and ram it with peg and peen rammer. • Fill the molding sand and ram it with peg and peen rammer properly. • Strike of the excess sand and finish the mould with strike off bar. • Make vent holes using vent wire. • Turn over the drag box carefully. • Set the cope on drag • Locate the runner and riser and place it Sprinkle parting sand around the pattern and inside over drag box. • Fill the molding sand and ram it with peg and peen rammer properly • Ram the cope along with runner and riser with peg and peen rammer properly. • Strike of the excess sand and finish the mould with strike off bar. • Remove the runner and riser carefully • Cut the pouring basin like funnel shape on the sprue. • Turn over the cope and remove the solid bearing wood pattern carefully. • Cut the wedge gate on drag mould Sprinkle parting sand around the cavity on drag box and cope box. • Check with instructor. • Assemble the both mould together carefully

WORKING PROCEEDURE

1. Clean the moulding board and place the drag box upside down on the moulding board.

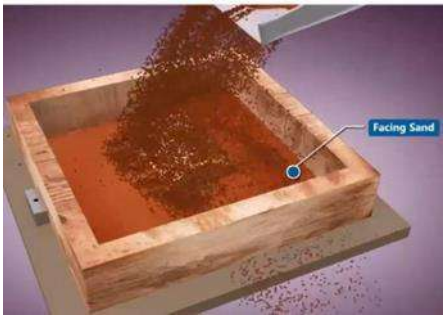


2. Place the pattern inside the box centrally.

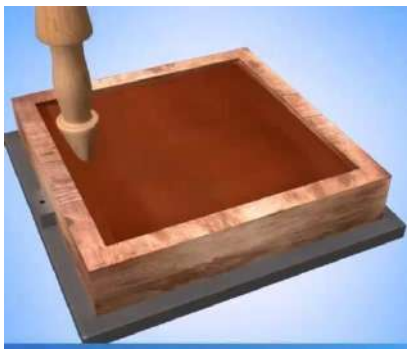


3. Sprinkle parting sand around the pattern and inside the drag box.

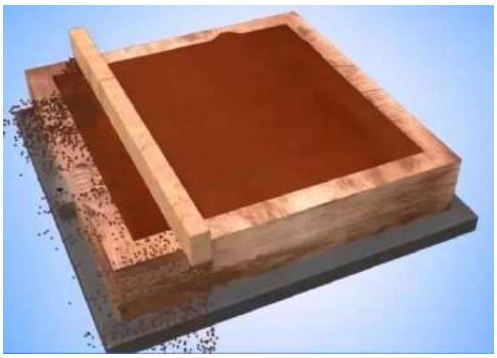
4. Fill the facing sand all around the pattern and ram it with peg and peen rammer.



5. Fill the molding sand and ram it with peg and peen rammer properly.



6. Strike of the excess sand and finish the mould with strike off bar.

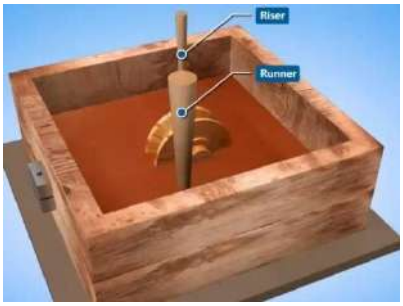


7. Turn over the drag box carefully.

8. Set the cope on drag

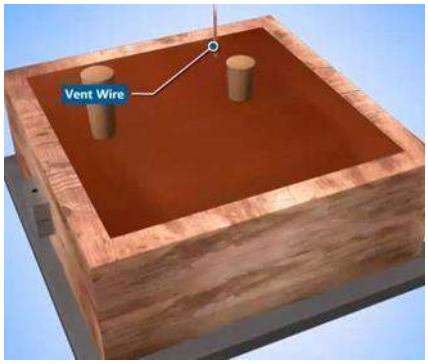
9. Place the another half pattern of V-Pulley using dowel holes

10. Locate the runner and riser and place it Sprinkle parting sand around the pattern and inside over drag box.



11. Fill the molding sand and ram it with peg and peen rammer properly. Strike of the excess sand and finish the mould with strike off bar

12. Make vent holes using vent wires

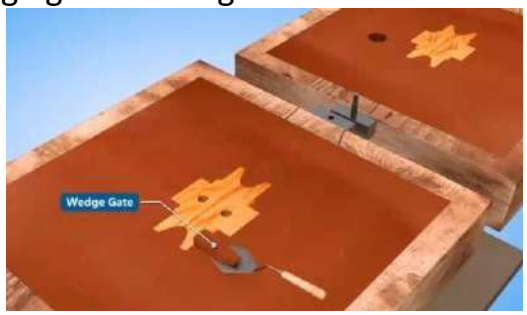


13.Cut the pouring  e sprue.

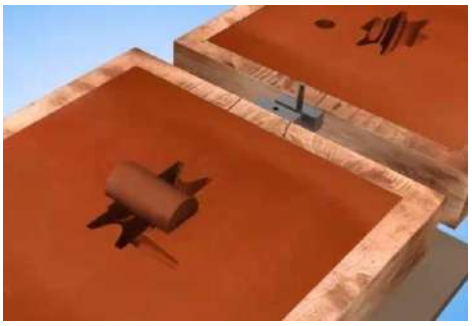
14. Remove the runner and riser carefully

15. Turn over the cope

16. Cut the wedge gate on drag mould



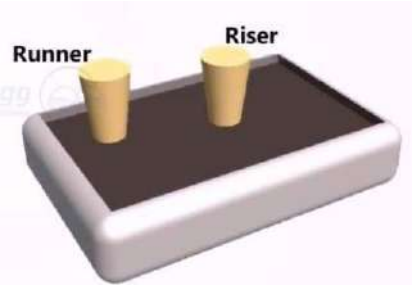
17. Remove the V-Pulley wood pattern carefully.

	 18.Place the core carefully  
SAFETY PRECAUTIONS	1) Place the pattern in proper position in drag box. 2) Clean the pattern before placing the pattern in moulding box. 3) Care should taken in the removing of pattern otherwise the mould cavity may be damaged. 4) Care should be taken while ramming to avoid blow holes, cracks, hot tears. 5) Place the runner, raiser and cut the gate properly otherwise shrinkage cavity may be occur. 6) Proper venting should be done to avoid blow holes
ACCURACY OF FINISH	±1mm
NAME OF THE STUDENT	SIGNATURE OF STAFF

NAME OF THE STUDENT		PIN NO:	EXERCISE : 1.6
FOUNDRY SHOP	TITLE	MOULD PREPARATION FOR GEAR PULLEY	
AIM	To Perform the mould preparation for Gear Pulley		
OUTCOME	The student shall be able to prepare the mould for Gear Pulley at work place as per the industry practice.		
MATERIAL REQUIRED	Parting sand, facing sand, Moulding sand and water		
TOOLS AND EQUIPMENT	 **1. Trowels**  **2 core box**  **3. Cope and drag box**  **4. Strikeoff bar**		

5. Rammers

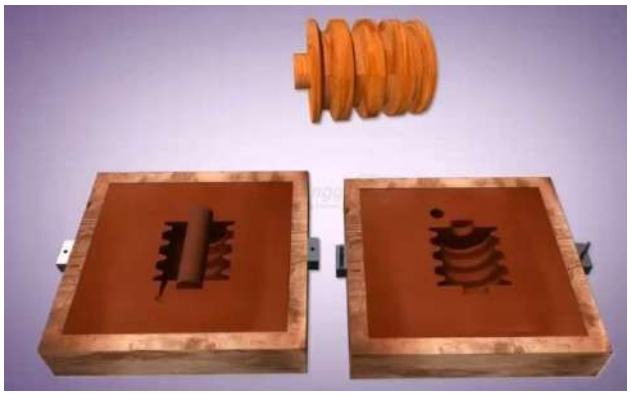
6. sand



7. Runner and Raiser

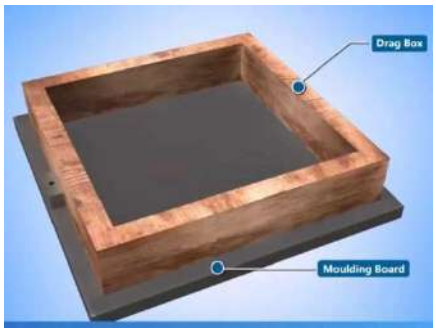
8. Went wire

9. Patteren

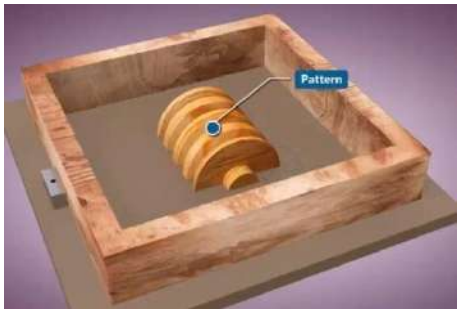
SKETCH	
Tasks	• Clean the moulding board and place the drag box upside down on the moulding board. • Place the pattern inside the box centrally. • Sprinkle parting sand around the pattern and inside the drag box. • Fill the facing sand all around the pattern and ram it with peg and peen rammer. • Fill the molding sand and ram it with peg and peen rammer properly. • Strike of the excess sand and finish the mould with strike off bar. • Make vent holes using vent wire. • Turn over the drag box carefully. • Set the cope on drag • Locate the runner and riser and place it Sprinkle parting sand around the pattern and inside over drag box. • Fill the molding sand and ram it with peg and peen rammer properly • Ram the cope along with runner and riser with peg and peen rammer properly. • Strike of the excess sand and finish the mould with strike off bar. • Remove the runner and riser carefully • Cut the pouring basin like funnel shape on the sprue. • Turn over the cope and remove the solid bearing wood pattern carefully. • Cut the wedge gate on drag mould Sprinkle parting sand around the cavity on drag box and cope box. • Check with instructor. • Assemble the both mould together carefully

WORKING PROCEEDURE

1. Clean the moulding board and place the drag box upside down on the moulding board.



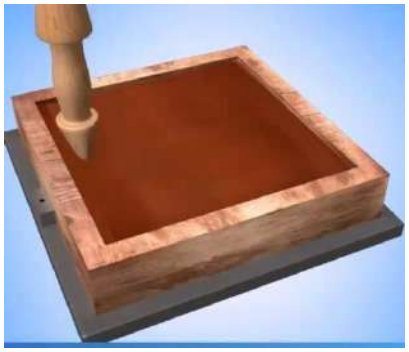
2. Place the half pattern inside the box centrally.



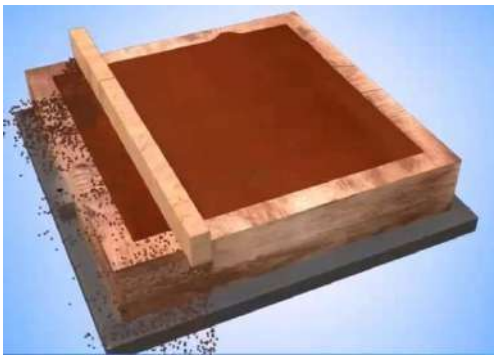
3. Sprinkle parting sand around the pattern and inside the drag box.

4. Fill the facing sand all around the pattern and ram it with peg and peen rammer.

5. Fill the molding sand and ram it with peg and peen rammer properly.

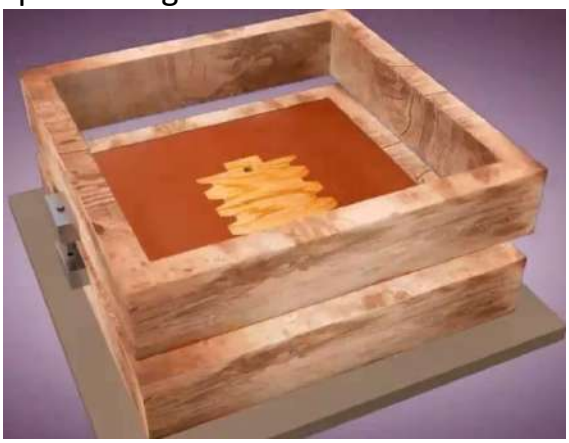


6. Strike of the excess sand and finish the mould with strike off bar.



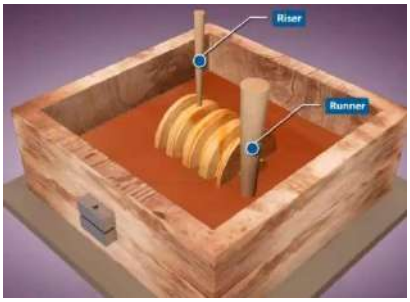
7. Turn over the drag box carefully.

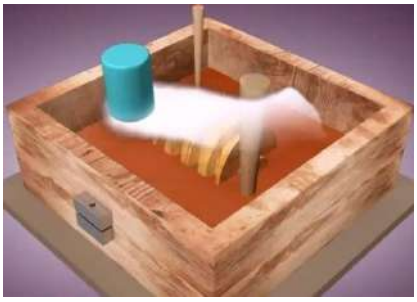
8. Set the cope on drag



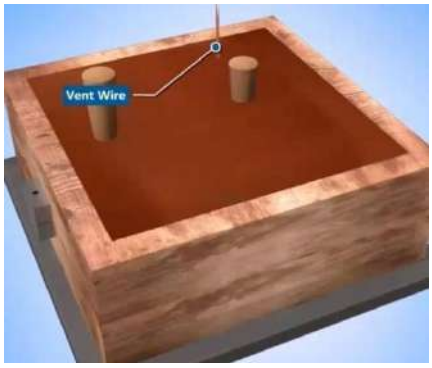
9. Place the another half pattern of split pattern of Gear Pulley using dowel holes

10. Locate the runner and riser and place it Sprinkle parting sand around the pattern and inside over drag box. Fill the molding sand and ram it with peg and peen rammer properly. Remove execs





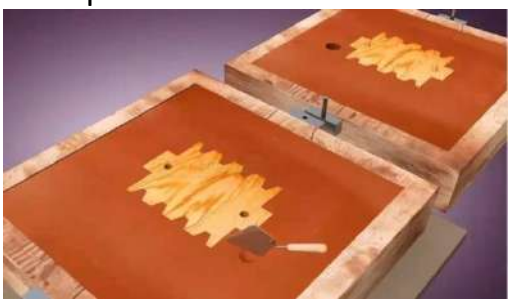
11. Make vent holes using vent wires



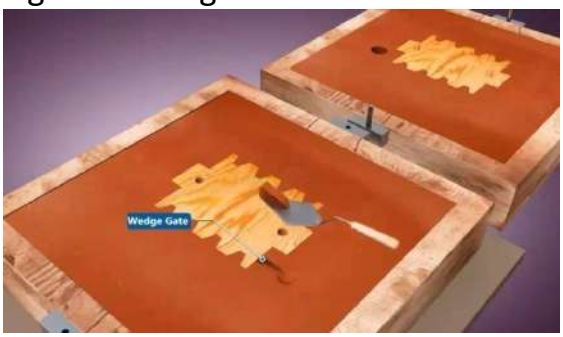
12. Cut the pouring basin like funnel shape on the sprue.

13. Remove the runner and riser carefully

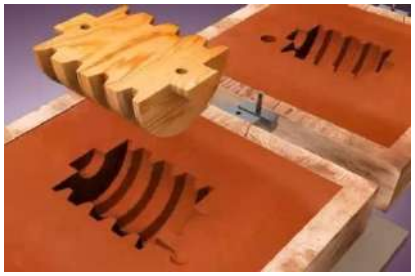
14. Turn over the cope



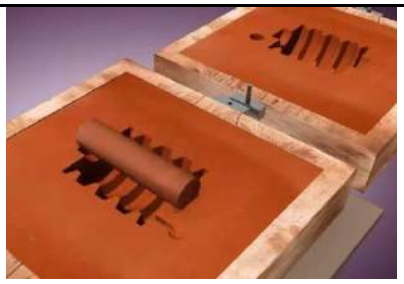
15. Cut the wedge gate on drag mould



16. Remove the Gear Pulley wood pattern carefully.



17. Place the core carefully

	
SAFETY PRECAUTIONS	1) Place the pattern in proper position in drag box. 2) Clean the pattern before placing the pattern in moulding box. 3) Care should taken in the removing of pattern otherwise the mould cavity may be damaged. 4) Care should be taken while ramming to avoid blow holes, cracks, hot tears. 5) Place the runner, raiser and cut the gate properly otherwise shrinkage cavity may be occure. 6) Proper venting should be done to avoid blow holes
ACCURACY OF FINISH	±1mm
NAME OF THE STUDENT	SIGNATURE OF STAFF

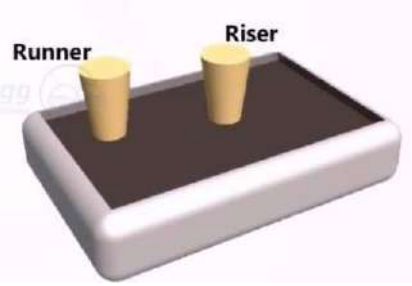
VIVA QUESTIONS - FOUNDRY

1. What are the properties of good moulding sand?
2. What is core sand?
3. What is moulding sand?
4. What are the different types of patterns used in foundry?
5. What is the purpose of gating system?
6. What are the different tools used for making moulds in the foundry
7. What is meant by pattern allowance?
8. What is the purpose of pattern allowance?
9. What are the different materials used for patterns.
10. What are cope and drag.
11. What is a core?
12. How a core is made?
13. What is foundry.
14. What is casting.
15. What is the use of sprue.
16. What is the function of runner and riser of gating system.
17. Name few casting defects that generally occur.
18. List out different types casting processes.
19. What is the difference between green sand moulding and dry sand moulding?
20. Name different additives used in making moulding sand.
21. What do you understand by shrinkage allowance.
22. What do you understand by draft allowance.
23. List out different stages of making a product using casting process.
24. What is the function of swab?
25. What is the function of lifter.

NAME OF THE STUDENT		**PIN NO:**	**EXERCISE : 1.1**
FOUNDRY SHOP	**TITLE**	**MOULD PREPARATION FOR SOLID BEARING**	
AIM	To Perform the mould preparation for solid bearing		
OUTCOME	The student shall be able to prepare the mould for solid bearing at work place as per the industry practice.		
MATERIAL REQUIRED	Parting sand, facing sand, Moulding sand and water		
TOOLS AND EQUIPMENT	 **1. Trowels**  **2 core box**  **3. Cope and drag box**  **4. Strikeoff bar**		

5. Rammers

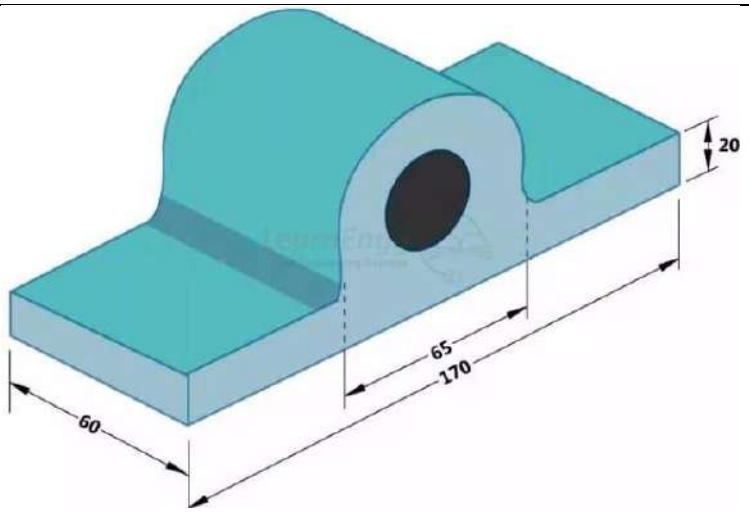
6. sand



7. Runner and Raiser

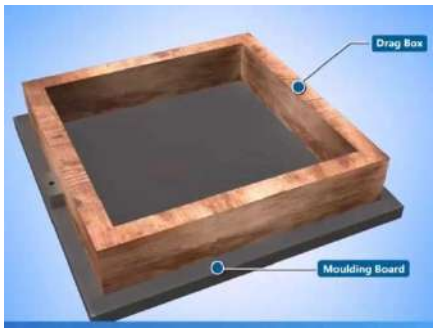
8. Went wire

9. Patteren

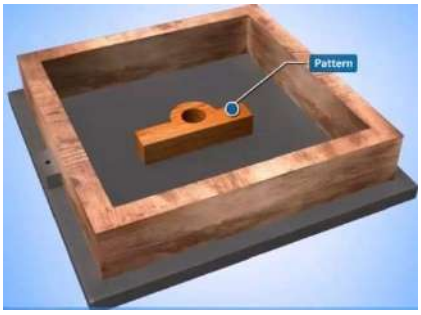
SKETCH	
Tasks	• Clean the moulding board and place the drag box upside down on the moulding board. • Place the pattern inside the box centrally. • Sprinkle parting sand around the pattern and inside the drag box. • Fill the facing sand all around the pattern and ram it with peg and peen rammer. • Fill the molding sand and ram it with peg and peen rammer properly. • Strike of the excess sand and finish the mould with strike off bar. • Make vent holes using vent wire. • Turn over the drag box carefully. • Set the cope on drag • Locate the runner and riser and place it Sprinkle parting sand around the pattern and inside over drag box. • Fill the molding sand and ram it with peg and peen rammer properly • Ram the cope along with runner and riser with peg and peen rammer properly. • Strike of the excess sand and finish the mould with strike off bar. • Cut the pouring basin like funnel shape on the sprue. • Remove the runner and riser carefully • Turn over the cope and remove the solid bearing wood pattern carefully. • Cut the wedge gate on drag mould Sprinkle parting sand around the cavity on drag box and cope box. • Check with instructor. • Assemble the both mould together carefully

WORKING PROCEEDURE

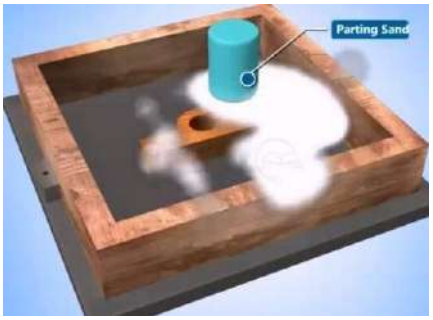
1. Clean the moulding board and place the drag box upside down on the moulding board.



2. Place the pattern inside the box centrally.

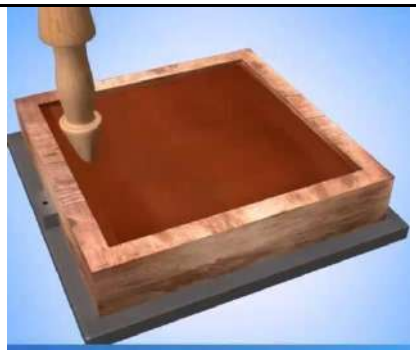


3. Sprinkle parting sand around the pattern and inside the drag box.

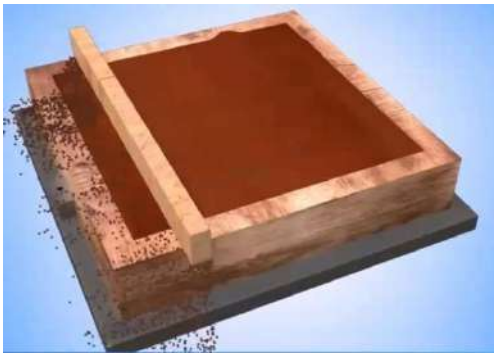


4. Fill the facing sand all around the pattern and ram it with peg and peen rammer.

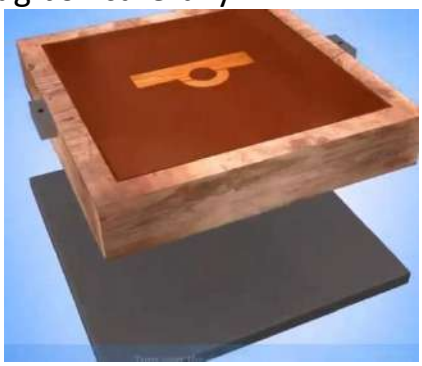
5. Fill the molding sand and ram it with peg and peen rammer properly.



6. Strike of the excess sand and finish the mould with strike off bar.

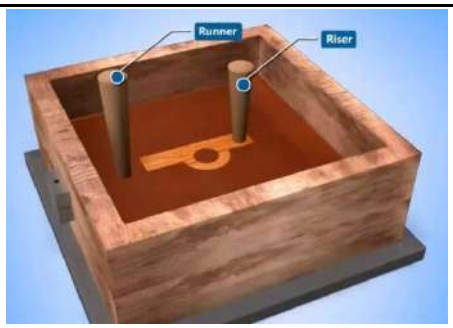


7. Turn over the drag box carefully.



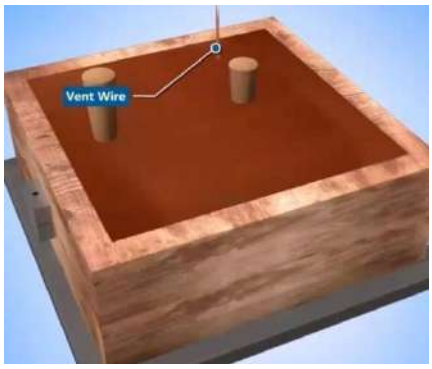
8. Set the cope on drag

9. Locate the runner and riser and place it Sprinkle parting sand around the pattern and inside over drag box.



10. Fill the molding sand and ram it with peg and peen rammer properly. Strike of the excess sand and finish the mould with strike off bar


11. Make vent holes using vent wires



12. Cut the pouring basin like funnel shape on the sprue.

13. Remove the runner and riser carefully

14. Turn over the cope

15. Cut the wedge gate on drag mould Sprinkle parting sand around the cavity on drag box and cope box.

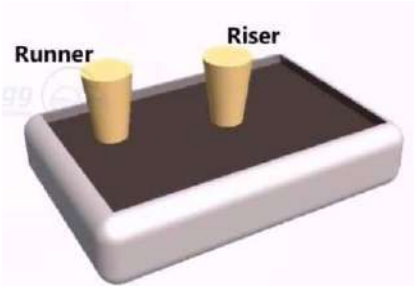
16. Remove the solid bearing wood pattern carefully.

	17.Check with instructor. 
SAFETY PRECAUTIONS	1) Place the pattern in proper position in drag box. 2) Clean the pattern before placing the pattern in moulding box. 3) Care should taken in the removing of pattern otherwise the mould cavity may be damaged. 4) Care should be taken while ramming to avoid blow holes, cracks, hot tears. 5) Place the runner, raiser and cut the gate properly otherwise shrinkage cavity may be occure. 6) Proper venting should be done to avoid blow holes
ACCURACY OF FINISH	±1mm
NAME OF THE STUDENT	SIGNATURE OF STAFF

NAME OF THE STUDENT		**PIN NO:**	**EXERCISE : 1.2**
FOUNDRY SHOP	**TITLE**	**MOULD PREPARATION FOR FLANGE COUPLING**	
AIM	To Perform the mould preparation for Flange Coupling		
OUTCOME	The student shall be able to prepare the mould for Flange Coupling at work place as per the industry practice.		
MATERIAL REQUIRED	Parting sand, facing sand, Moulding sand and water		
TOOLS AND EQUIPMENT	 **1. Trowels**  **2 core box**  **3.Cope and drag box**  **4. Strikeoff bar**		

5. Rammers

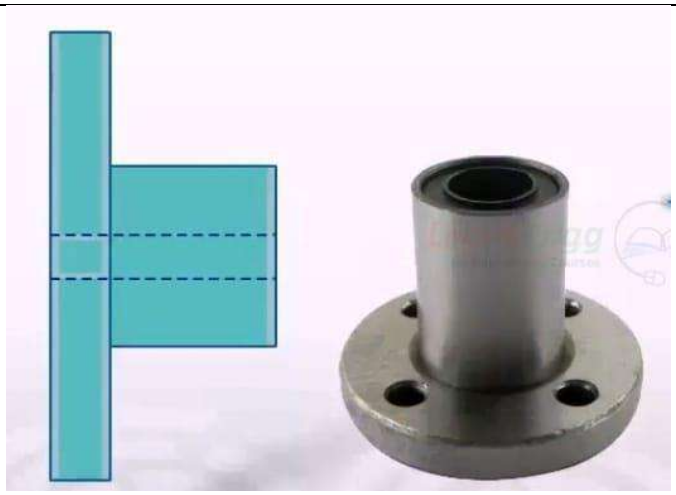
6. sand



7. Runner and Raiser

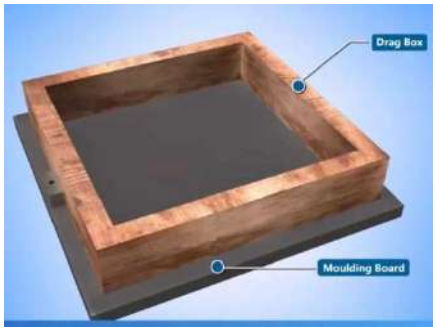
8. Went wire

9. Patteren

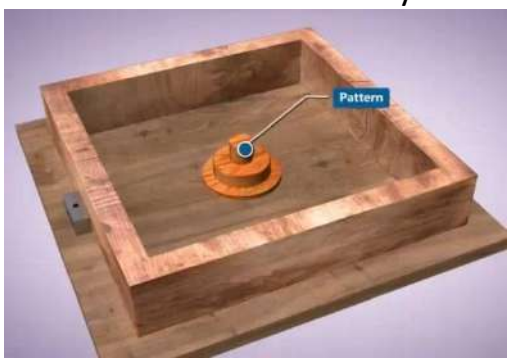
SKETCH	
Tasks	• Clean the moulding board and place the drag box upside down on the moulding board. • Place the pattern inside the box centrally. • Sprinkle parting sand around the pattern and inside the drag box. • Fill the facing sand all around the pattern and ram it with peg and peen rammer. • Fill the molding sand and ram it with peg and peen rammer properly. • Strike of the excess sand and finish the mould with strike off bar. • Make vent holes using vent wire. • Turn over the drag box carefully. • Set the cope on drag • Locate the runner and riser and place it Sprinkle parting sand around the pattern and inside over drag box. • Fill the molding sand and ram it with peg and peen rammer properly • Ram the cope along with runner and riser with peg and peen rammer properly. • Strike of the excess sand and finish the mould with strike off bar. • Remove the runner and riser carefully • Cut the pouring basin like funnel shape on the sprue. • Turn over the cope and remove the solid bearing wood pattern carefully. • Cut the wedge gate on drag mould Sprinkle parting sand around the cavity on drag box and cope box. • Check with instructor. • Assemble the both mould together carefully

WORKING PROCEEDURE

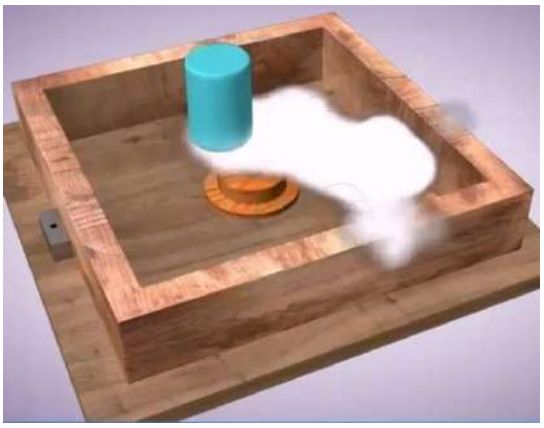
1. Clean the moulding board and place the drag box upside down on the moulding board.



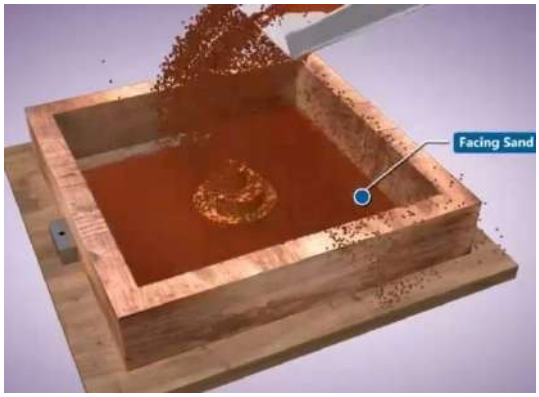
2. Place the pattern inside the box centrally.



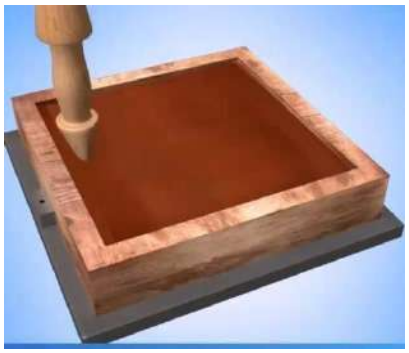
3. Sprinkle parting sand around the pattern and inside the drag box.



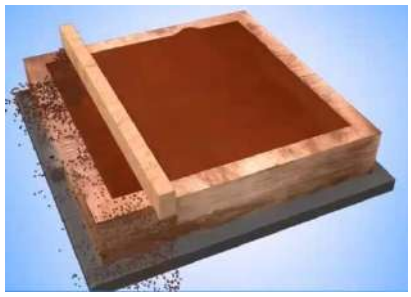
4. Fill the facing sand all around the pattern and ram it with peg and peen rammer.



5. Fill the molding sand and ram it with peg and peen rammer properly.

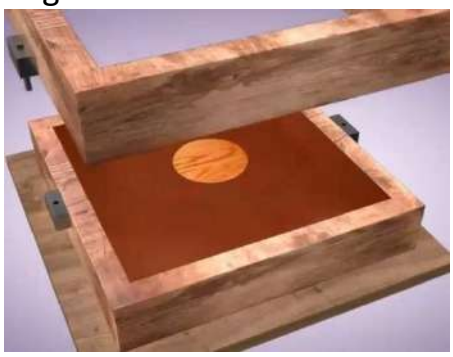


6. Strike of the excess sand and finish the mould with strike off bar.

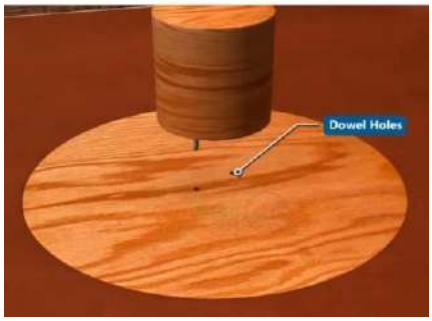


7. Turn over the drag box carefully.

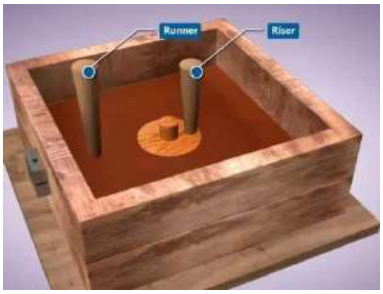
8. Set the cope on drag

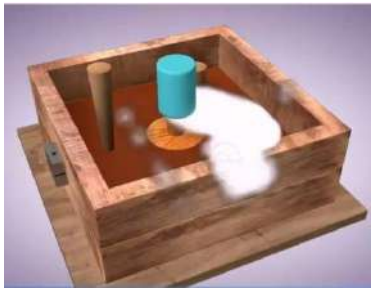


9. Place the another half pattern of split pattern using dowel holes

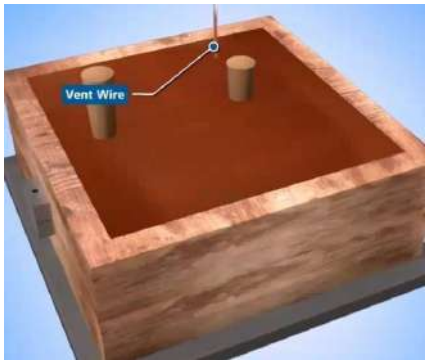


10. Locate the runner and riser and place it Sprinkle parting sand around the pattern and inside over drag box. Fill the molding sand and ram it with peg and peen rammer properly. Remove





11. Make vent holes using vent wires



12. Cut the pouring basin like funnel shape on the sprue.

13. Remove the runner and riser carefully

14. Turn over the cope

15. Cut the wedge gate on drag mould

16. Remove the solid bearing wood pattern carefully.

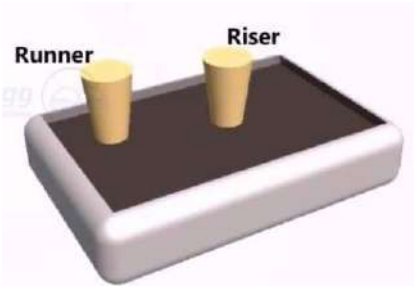
17. Place the core carefully

	
SAFETY PRECAUTIONS	1) Place the pattern in proper position in drag box. 2) Clean the pattern before placing the pattern in moulding box. 3) Care should taken in the removing of pattern otherwise the mould cavity may be damaged. 4) Care should be taken while ramming to avoid blow holes, cracks, hot tears. 5) Place the runner, raiser and cut the gate properly otherwise shrinkage cavity may be occur. 6) Proper venting should be done to avoid blow holes
ACCURACY OF FINISH	±1mm
NAME OF THE STUDENT	SIGNATURE OF STAFF

NAME OF THE STUDENT		**PIN NO:**	**EXERCISE : 1.3**
FOUNDRY SHOP	**TITLE**	**MOULD PREPARATION FOR SPLIT BEARING**	
AIM	To Perform the mould preparation for split bearing		
OUTCOME	The student shall be able to prepare the mould for split bearing at work place as per the industry practice.		
MATERIAL REQUIRED	Parting sand, facing sand, Moulding sand and water		
TOOLS AND EQUIPMENT	 **1. Trowels**  **2 core box**  **3.Cope and drag box**  **4. Strikeoff bar**		

5. **Rammers**

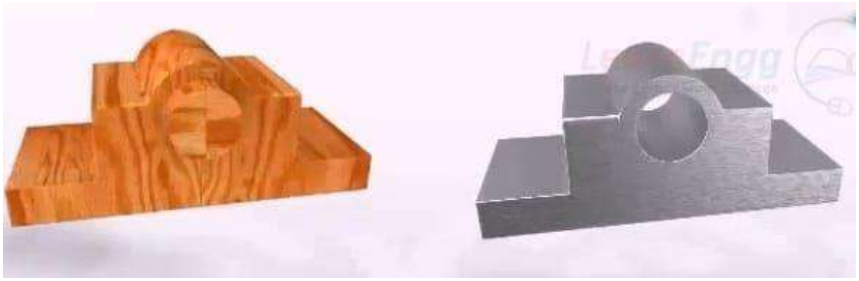
6. **sand**



7. **Runner and Raiser**

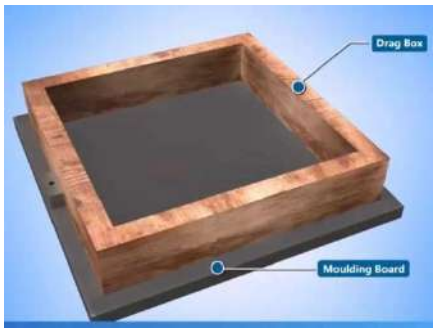
8. **Went wire**

9. **Patteren**

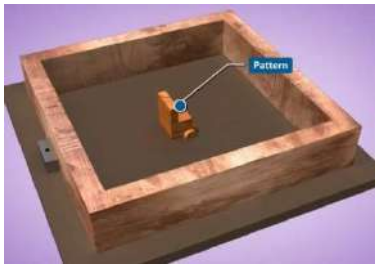
SKETCH	
Tasks	• Clean the moulding board and place the drag box upside down on the moulding board. • Place the pattern inside the box centrally. • Sprinkle parting sand around the pattern and inside the drag box. • Fill the facing sand all around the pattern and ram it with peg and peen rammer. • Fill the molding sand and ram it with peg and peen rammer properly. • Strike of the excess sand and finish the mould with strike off bar. • Make vent holes using vent wire. • Turn over the drag box carefully. • Set the cope on drag • Locate the runner and riser and place it Sprinkle parting sand around the pattern and inside over drag box. • Fill the molding sand and ram it with peg and peen rammer properly • Ram the cope along with runner and riser with peg and peen rammer properly. • Strike of the excess sand and finish the mould with strike off bar. • Remove the runner and riser carefully • Cut the pouring basin like funnel shape on the sprue. • Turn over the cope and remove the solid bearing wood pattern carefully. • Cut the wedge gate on drag mould Sprinkle parting sand around the cavity on drag box and cope box. • Check with instructor. • Assemble the both mould together carefully

WORKING PROCEEDURE

1. Clean the moulding board and place the drag box upside down on the moulding board.



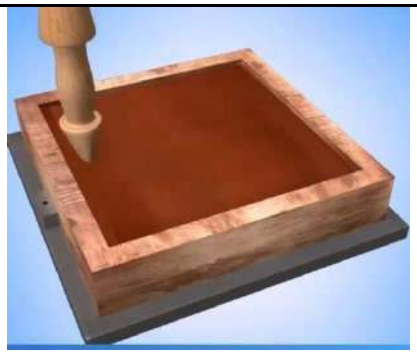
2. Place the half pattern inside the box centrally.



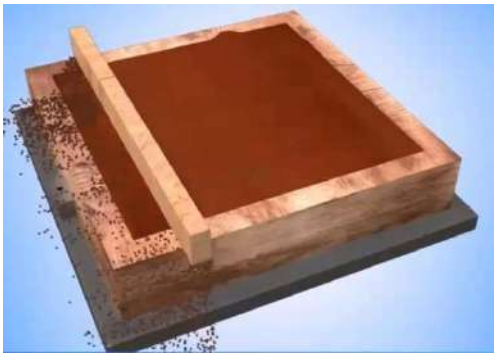
3. Sprinkle parting sand around the pattern and inside the drag box.

4. Fill the facing sand all around the pattern and ram it with peg and peen rammer.

5. Fill the molding sand and ram it with peg and peen rammer properly.

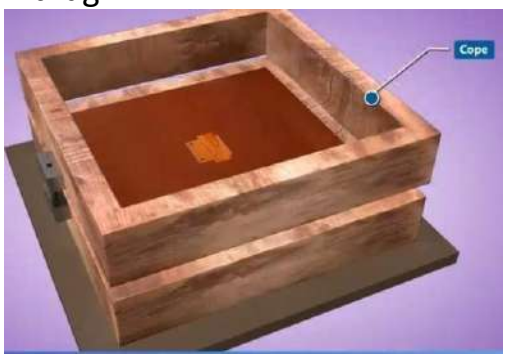


6. Strike of the excess sand and finish the mould with strike off bar.

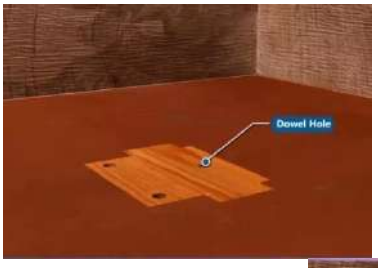


7. Turn over the drag box carefully.

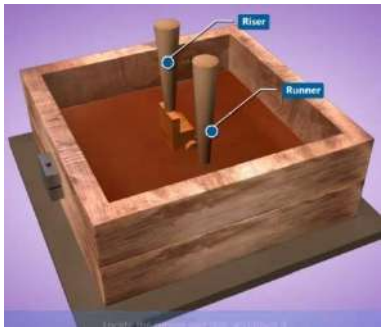
8. Set the cope on drag

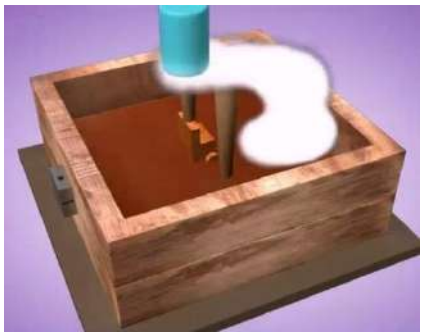


9. Place the another half pattern of split using dowel holes

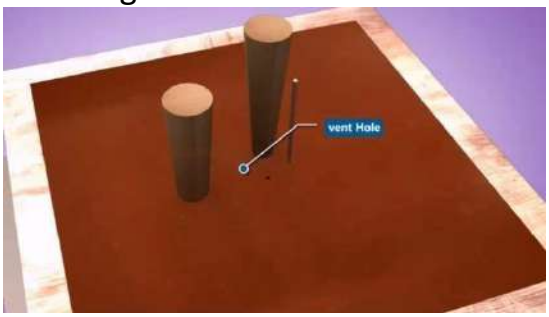


10. Locate the runner and riser, Sprinkle parting sand around the pattern and inside over drag box. Fill the molding sand and ram it with peg and peen rammer properly. Remove excess sand with strike off bar.





11. Make vent holes using vent wire

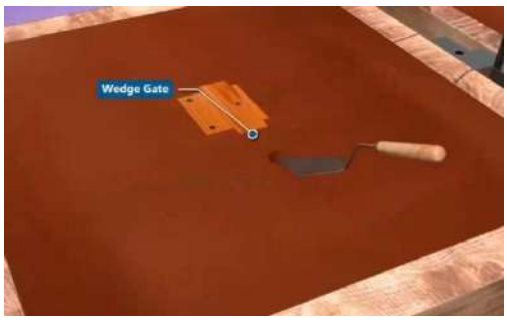


12. Cut the pouring basin like funnel shape on the sprue.

13. Remove the runner and riser carefully

14. Turn over the cope

15. Cut the wedge gate on drag mould.



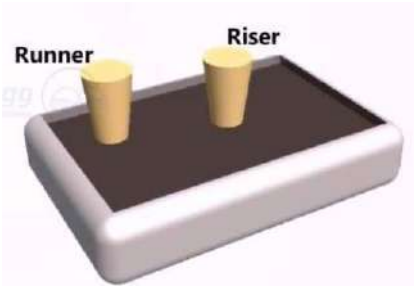
16. Remove the solid bearing wood pattern carefully.

	
SAFETY PRECAUTIONS	1) Place the pattern in proper position in drag box. 2) Clean the pattern before placing the pattern in moulding box. 3) Care should taken in the removing of pattern otherwise the mould cavity may be damaged. 4) Care should be taken while ramming to avoid blow holes, cracks, hot tears. 5) Place the runner, raiser and cut the gate properly otherwise shrinkage cavity may be occure. 6) Proper venting should be done to avoid blow holes
ACCURACY OF FINISH	±1mm
NAME OF THE STUDENT	SIGNATURE OF STAFF

NAME OF THE STUDENT		**PIN NO:**	**EXERCISE : 1.4**
FOUNDRY SHOP	**TITLE**	**MOULD PREPARATION FOR CONNECTING ROD**	
AIM	To Perform the mould preparation for Connecting Rod		
OUTCOME	The student shall be able to prepare the mould for Connecting Rod at work place as per the industry practice.		
MATERIAL REQUIRED	Parting sand, facing sand, Moulding sand and water		
TOOLS AND EQUIPMENT	 **1. Trowels**  **2 core box**  **3.Cope and drag box**  **4. Strikeoff bar**		

5. **Rammers**

6. **sand**



7. **Runner and Raiser**

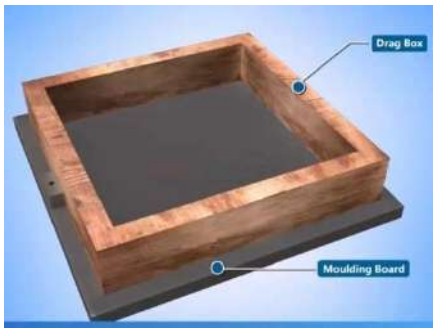
8. **Went wire**

9. **Patteren**

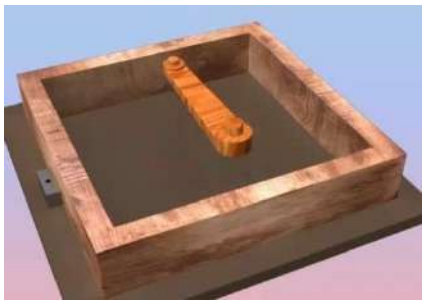
SKETCH	
Tasks	• Clean the moulding board and place the drag box upside down on the moulding board. • Place the pattern inside the box centrally. • Sprinkle parting sand around the pattern and inside the drag box. • Fill the facing sand all around the pattern and ram it with peg and peen rammer. • Fill the molding sand and ram it with peg and peen rammer properly. • Strike of the excess sand and finish the mould with strike off bar. • Make vent holes using vent wire. • Turn over the drag box carefully. • Set the cope on drag • Locate the runner and riser and place it Sprinkle parting sand around the pattern and inside over drag box. • Fill the molding sand and ram it with peg and peen rammer properly • Ram the cope along with runner and riser with peg and peen rammer properly. • Strike of the excess sand and finish the mould with strike off bar. • Remove the runner and riser carefully • Cut the pouring basin like funnel shape on the sprue. • Turn over the cope and remove the solid bearing wood pattern carefully. • Cut the wedge gate on drag mould Sprinkle parting sand around the cavity on drag box and cope box. • Check with instructor. • Assemble the both mould together carefully

WORKING PROCEEDURE

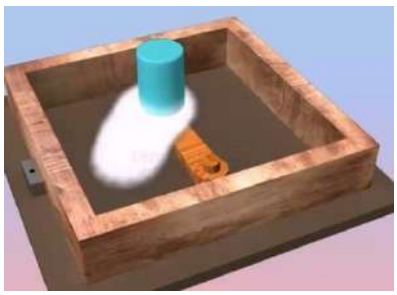
1. Clean the moulding board and place the drag box upside down on the moulding board.



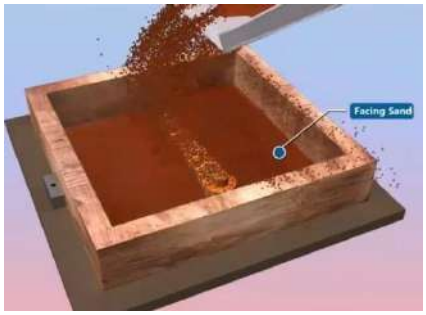
2. Place the pattern inside the box centrally.



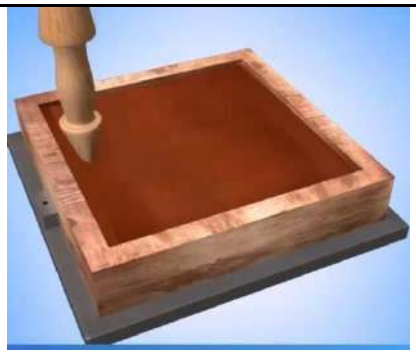
3. Sprinkle parting sand around the pattern and inside the drag box.



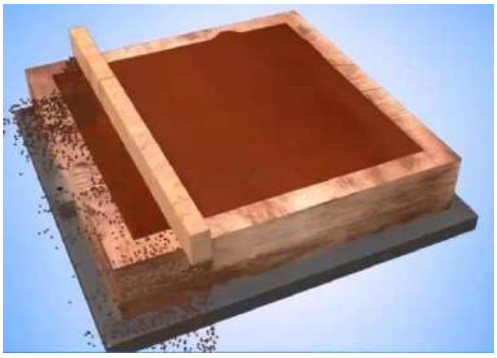
4. Fill the facing sand all around the pattern and ram it with peg and peen rammer.



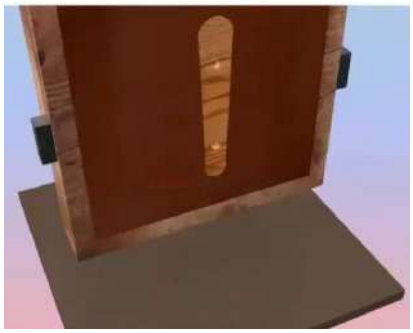
5. Fill the molding sand and ram it with peg and peen rammer properly.



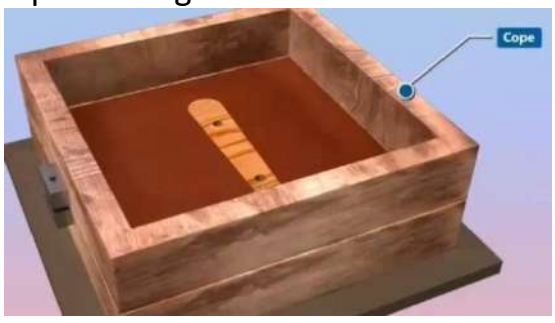
6. Strike of the excess sand and finish the mould with strike off bar.



7. Turn over the drag box carefully.

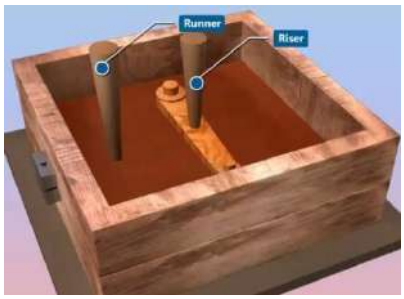


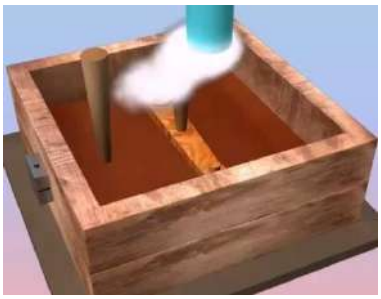
8. Set the cope on drag



9. Place the another half pattern of V-Pulley using dowel holes

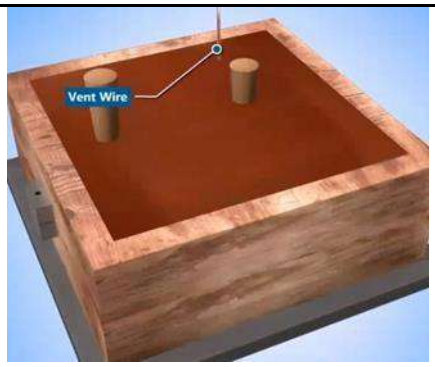
10. Locate the runner and riser and place it Sprinkle parting sand around the pattern and inside over drag box.





11. Fill the molding sand and ram it with peg and peen rammer properly. Strike of the excess sand and finish the mould with strike off bar

12. Make vent holes using vent wires

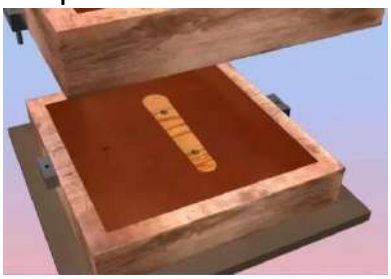


13.Cut the pouring b sprue.

14. 

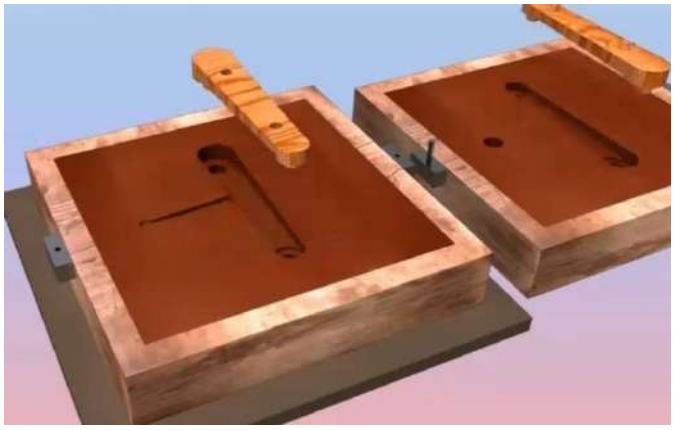
15. Remove the runner and riser carefully

16. Turn over the cope



17. Cut the wedge gate on drag mould

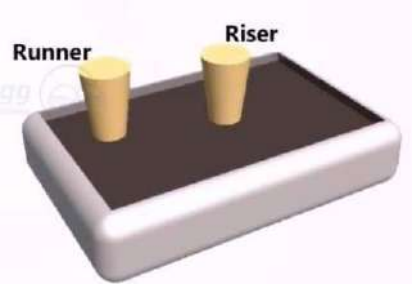
18. Remove the V-Pulley wood pattern carefully.

	
SAFETY PRECAUTIONS	1) Place the pattern in proper position in drag box. 2) Clean the pattern before placing the pattern in moulding box. 3) Care should taken in the removing of pattern otherwise the mould cavity may be damaged. 4) Care should be taken while ramming to avoid blow holes, cracks, hot tears. 5) Place the runner, raiser and cut the gate properly otherwise shrinkage cavity may be occur. 6) Proper venting should be done to avoid blow holes
ACCURACY OF FINISH	±1mm
NAME OF THE STUDENT	SIGNATURE OF STAFF

NAME OF THE STUDENT		**PIN NO:**	**EXERCISE : 1.5**
FOUNDRY SHOP	**TITLE**	**MOULD PREPARATION FOR V-PULLEY**	
AIM	To Perform the mould preparation for V-Pulley		
OUTCOME	The student shall be able to prepare the mould for V-Pulley at work place as per the industry practice.		
MATERIAL REQUIRED	Parting sand, facing sand, Moulding sand and water		
TOOLS AND EQUIPMENT	 **1. Trowels**  **2 core box**  **3.Cope and drag box**  **4. Strikeoff bar**		

5. Rammers

6. sand



7. Runner and Raiser

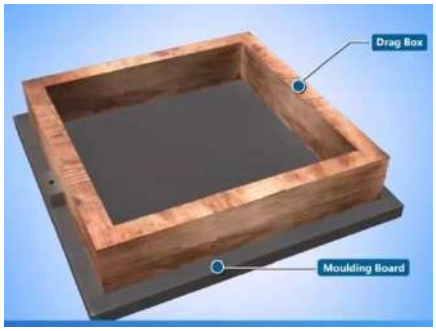
8. Went wire

9. Patteren

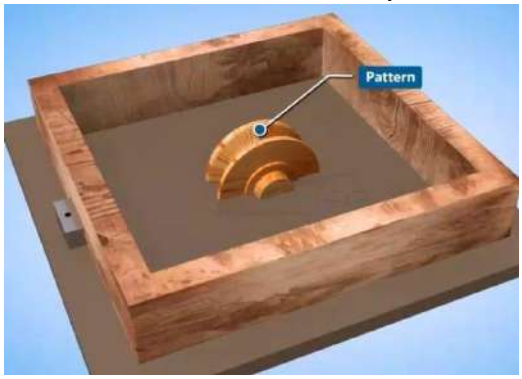
SKETCH	
Tasks	• Clean the moulding board and place the drag box upside down on the moulding board. • Place the pattern inside the box centrally. • Sprinkle parting sand around the pattern and inside the drag box. • Fill the facing sand all around the pattern and ram it with peg and peen rammer. • Fill the molding sand and ram it with peg and peen rammer properly. • Strike of the excess sand and finish the mould with strike off bar. • Make vent holes using vent wire. • Turn over the drag box carefully. • Set the cope on drag • Locate the runner and riser and place it Sprinkle parting sand around the pattern and inside over drag box. • Fill the molding sand and ram it with peg and peen rammer properly • Ram the cope along with runner and riser with peg and peen rammer properly. • Strike of the excess sand and finish the mould with strike off bar. • Remove the runner and riser carefully • Cut the pouring basin like funnel shape on the sprue. • Turn over the cope and remove the solid bearing wood pattern carefully. • Cut the wedge gate on drag mould Sprinkle parting sand around the cavity on drag box and cope box. • Check with instructor. • Assemble the both mould together carefully

WORKING PROCEEDURE

1. Clean the moulding board and place the drag box upside down on the moulding board.

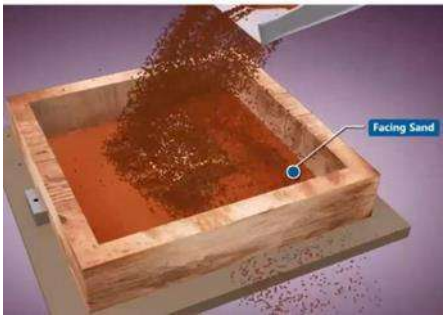


2. Place the pattern inside the box centrally.

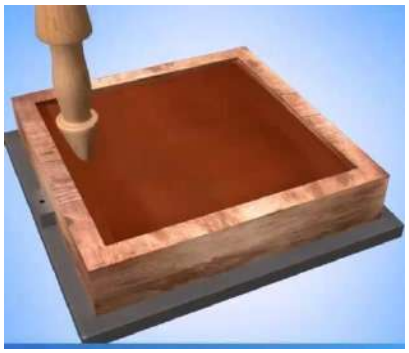


3. Sprinkle parting sand around the pattern and inside the drag box.

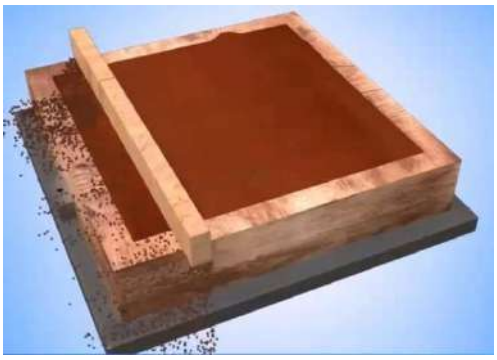
4. Fill the facing sand all around the pattern and ram it with peg and peen rammer.



5. Fill the molding sand and ram it with peg and peen rammer properly.

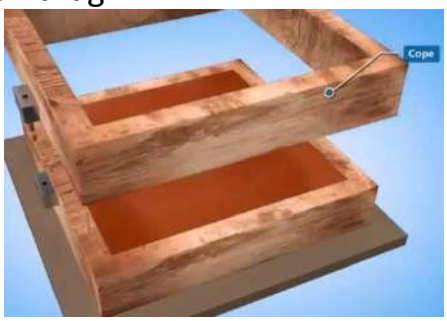


6. Strike of the excess sand and finish the mould with strike off bar.



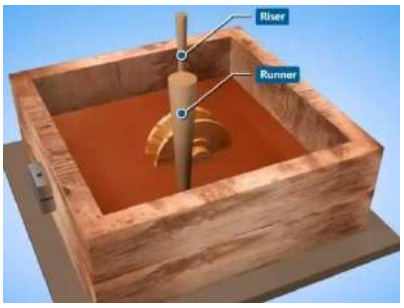
7. Turn over the drag box carefully.

8. Set the cope on drag



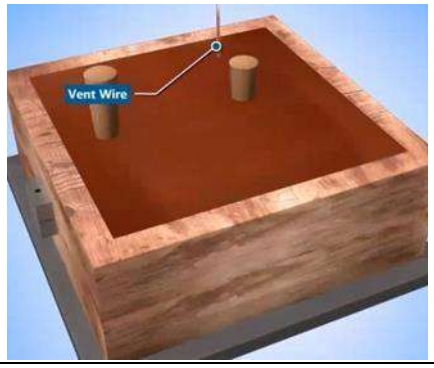
9. Place the another half pattern of V-Pulley using dowel holes

10. Locate the runner and riser and place it Sprinkle parting sand around the pattern and inside over drag box.



11. Fill the molding sand and ram it with peg and peen rammer properly. Strike of the excess sand and finish the mould with strike off bar

12. Make vent holes using vent wires



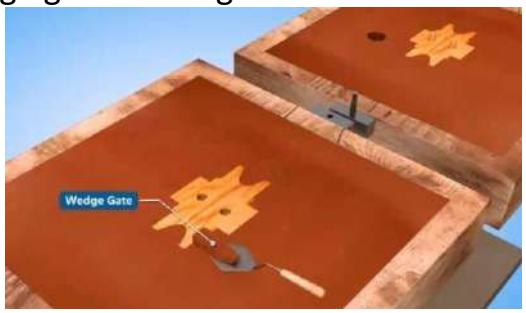
13. Cut the pouring b sprue.

14. 

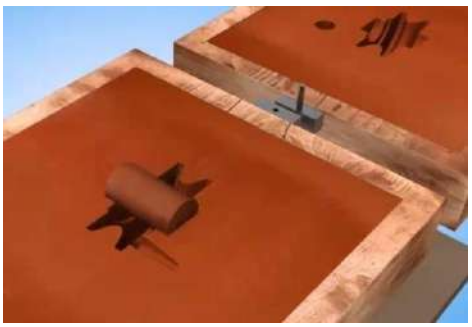
15. Remove the runner and riser carefully

16. Turn over the cope

17. Cut the wedge gate on drag mould



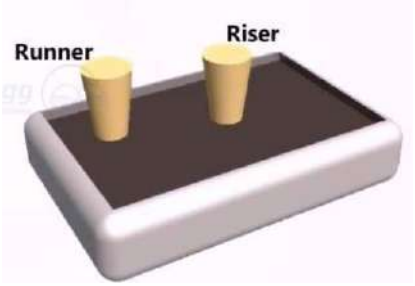
18. Remove the V-Pulley wood pattern carefully.

	 19.Place the core carefully  
SAFETY PRECAUTIONS	1) Place the pattern in proper position in drag box. 2) Clean the pattern before placing the pattern in moulding box. 3) Care should taken in the removing of pattern otherwise the mould cavity may be damaged. 4) Care should be taken while ramming to avoid blow holes, cracks, hot tears. 5) Place the runner, raiser and cut the gate properly otherwise shrinkage cavity may be occur. 6) Proper venting should be done to avoid blow holes
ACCURACY OF FINISH	±1mm
NAME OF THE STUDENT	SIGNATURE OF STAFF

NAME OF THE STUDENT		PIN NO:	EXERCISE : 1.6
FOUNDRY SHOP	TITLE	MOULD PREPARATION FOR GEAR PULLEY	
AIM	To Perform the mould preparation for Gear Pulley		
OUTCOME	The student shall be able to prepare the mould for Gear Pulley at work place as per the industry practice.		
MATERIAL REQUIRED	Parting sand, facing sand, Moulding sand and water		
TOOLS AND EQUIPMENT	 **1. Trowels**  **2 core box**  **3. Cope and drag box**  **4. Strikeoff bar**		

5. Rammers

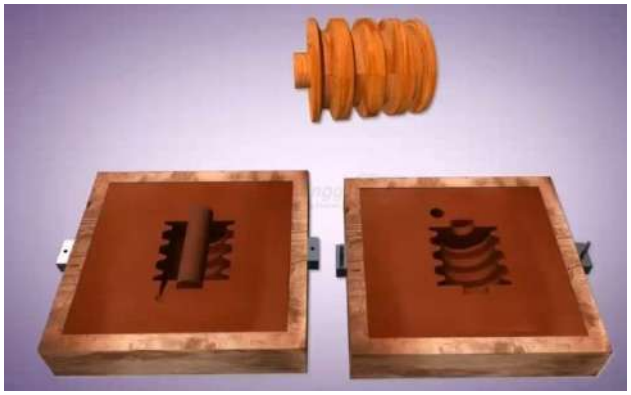
6. sand



7. Runner and Raiser

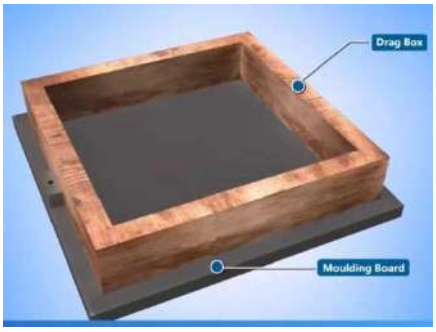
8. Went wire

9. Patteren

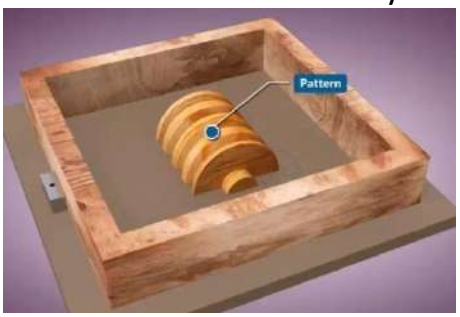
SKETCH	
Tasks	• Clean the moulding board and place the drag box upside down on the moulding board. • Place the pattern inside the box centrally. • Sprinkle parting sand around the pattern and inside the drag box. • Fill the facing sand all around the pattern and ram it with peg and peen rammer. • Fill the molding sand and ram it with peg and peen rammer properly. • Strike of the excess sand and finish the mould with strike off bar. • Make vent holes using vent wire. • Turn over the drag box carefully. • Set the cope on drag • Locate the runner and riser and place it Sprinkle parting sand around the pattern and inside over drag box. • Fill the molding sand and ram it with peg and peen rammer properly • Ram the cope along with runner and riser with peg and peen rammer properly. • Strike of the excess sand and finish the mould with strike off bar. • Remove the runner and riser carefully • Cut the pouring basin like funnel shape on the sprue. • Turn over the cope and remove the solid bearing wood pattern carefully. • Cut the wedge gate on drag mould Sprinkle parting sand around the cavity on drag box and cope box. • Check with instructor. • Assemble the both mould together carefully

WORKING PROCEEDURE

1. Clean the moulding board and place the drag box upside down on the moulding board.



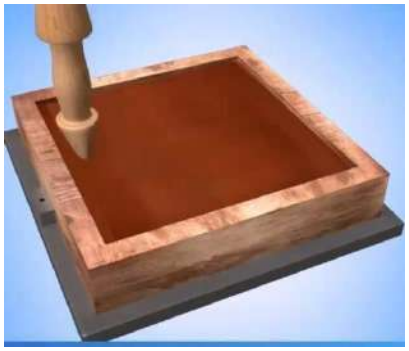
2. Place the half pattern inside the box centrally.



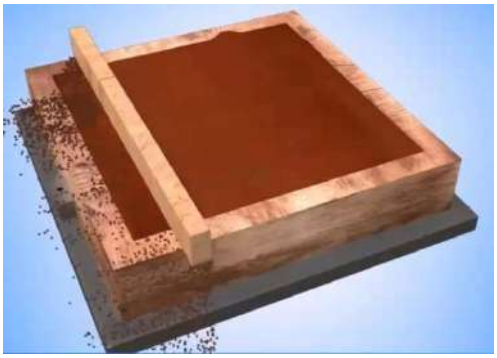
3. Sprinkle parting sand around the pattern and inside the drag box.

4. Fill the facing sand all around the pattern and ram it with peg and peen rammer.

5. Fill the molding sand and ram it with peg and peen rammer properly.



6. Strike of the excess sand and finish the mould with strike off bar.

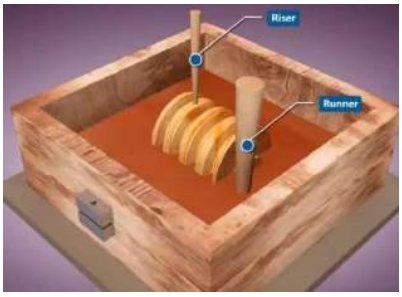


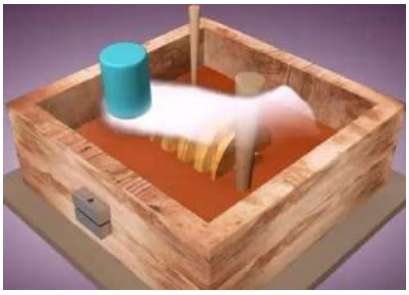
7. Turn over the drag box carefully.

8. Set the cope on drag

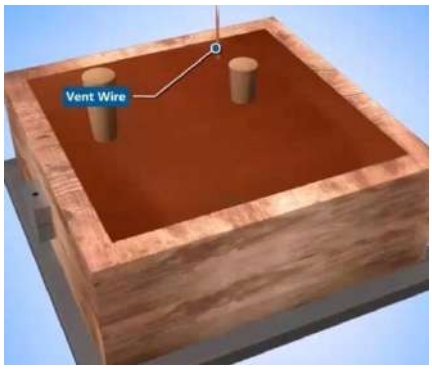
9. Place the another half pattern of split pattern of Gear Pulley using dowel holes

10. Locate the runner and riser and place it Sprinkle parting sand around the pattern and inside over drag box. Fill the molding sand and ram it with peg and peen rammer properly. Remove execs





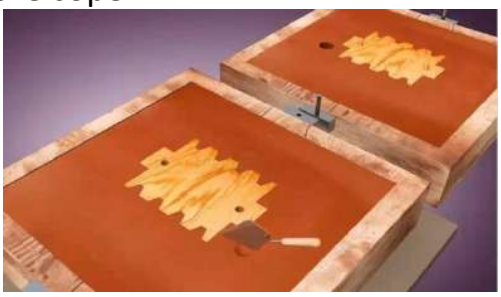
11. Make vent holes using vent wires



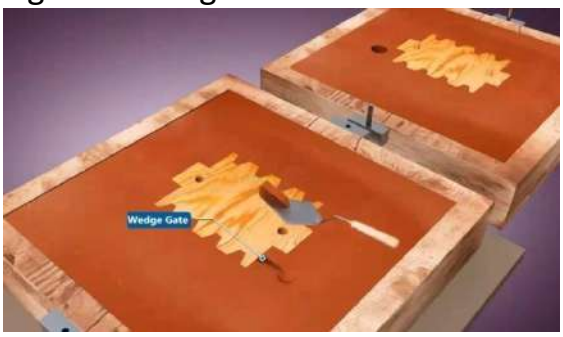
12. Cut the pouring basin like funnel shape on the sprue.

13. Remove the runner and riser carefully

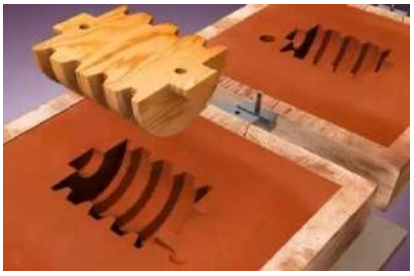
14. Turn over the cope



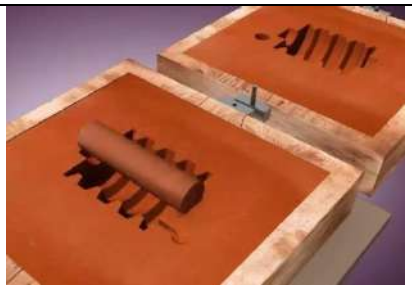
15. Cut the wedge gate on drag mould



16. Remove the Gear Pulley wood pattern carefully.

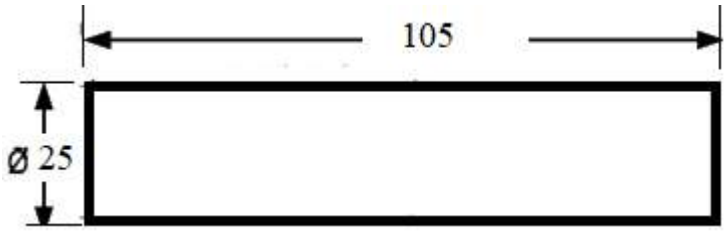


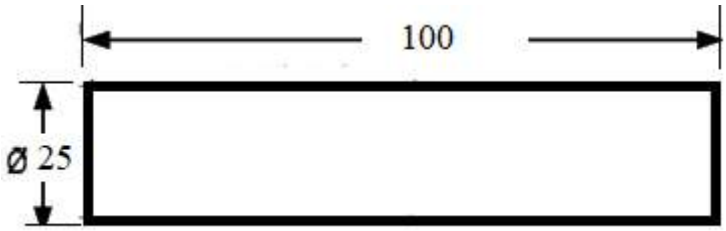
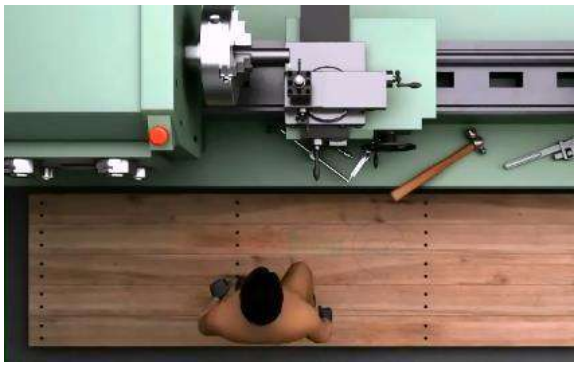
17. Place the core carefully

	
SAFETY PRECAUTIONS	1) Place the pattern in proper position in drag box. 2) Clean the pattern before placing the pattern in moulding box. 3) Care should taken in the removing of pattern otherwise the mould cavity may be damaged. 4) Care should be taken while ramming to avoid blow holes, cracks, hot tears. 5) Place the runner, raiser and cut the gate properly otherwise shrinkage cavity may be occure. 6) Proper venting should be done to avoid blow holes
ACCURACY OF FINISH	±1mm
NAME OF THE STUDENT	SIGNATURE OF STAFF

VIVA QUESTIONS - FOUNDRY

1. What are the properties of good moulding sand?
2. What is core sand?
3. What is moulding sand?
4. What are the different types of patterns used in foundry?
5. What is the purpose of gating system?
6. What are the different tools used for making moulds in the foundry
7. What is meant by pattern allowance?
8. What is the purpose of pattern allowance?
9. What are the different materials used for patterns.
10. What are cope and drag.
11. What is a core?
12. How a core is made?
13. What is foundry.
14. What is casting.
15. What is the use of sprue.
16. What is the function of runner and riser of gating system.
17. Name few casting defects that generally occur.
18. List out different types casting processes.
19. What is the difference between green sand moulding and dry sand moulding?
20. Name different additives used in making moulding sand.
21. What do you understand by shrinkage allowance.
22. What do you understand by draft allowance.
23. List out different stages of making a product using casting process.
24. What is the function of swab?
25. What is the function of lifter.

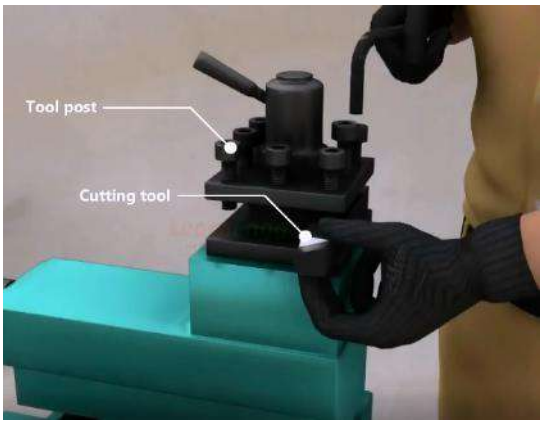
NAME OF THE STUDENT		**PIN :**	**EXERCISE : 2.1**
MACHINE SHOP	**TITLE**	**Perform Facing operation on the given Lathe.**	
AIM	To Perform Facing operation on the given job by using a Lathe Machine.		
OUTCOMES	**The student shall be able to learn** a) Skill in centering the Job. b) Skill in uniform feeding of cutting Tool. c) Skill in fixing the cutting Tool. d) Practice Facing operation as specified in the sketch.		
SPECIFICATION OF WORK PIECE TO BE TAKEN	Mild Steel Rod : Diameter 25 mm x Length 105 mm. 		
TOOLS AND EQUIPMENT	**Lathe Machine, Chuck key, Outside caliper, Steel Rule, Spanners, Surface Gauge, H.S.S single point cutting tool.**  		

SKETCH OF FINISHED WORK PIECE	
TASKS	1. Cut the work piece as per the specifications from the raw material with a saw. 2. Fix the Job in the chuck with the help of a chuck Key. 3. Align the job in the chuck by centering the rod using surface gauge. 4. Fix the Turning Tool in the Tool Post with the help of Spanner and correct the centre height. 5. Switch on the power supply to the lathe. 6. Face both ends of the given Work Piece to get the required size as shown in the finished sketch. 7. Switch off the power supply. 8. Remove the finished work piece from the chuck.
WORKING PROCEDURE	1. Wear all the safely equipment's like goggles, gloves, safety shoes, safely helmets.  2. Check for any circumstances for any abstraction to perform the work  3. The given work piece is checked for its dimensions.

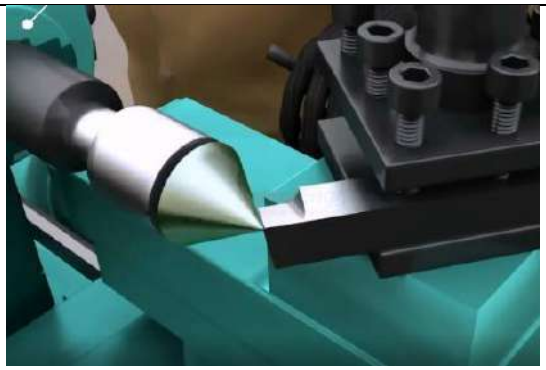
4. For turning purpose, take an excess length of workpiece.

5. The work piece is held in the chuck, chuck key is used to tighten the work piece firmly, ensuring centering of the job.

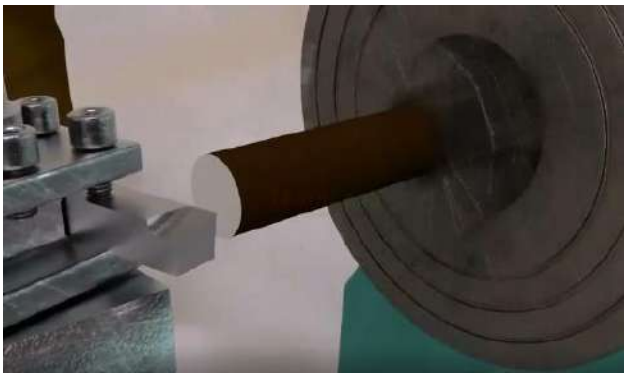
6. Place the single point cutting tool in tool post with the help of spanner.



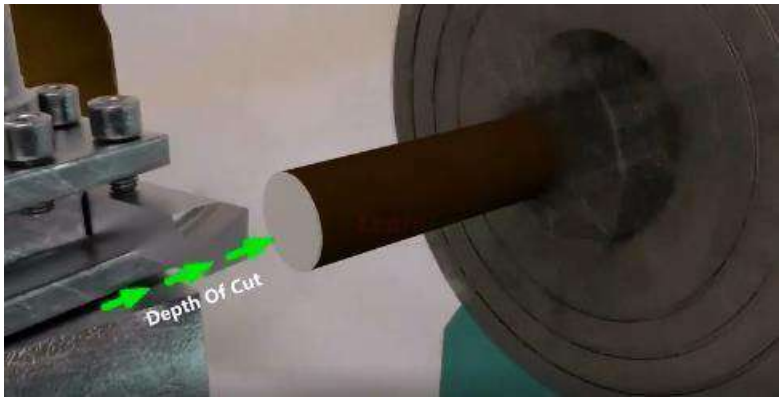
7. Check the tool position with the dead centre in tailstock.

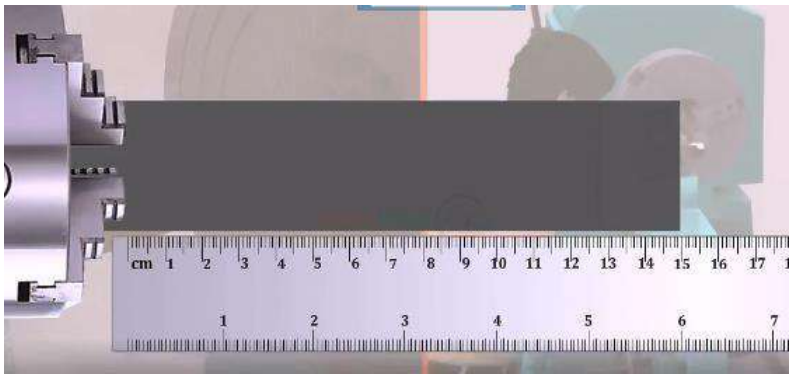


8. Take a rough cut by facing and turning the given object.

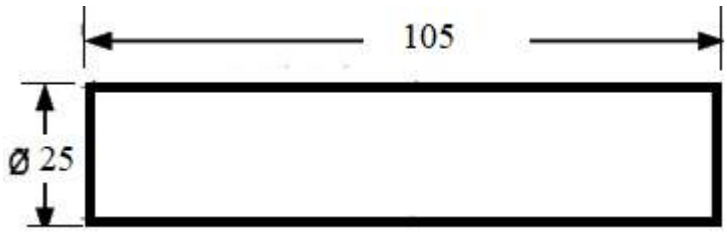


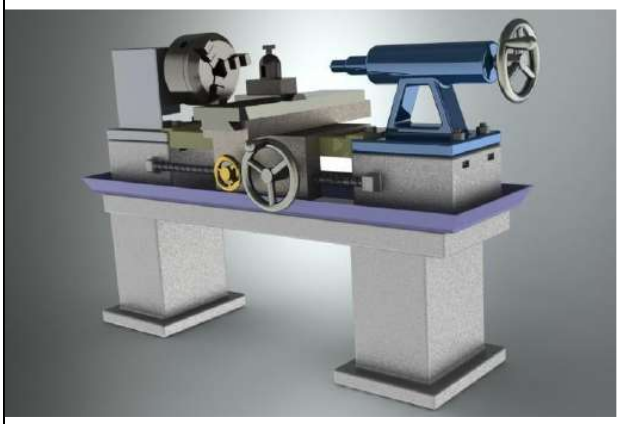
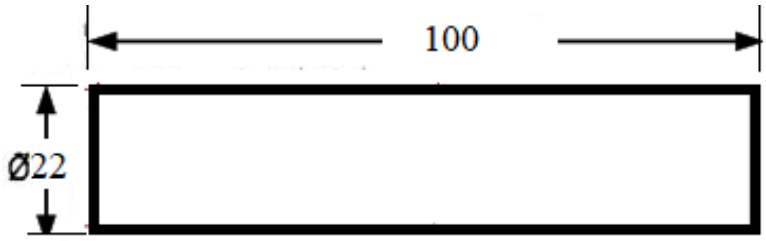
9. Take a facing and turning the given object.

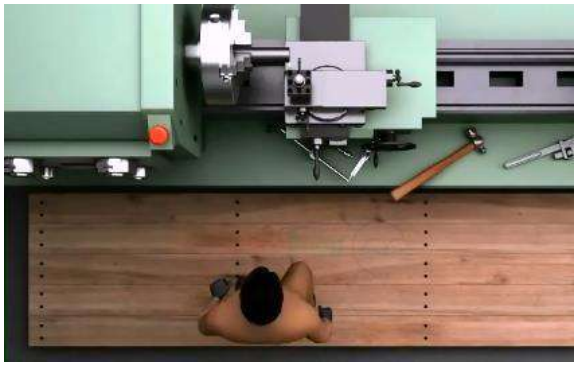




SAFETY PRECAUTIONS	1. Before starting, check that the work piece, Tool Holder and Tail stock are firmly and properly clamped. 2. Do not wear loose clothes and wear the shoes, goggles, apron while working near the Machine.
ACCURACY OF FINISH	± 0.25mm
NAME OF THE STUDENT	SIGNATURE OF STAFF

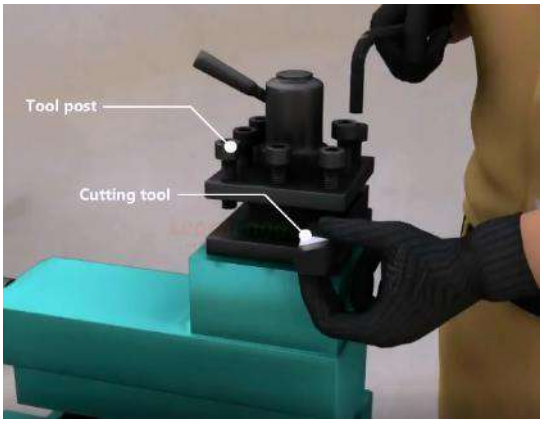
NAME OF THE STUDENT		PIN :	EXERCISE : 2.2
MACHINE SHOP	TITLE	**Perform Plain Turning operation by using the given Lathe.**	
AIM	To Perform Plain Turning operation on the given job by using a Lathe Machine.		
OUTCOMES	**The student shall be able to learn** a) Skill in centering the Job. b) Skill in uniform feeding of cutting Tool. c) Skill in fixing the cutting Tool. d) Practice Facing and Turning operations as specified in the sketch.		
SPECIFICATION OF WORK PIECE TO BE TAKEN	Mild Steel Rod : Diameter 25 mm x Length 105 mm. 		

TOOLS AND EQUIPMENT	**Lathe Machine, Chuck key, Outside calliper, Steel Rule, Wrench, Surface Gauge, H.S.S single point cutting tool.**    
SKETCH OF FINSISHED WORK PIECE	
TASKS	1. Cut the work piece as per the specifications from the raw material with a hack saw. 2. Fix the Job in the chuck with the help of a chuck Key. 3. Align the job in the chuck by centering the rod using surface gauge. 4. Fix the Turning Tool in the Tool Post with the help of Spanner and correct the centre height. 5. Switch on the power supply to the lathe. 6. Face both ends of the given Work Piece to get the required length as shown in the sketch.

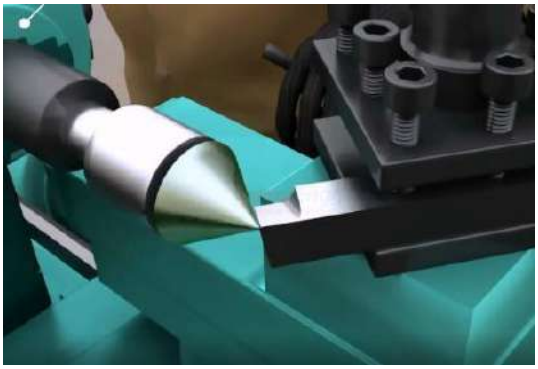
	7. Reduce the diameter of the work piece by plain turning from 25 mm to 22 mm along its length. 8. Check the diameter of the job during turning with an outside calliper. 9. Switch off the power supply. 10. Remove the finished work piece from the chuck.
WORKING PROCEDURE	1. Wear all the safely equipment's like goggles, gloves, safety shoes, safely helmets.  2. Check for any circumstances for any abstraction to perform the work  3. The given work piece is checked for its dimensions  4. For turning purpose, take an excess length of workpiece.

5. The work piece is held in the chuck, chuck key is used to tighten the work piece firmly, ensuring centering of the job.

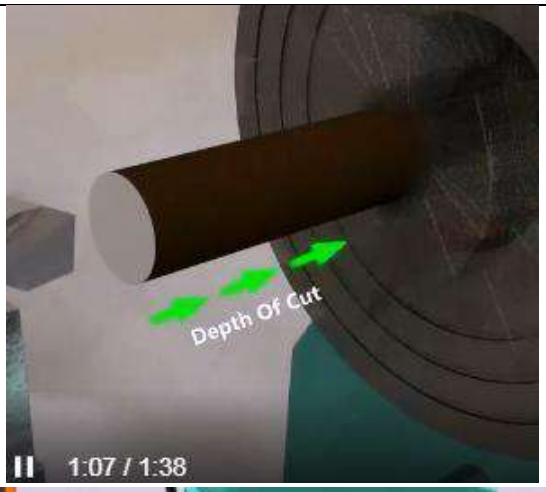
6. Place the single point cutting tool in tool post with the help of spanner.

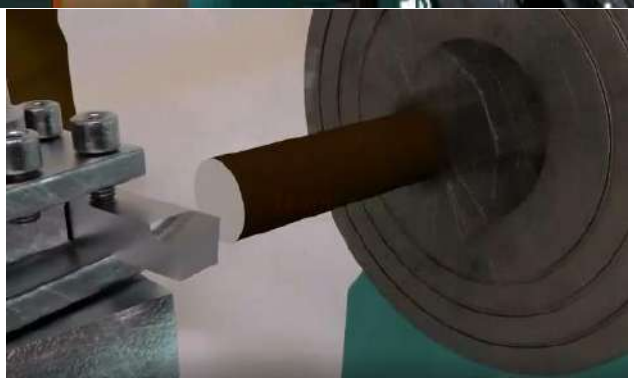


7. Check the tool position with the dead centre in tailstock.

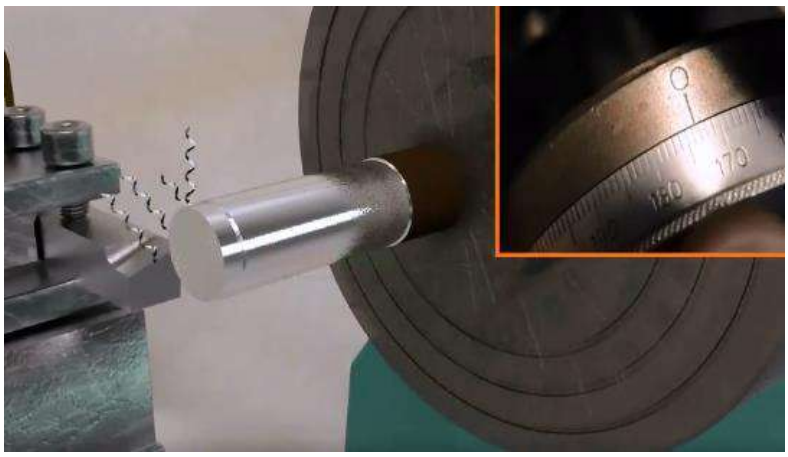


8. Take a rough cut by facing and turning the given object.

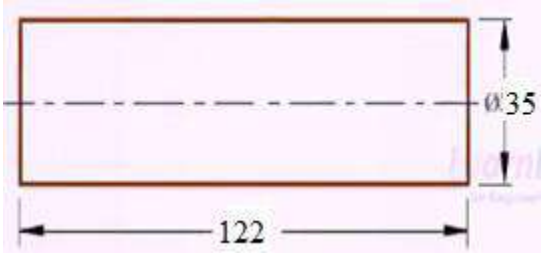


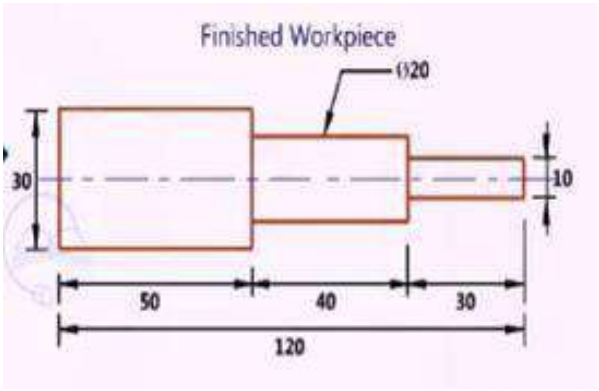


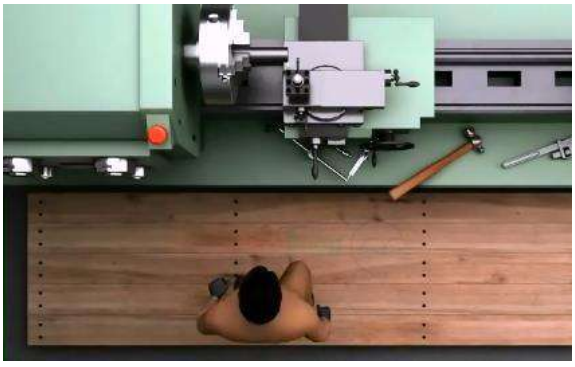
9. Set depth of cut, step by step through cross-slide by 0.5 mm.



SAFETY PRECAUTIONS	1. Before starting, check that the work piece, Tool Holder and Tail stock are firmly and properly clamped. 2. Do not wear loose clothes and wear the shoes, goggles, apron while working near the Machine.
ACCURACY OF FINISH	± 0.25mm
NAME OF THE STUDENT SIGNATURE OF STAFF	

NAME OF THE STUDENT		PIN :	EXERCISE : 2.3
MACHINE SHOP	TITLE	**Perform Step Turning operation by using the given Lathe.**	
AIM	To Perform Step Turning operation on the given job by using a Lathe Machine.		
OUTCOMES	**The student shall be able to learn** a) Skill in centering the Job. b) Skill in uniform feeding of cutting Tool. c) Skill in fixing the cutting Tool. d) Practice Step Turning operation as specified in the sketch.		
SPECIFICATION OF WORK PIECE	Mild Steel Rod : Diameter 35 mm x Length 122 mm. 		

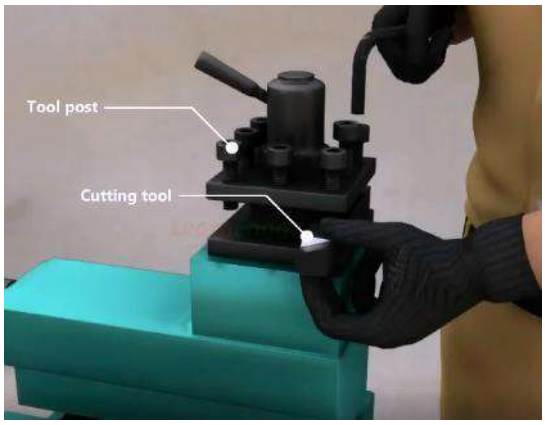
TOOLS AND EQUIPMENT	**Lathe Machine, Chuck key, Outside calliper, Steel Rule, Wrench, Surface Gauge, H.S.S single point cutting tool.**    
SKETCH OF FINISHED WORK PIECE	
TASKS	1. Cut the work piece as per the specifications from the raw material with a hack saw. 2. Fix the Job in the chuck with the help of a chuck Key. 3. Align the job in the chuck by centering the rod using surface gauge. 4. Fix the Turning Tool in the Tool Post with the help of Spanner and correct the centre height. 5. Switch on the power supply to the lathe. 6. Face both ends of the given Work Piece to get the required length as shown in the finished sketch.

	7. Reduce the diameter of the work piece by plain turning from 35 mm to 30 mm along its length i.e., 120 mm. 8. Set depth of cut step by step by 0.5 mm through cross slide. 9. Move (Feed) the carriage towards head stock for making a cut on the job with the cutting tool. 10. While doing the work, Check the diameter of the job with an outside calliper. 11. First step is to reduce the diameter of the work piece by plain turning from 30 mm to 20 mm along a length of 70 mm by repeating the task points 8, 9 and 10 respectively. 12. Second step is to reduce the diameter of the work piece by plain turning from 20 mm to 10 mm along a length of 30 mm by repeating the task points 8, 9 and 10 respectively. 13. Switch off the power supply. 14. Remove the finished work piece from the chuck.
WORKING PROCEEDURE	1. Wear all the safely equipment's like goggles, gloves, safety shoes, safely helmets.  2. Check for any circumstances for any abstraction to perform the work  3. The given work piece is checked for its dimensions, that is length is 122 mm and diameter is 35 mm 

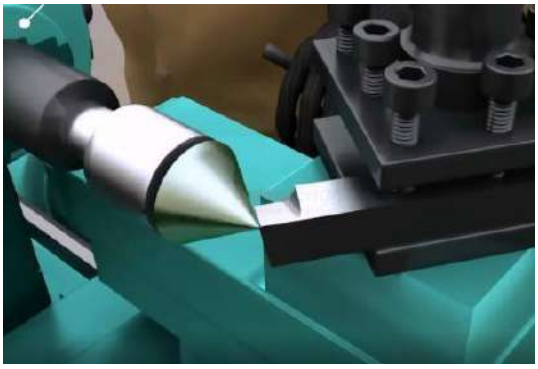
4. For turning purpose, take an excess length of workpiece.

5. The work piece is held in the chuck, chuck key is used to tighten the work piece firmly, ensuring centering of the job.

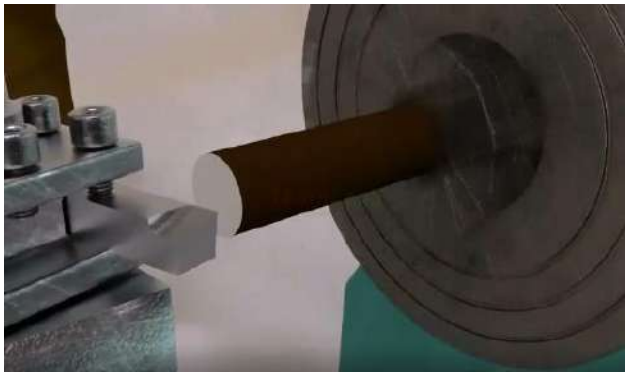
6. Place the single point cutting tool in tool post with the help of spanner.



7. Check the tool position with the dead centre in tailstock.

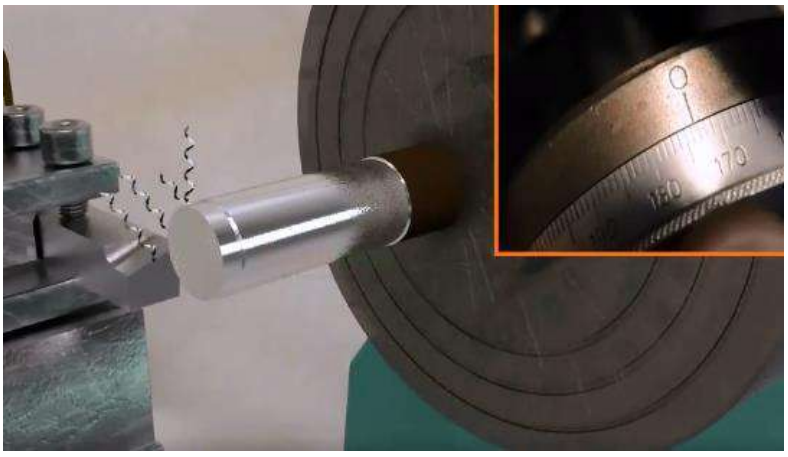


8. Take a rough cut by facing and turning the given object.

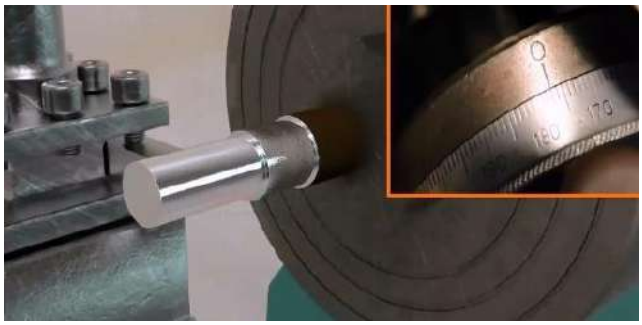


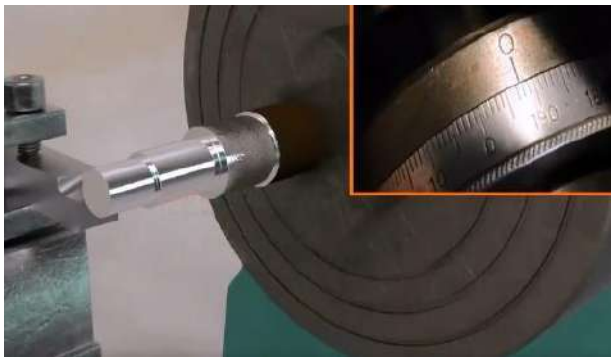
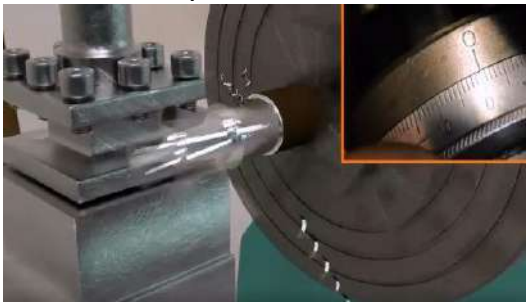
9. Take a rough cut by facing and turning the given object.

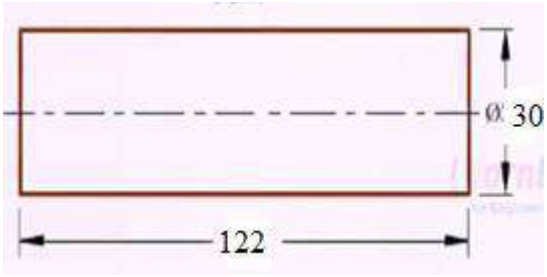
10. Set depth of cut, step by step through cross-slide by 0.5 mm.

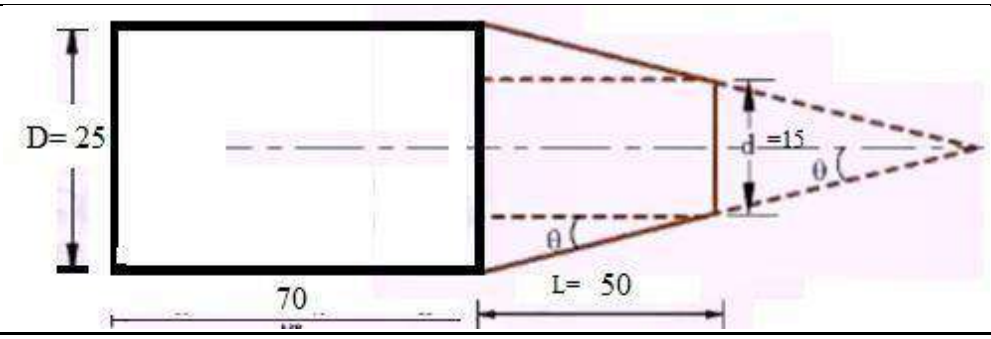


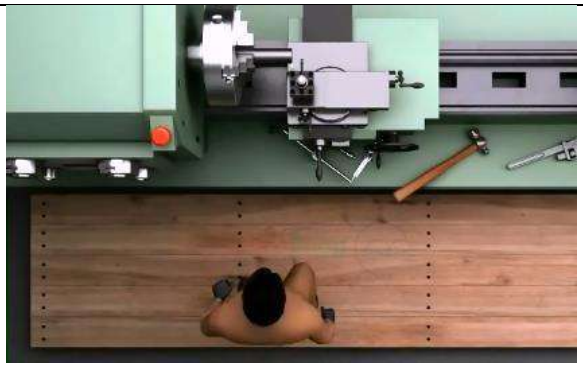
11. One end of the work piece is reduced to the 20 mm diameter for length of 70 mm.



	12. While doing the work, check the diameter intermediately.  13. Then reduce the workpiece to 10 mm diameter for the length of 30 mm.  14. After completion the excess material will be removed by parting tool.  
SAFETY PRECAUTIONS	1. Before starting, check that the work piece, Tool Holder and Tail stock are firmly and properly clamped. 2. Do not wear loose clothes and wear the shoes, goggles, apron while working near the Machine.
ACCURACY OF FINISH	± 0.5mm
NAME OF THE STUDENT	SIGNATURE OF STAFF

NAME OF THE STUDENT		**PIN :**	**EXERCISE : 2.4**
MACHINE SHOP	**TITLE**	**Perform Taper Turning operation by using the given Lathe.**	
AIM	To Perform Taper Turning operation on the given job by Swivelling the Compound Rest Method on a Lathe Machine.		
OUTCOMES	**The student shall be able to learn** a) Skill in centering the Job. b) Skill in uniform feeding of cutting Tool. c) Skill in fixing the cutting Tool. d) Practice TaperTurning operation as specified in the sketch.		
SPECIFICATION OF WORK PIECE TO BE TAKEN	Mild Steel Rod : Diameter 30 mm x Length 122 mm. 		
TOOLS AND EQUIPMENT	**Lathe Machine, Chuck key, Outside calliper, Steel Rule, Wrench, Surface Gauge, H.S.S single point cutting tool.**    		

SKETCH OF THE FINISHED WORK PIECE	
TASKS	1. Cut the work piece as per the specifications from the raw material with a saw. 2. Fix the Job in the chuck with the help of a chuck Key. 3. Align the job in the chuck by centering the rod using surface gauge. 4. Fix the Turning Tool in the Tool Post with the help of Spanner and correct the centre height. 5. Switch on the power supply to the lathe. 6. Face both ends of the given Work Piece to get the required length as shown in the sketch. 7. Reduce the diameter from 30 mm to 25 mm over a length of 120 mm. 8. Calculate the taper angle. 9. Compound rest base is swelled and setted half taper angel of 6 degree which is already calculated. 10. Touch the tool tip over the workpiece surface and set the depth of cut scale to zero. 11. Now give the depth of cut 0.5mm each time through cross-slide till achieve the required minor diameter. 12. Give feed through Cutting tool by hand wheel of the compound rest moved at an angle to the lathe axis from right to left in stages. 13. Switch off the power supply. 14. Remove the finished work piece from the chuck.
WORKING PROCEEDURE	1. Wear all the safely equipment's like goggles, gloves, safety shoes, safely helmets.  2. Check for any circumstances for any abstraction to perform the work

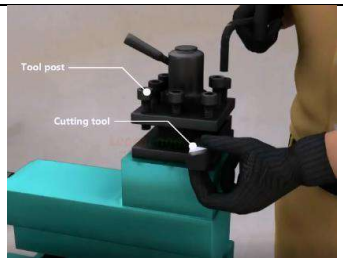


3. The given work piece is checked for its dimensions, that is length is 122 mm and diameter is 30 mm

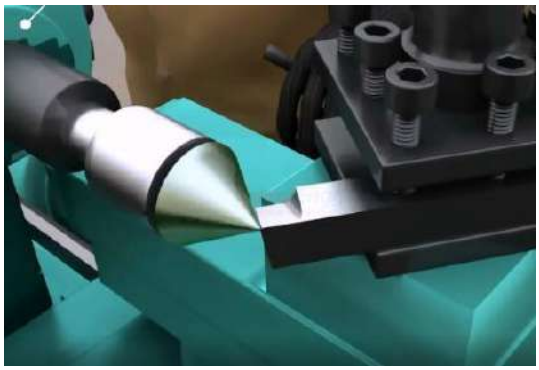
4. For turning purpose, take an excess length of workpiece.

5. The work piece is held in the chuck, chuck key is used to tighten the work piece firmly, ensuring centering of the job.

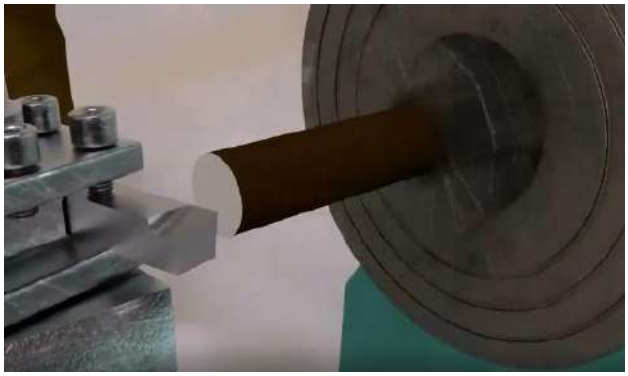
6. Place the single point cutting tool in tool post with the help of spanner.



7. Check the tool position with the dead centre in tailstock.

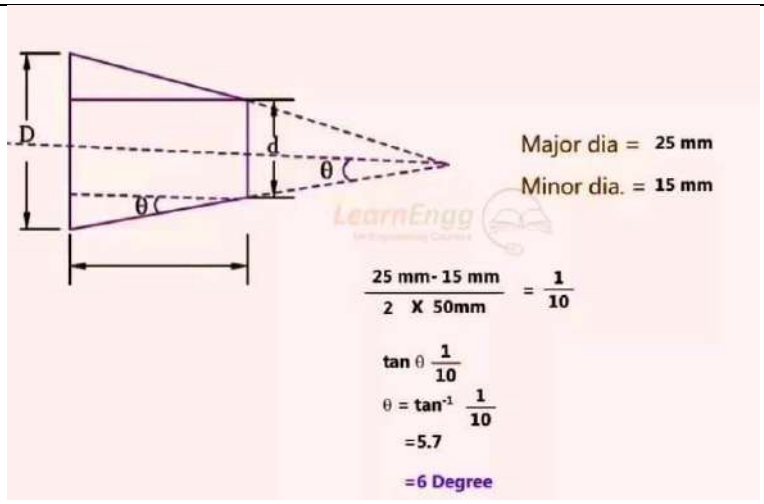


8. Take a rough cut by facing and turning the given object.



9. Take a rough cut by facing and turning the given object.

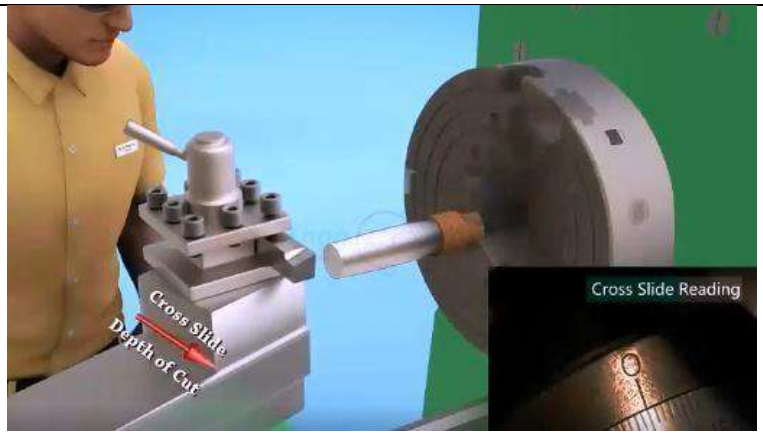
10. Calculate the taper angle



11. Compound rest base is swelled and setted half taper angel of 6 degree which is already calculated.

12. Touch the tool tip over the workpiece surface and set the depth of cut scale to zero.

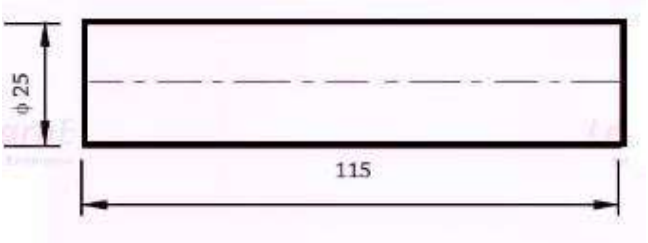
13. Now give the depth of cut 0.5mm each time through cross-slide till achieve the required minor diameter.

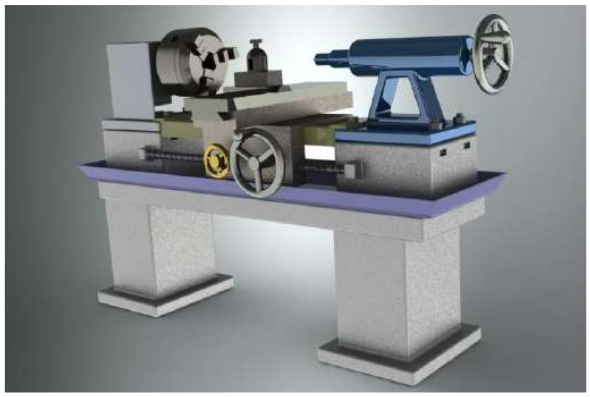
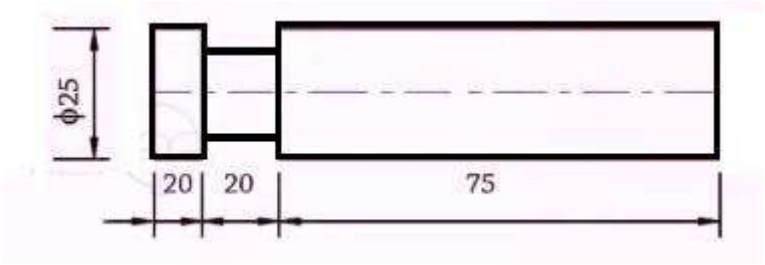


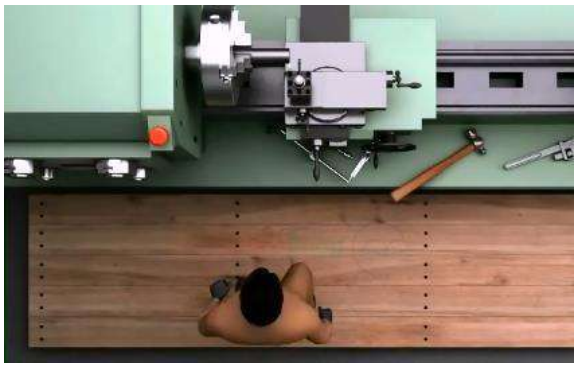
14. Give feed through Cutting tool by hand wheel of the compound rest moved at an angle to the lathe axis from right to left in stages.

SAFETY PRECAUTIONS	1. Before starting, check that the work piece, Tool Holder and Tail stock are firmly and properly clamped. 2. Do not wear loose clothes and wear the shoes, goggles, apron while working near the Machine.
ACCURACY OF FINISH	± 1.0 mm

NAME OF THE STUDENT SIGNATURE OF STAFF

NAME OF THE STUDENT		**PIN :**	**EXERCISE : 2.5**
MACHINE SHOP	**TITLE**	**Perform Collar operation on the given Lathe.**	
AIM	To Perform turning collars on the given job on a Lathe Machine.		
OUTCOMES	**The student shall be able to learn** a) Skill in centering the Job. b) Skill in uniform feeding of cutting Tool. c) Skill in fixing the cutting Tool. d) Practice collar Turning operation as specified in the sketch.		
SPECIFICATIONS OF WORK PIECE TO BE TAKEN	Mild Steel Rod : Diameter 25 mm x Length 115 mm. 		

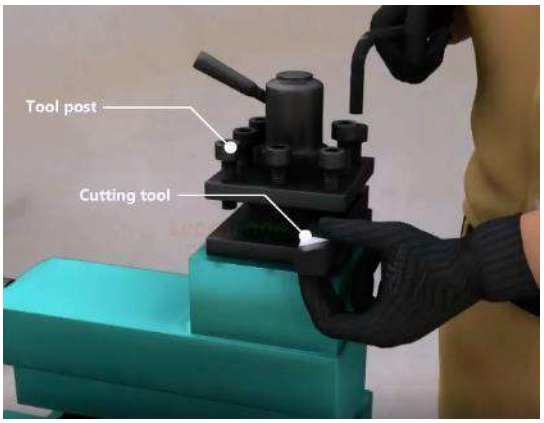
TOOLS AND EQUIPMENT	**Lathe Machine, Chuck key, Outside calliper, Steel Rule, Wrench, Surface Gauge, H.S.S single point cutting tool.**    
SKETCH OF FINISHED WORK-PIECE	
TASKS	1. Cut the work piece as per the specifications from the raw material with a hack saw. 2. Fix the Job in the chuck with the help of a chuck Key. 3. Align the job in the chuck by centering the rod using surface gauge. 4. Fix the Turning Tool in the Tool Post with the help of Spanner and correct the centre height. 5. Switch on the power supply to the lathe. 6. Face both ends of the given Work Piece to get the required length as shown in the sketch.

	7. Now fix the parting tool in the tool post and tightens the nuts of tool using spanner. 8. Touch the left face of the parting tool over the faced surface. 9. Move the tool 20 mm plus parting tool thickness towards the chuck and mark the line. 10. Touch the tool tip over the work piece surface and set the depth of cut scale to zero. 11. Now give the depth of cut "0". 12. 5 mm each time through cross slide till achieve the required minor diameter. 13. Give feed through cutting tool by hand wheel of the carriage moved towards chuck from right to left in stages. 14. Repeat the above procedure and achieve the work piece speciation as per the final drawing. 15. While doing the work, check the diameter of the job with an outside calliper. 16. Switch off the power supply. 17. Remove the finished work piece from the chuck.
WORKING PROCEEDURE	1. Wear all the safely equipment's like goggles, gloves, safety shoes, safely helmets.  2. Check for any circumstances for any abstraction to perform the work  3. The given work piece is checked for its dimensions

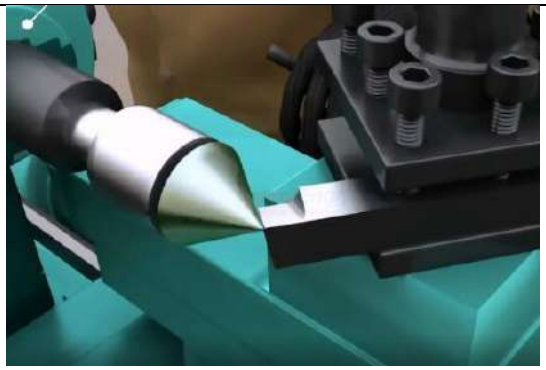
4. For turning purpose, take an excess length of workpiece.

5. The work piece is held in the chuck, chuck key is used to tighten the work piece firmly, ensuring centering of the job.

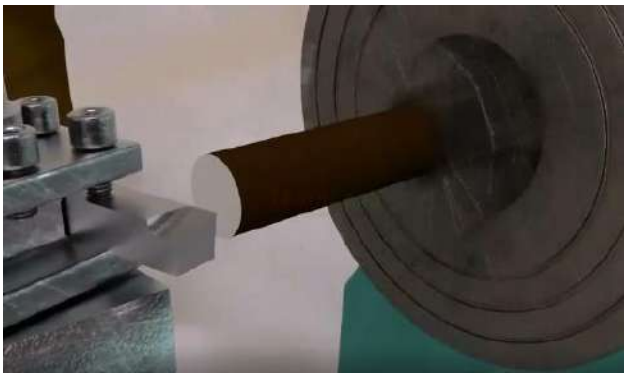
6. Place the single point cutting tool in tool post with the help of spanner.



7. Check the tool position with the dead centre in tailstock.

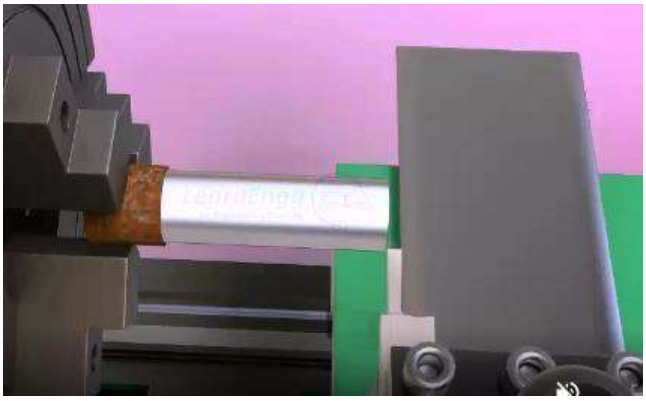


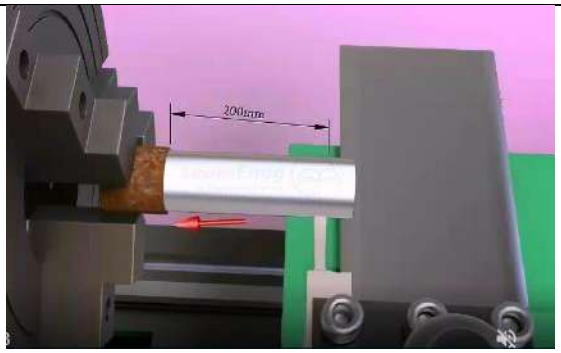
8. Take a rough cut by facing and turning the given object.



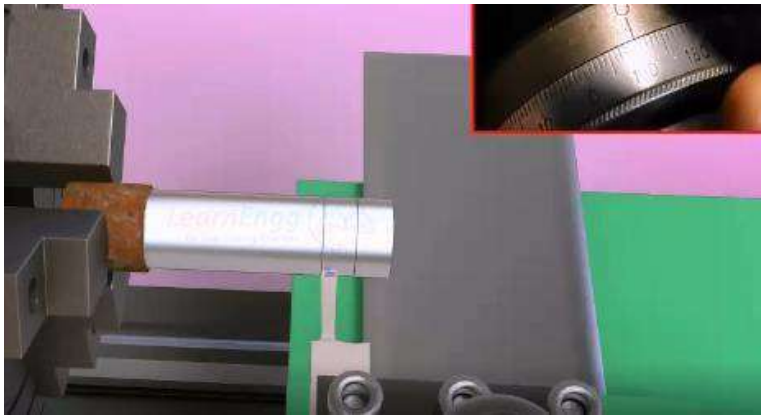
9. Take a rough cut by facing and turning the given object.

10. Move the tool 20mm minus parting tool thickness towards chuck and mark the line

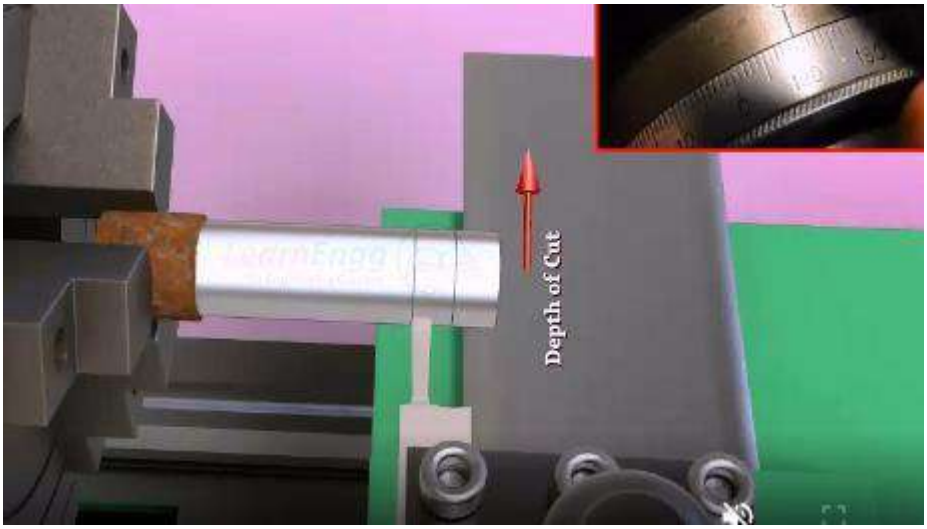




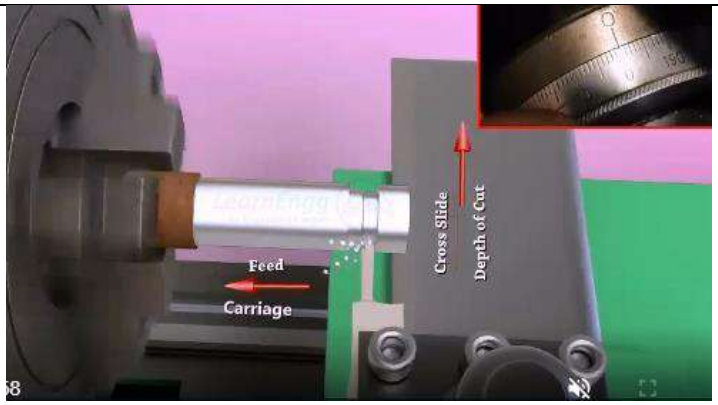
11. Touch the tool tip over the workpiece surface and set the depth of cut scale to zero.

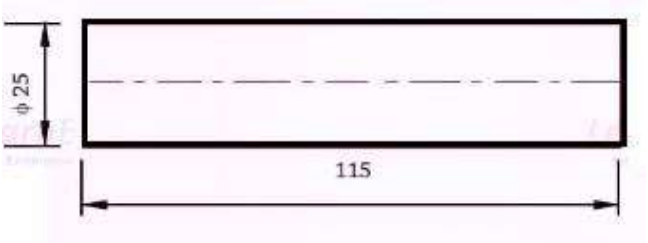


12. Now give the depth of cut 0.5mm each time through cross-slide till achieve the required minor diameter.

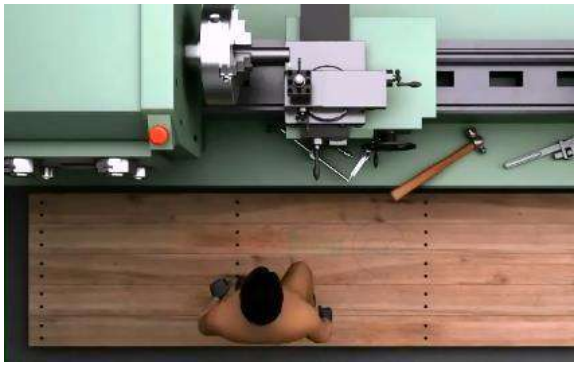


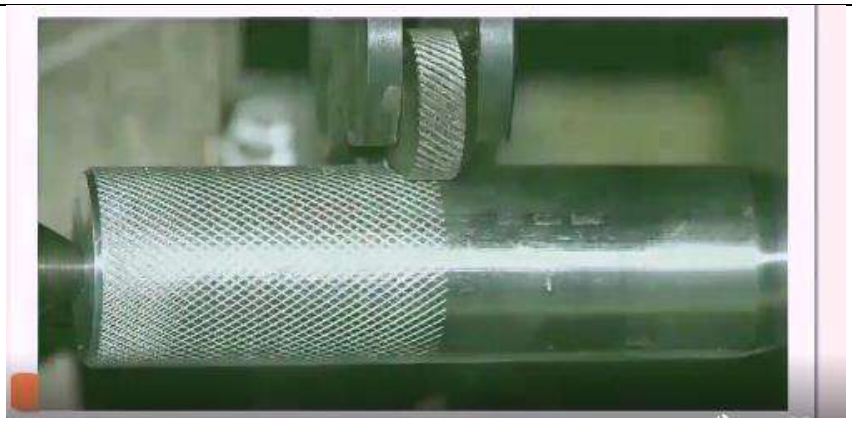
13. Give feed through Cutting tool by hand wheel of the carriage moved towards chuck from right to left in stages.

	
SAFETY PRECAUTIONS	1. Before starting, check that the work piece, Tool Holder and Tail stock are firmly and properly clamped. 2. Do not wear loose clothes and wear the shoes, goggles, apron while working near the Machine.
ACCURACY OF FINISH	± 1mm
NAME OF THE STUDENT	SIGNATURE OF STAFF

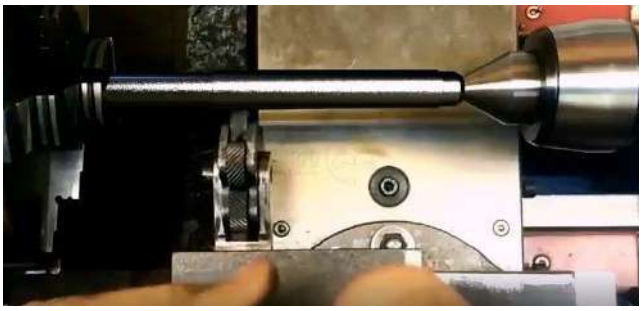
NAME OF THE STUDENT		**PIN :**	**EXERCISE : 2.6**
MACHINE SHOP	**TITLE**	**Perform Collar operation on the given Lathe.**	
AIM	To Perform knurling operation on the given job on a Lathe Machine.		
OUTCOMES	**The student shall be able to learn** a) Skill in centering the Job. b) Skill in uniform feeding of cutting Tool. c) Skill in fixing the cutting Tool. d) Practice knurling operation as specified in the sketch.		
SPECIFICATIONS OF WORK PIECE TO BE TAKEN	Mild Steel Rod : Diameter 25 mm x Length 115 mm. 		

TOOLS AND EQUIPMENT	**Lathe Machine, Chuck key, Outside calliper, Steel Rule, Wrench, Surface Gauge, H.S.S single point cutting tool.**    
SKETCH OF FINISHED WORK-PIECE	
TASKS	1. Cut the work piece as per the specifications from the raw material with a saw. 2. Fix the Job in the chuck with the help of a chuck Key. 3. Align the job in the chuck by centering the rod using surface gauge. 4. Fix the Turning Tool in the Tool Post with the help of Spanner and correct the centre height. 5. Switch on the power supply to the lathe. 6. Face both ends of the given Work Piece to get the required 7. Set the knurl tool holder on the tool post.

	8. Knurling is done by using knurling tool. 9. The knurling tool has a pair of rollers, with cross or diamond knurl pattern around their periphery. 10. Use coolant while performing operation. 11. Switch off the power supply. 12. Remove the finished work piece from the chuck.
WORKING PROCEEDURE	1. Wear all the safely equipment's like goggles, gloves, safety shoes, safely helmets.  2. Check for any circumstances for any abstraction to perform the work  3. The given work piece is checked for its dimensions, that is length is 120 mm and diameter is 30 mm  4. Set the knurl tool in knurl tool holder on the tool post

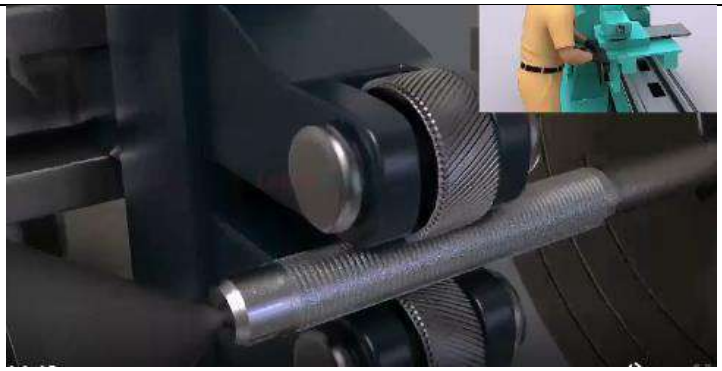


5. Generally knurling is done by the knuckle joint tool and revolving head knurling tool.



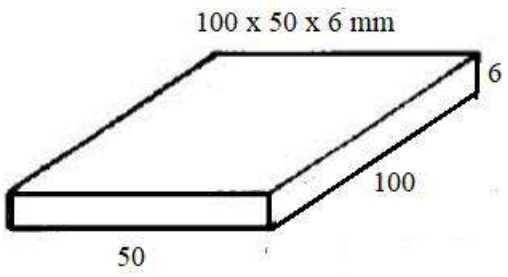
6. The Knuckle joint tool has a pair of rollers, cross or diamond knurl pattern can be produced.

7. Then perform the operation by the knuckle joint knuriling tool which consists of a set of hardened steel rollers in a holder with the teeth cut on their surface in a definite pattern.

	 
SAFETY PRECAUTIONS	1. Before starting, check that the work piece, Tool Holder and Tail stock are firmly and properly clamped. 2. Do not wear loose clothes and wear the shoes, goggles, apron while working near the Machine.
ACCURACY OF FINISH	± 0.5mm
NAME OF THE STUDENT	SIGNATURE OF STAFF

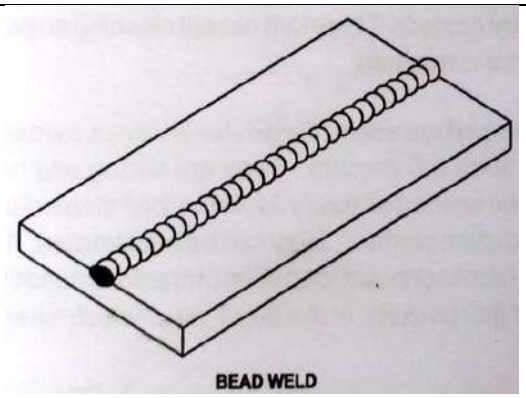
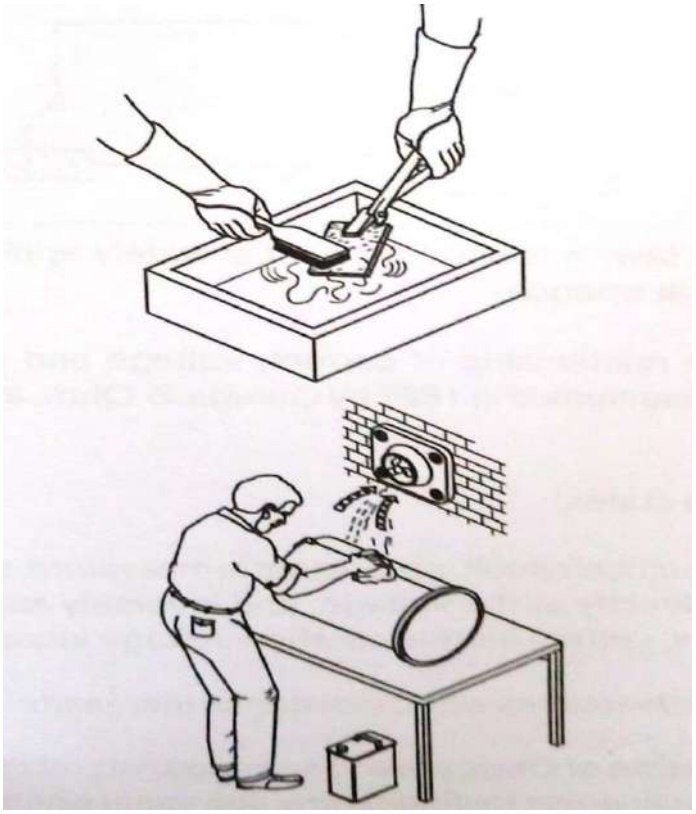
VIVA QUESTIONS – MACHINE SHOP – TURNING

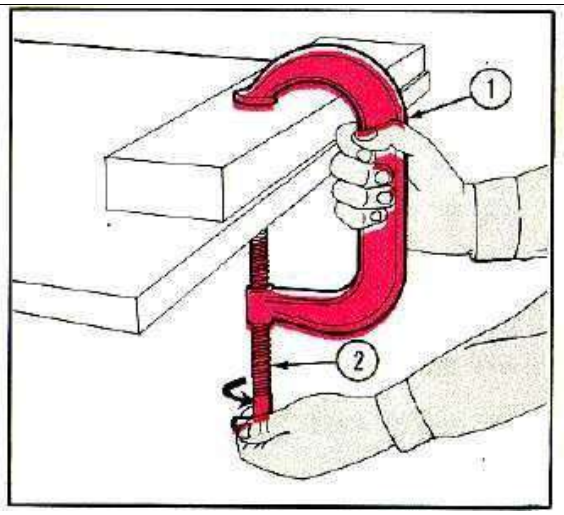
1. What is a lathe?
2. What are the various operations can be performed on a lathe?
3. What are principle parts of the lathe?
4. State the various parts mounted on the carriage?
5. What are the four types of tool post?
6. What is an apron?
7. State any two specification of lathe?
8. List any four types of lathe?
9. What is a semi-automatic lathe?
10. State the various feed mechanisms used for obtaining automatic feed?
11. List any four holding devices?
12. What are the different operations performed on the lathe?
13. What is the difference between speed and feed.
14. What is meant by taper turning
15. List out the different methods of taper turning
16. State the formula used for calculating taper angle for taper turning operation.
17. What is knurling
18. What is the difference between live center and dead center.
19. What is the function of chucks
20. List out different types of chucks.
21. How do you measure the diameter of work piece during turning operation.
22. What material is used for lathe bed.
23. What is the name of the cutting tool used for turning operation.
24. Which mechanism is used for threading operation.
25. What is the difference between turning and facing.

NAME OF THE STUDENT		PIN :	EXERCISE : 3.1
MACHINE SHOP	TITLE	**Perform beading operation on the given M.S Plate.**	
AIM	To make weld beads on the given M.S. plate by arc welding.		
OUTCOMES	**The student shall be able to learn** a) Decide the type of polarity connection required depending on the situation. b) Perform the arc weld bead on a given M.S. specimen.		
SPECIFICATIONS OF WORK PIECE TO BE TAKEN	Mild Steel Flat : Length 100 mm x Width 50 mm x Thickness 6 mm 		

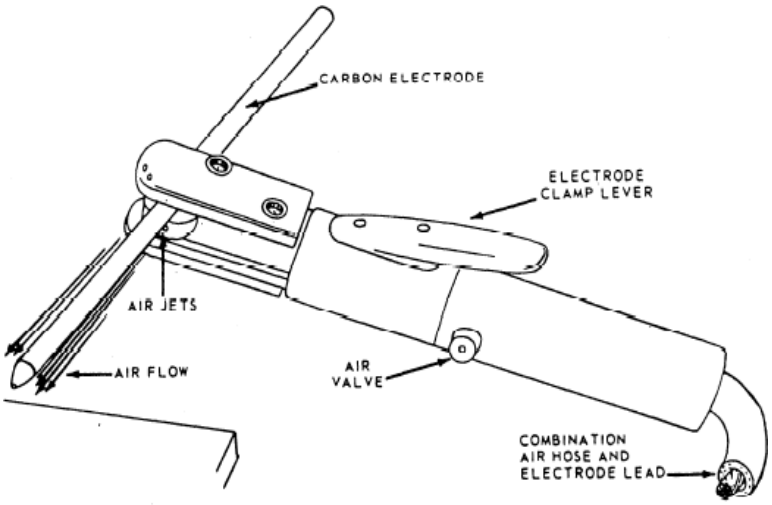
S No	Competency	Cognitive skills	Psychomotor Skills	Affective skills
1.	Weld a bead on a work piece	1. Knowing the relation between the work piece thickness and the amperage required. 2. Knowing the selection of electrode depending on the base material and work piece thickness.	1. Filing the work piece. 2. Fixing the electrode in the electrode holder. 3. Performing the welding 4. Removal of slag and cleaning.	1. Adopting procedural and safety precautions. 2. Maintain cleanliness. 3. Coordinating and communicating with fellow colleagues.

TOOLS , EQUIPMENT AND PROTECTION WEARABLES	**Arc Welding machine, Work table, Electrodes, M.S. Plate, Hand grinder, Chipping hammer, Wire brush, Face shield, Shoes, Goggles, Apron and Gloves.**  

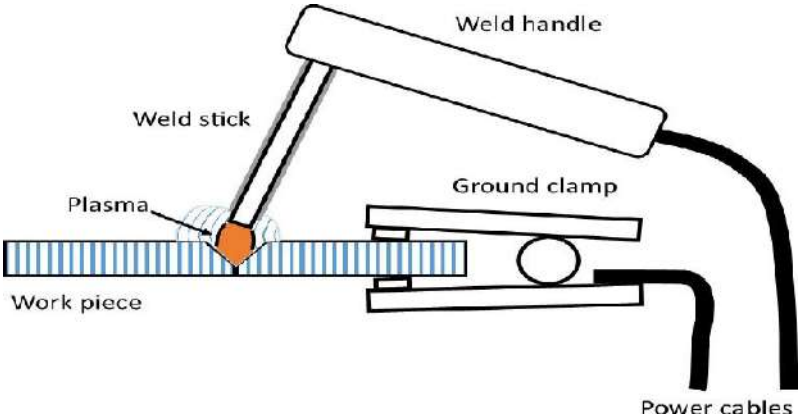
SKETCH OF FINISHED WORK-PIECE	
TASKS	1. The given M.S piece is thoroughly cleaned of rust and scale. 2. Fixing the work piece on the welding table with G-clamp. 3. The electrode is fitted in the electrode holder and the welding current is set to be a proper value. 4. The ground clamp is fastened to the welding table. 5. Wearing the apron and using the face shield, the arc is struck. 6. Move the electrode along the length of the work piece to form the bead. 7. The scale formation on the welds is removed by using the chipping hammer. 8. Clean the work piece with the wire brush.
WORKING PROCEEDURE	1. The given M.S piece is thoroughly cleaned of rust and scale.  2. Fixing the work piece on the welding table with G-clamp.



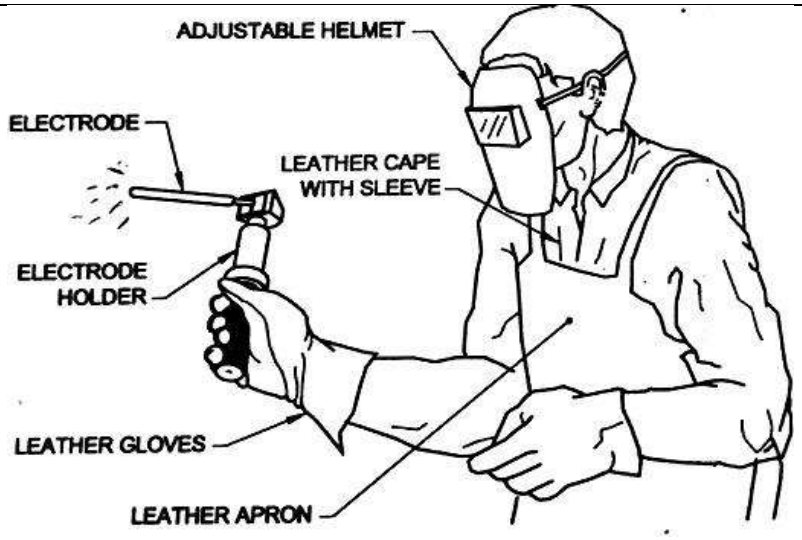
3. The electrode is fitted in the electrode holder and the welding current is set to be a proper value.



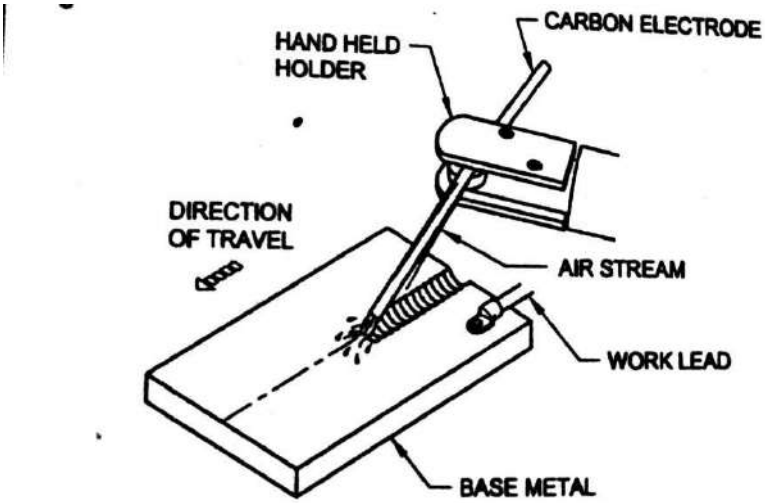
4. The ground clamp is fastened to the welding table.



5. Wearing the apron and using the face shield, the arc is struck.

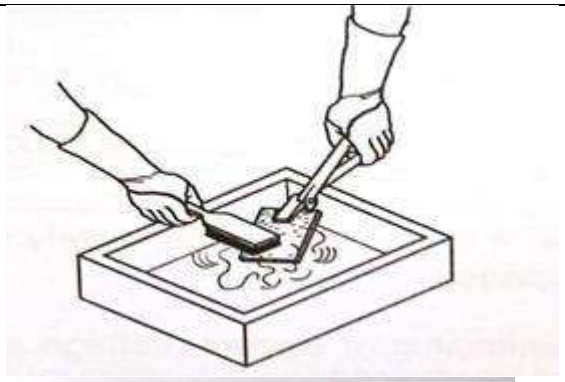
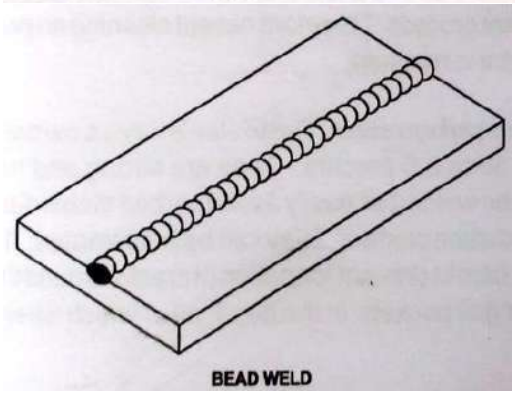


6. Move the electrode along the length of the work piece to form the bead.

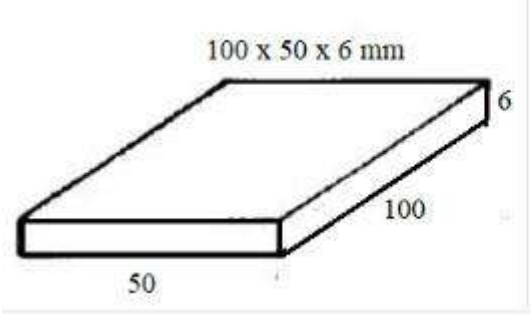


7. The scale formation on the welds is removed by using the chipping hammer.

8. Clean the work piece with the wire brush.

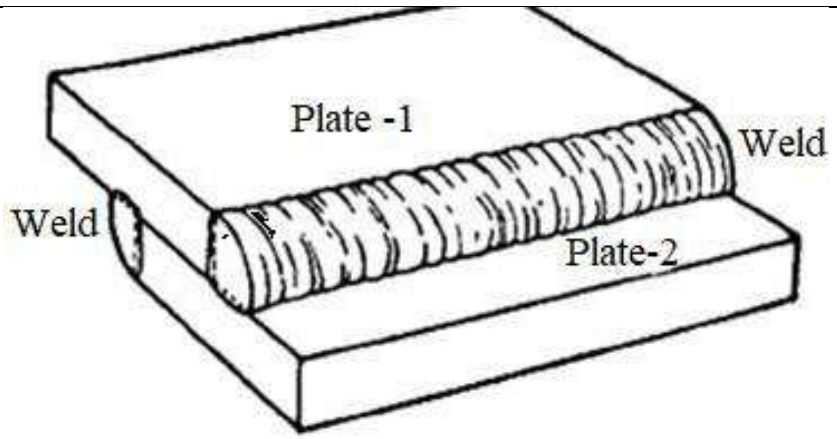
	 
SAFETY PRECAUTIONS	1. To prevent the electrical shocks: -Do not touch live electrical parts -Wear dry, hole-free insulating gloves and body protection -Insulate yourself from work and ground using dry insulating -When making input connections, attach proper grounding conductor first -Ground the work piece to a good electrical (earth) ground -Keep the welding equipment, work area and your gloves dry to avoid electric shocks. 2. Check workspaces and walkways to ensure no slip/trip hazards are present. 3. To protect against fumes and gases: - Keep your head out of the fumes, do not breathe the fumes -If inside, ventilate the area and/or use extractor at the arc to remove welding fumes and gases -Start the fume extraction unit before beginning to weld. 4. To protect against fire or explosion: -Protect yourself and others from flying sparks and hot metal -Do not weld where flying sparks can strike flammable material -Remove all flammables within 10m of the welding arc. 5. To protect against flying sparks and hot metal: -Wear approved face shield or safety goggles -Wear proper body protection to protect skin.

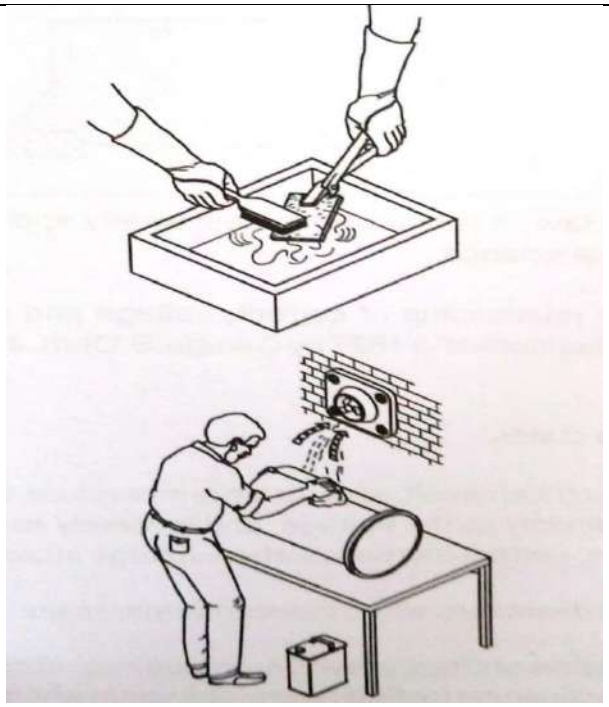
ACCURACY OF FINISH	± 1 mm
NAME OF THE STUDENT	SIGNATURE OF STAFF

NAME OF THE STUDENT		PIN :	EXERCISE : 3.2
MACHINE SHOP	TITLE	**Preparing of Lap Joint by using Arc Welding Machine.**	
AIM	To make a Lap joint, using the given two M.S plates with arc welding.		
OUTCOMES	**The student shall be able to learn** a) Decide the type of polarity connection required depending on the situation. b) Understand the lap joint and its application. c) Perform the arc weld on a given M.S. specimen.		
SPECIFICATIONS OF WORK PIECE TO BE TAKEN	Two Mild Steel Flats : Length 100 mm x Width 50 mm x Thickness 6 mm 		

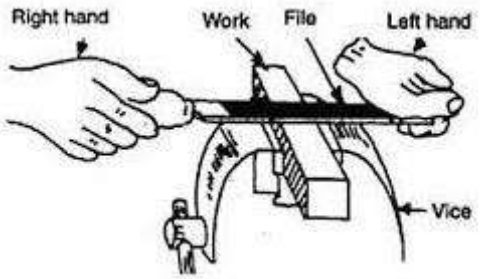
S No	Competency	Cognitive skills	Psychomotor Skills	Affective skills
1.	Weld a bead on a work piece	1. Lap joint and its applications 2. Knowing the relation between the work piece thickness and the amperage required. 3. Knowing the selection of electrode depending on the base material and work piece thickness.	1. Filing the work piece. 2. Fixing the electrode in the electrode holder. 3. Removal of blurs at the edges. 4. Performing the welding to complete lap joint 5. Removal of slag and cleaning.	1. Adopting procedural and safety precautions. 2. Maintain cleanliness. 3. Coordinating and communicating with fellow colleagues.

TOOLS , EQUIPMENT AND PROTECTION WEARABLES	**Arc Welding machine, Work table, Electrodes, M.S. Plate, Hand grinder, Chipping hammer, Wire brush, Face shield, Shoes, Goggles, Apron and Gloves.**  

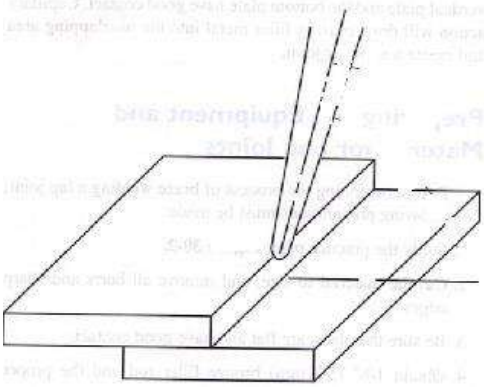
SKETCH OF FINISHED WORK-PIECE	
TASKS	1. The given two M.S pieces are thoroughly cleaned of rust and scale. 2. Remove the sharp corners and burrs by filing or grinding and prepare the work pieces. 3. The two pieces are positioned on the welding table such that, the two pieces overlapped one over the other. 4. The electrode is fitted in the electrode holder and the welding current is set to be a proper value. 5. The ground clamp is fastened to the welding table. 6. Wearing the apron, hand gloves, using the face shield and holding the over lapped pieces the arc is struck and the work pieces are tack-welded at the ends of both the sides. 7. The alignment of the lap joint is checked and the tack-welded pieces are reset, if required. 8. Welding is then carried out throughout the length of the lap joint, on both the sides. 9. The scale formed on the welds is removed by using the chipping hammer. 10. Clean the work piece with the wire brush.
WORKING PROCEEDURE	1. The given M.S pieces are thoroughly cleaned of rust and scale.



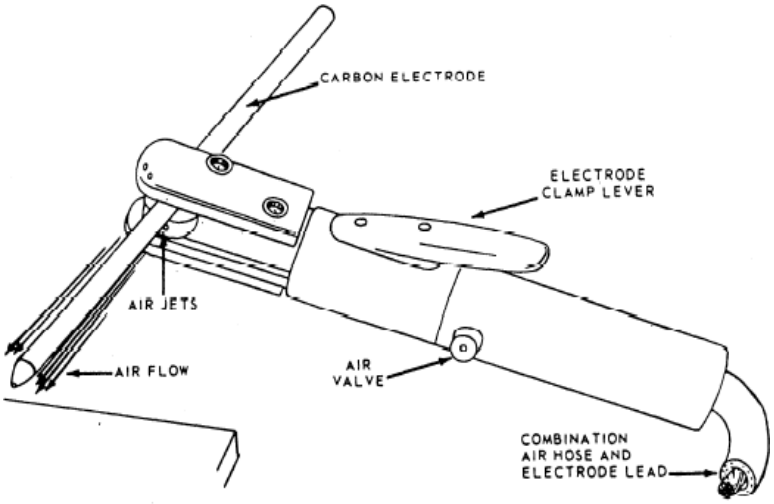
2. Remove the sharp corners and burrs by filing or grinding and prepare the work pieces.



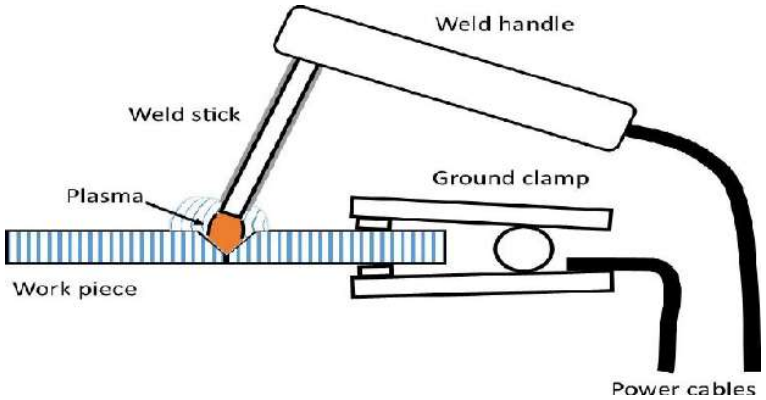
3. The two pieces are positioned on the welding table such that, the two pieces overlapped one over the other.



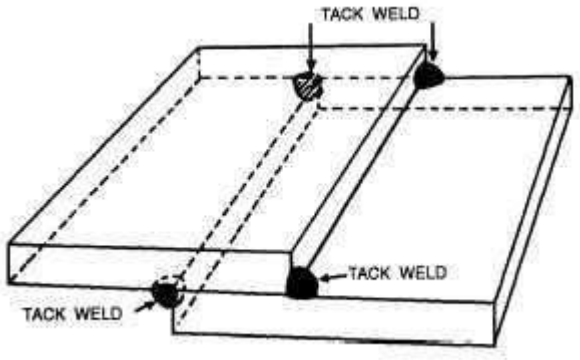
4. The electrode is fitted in the electrode holder and the welding current is set to be a proper value.

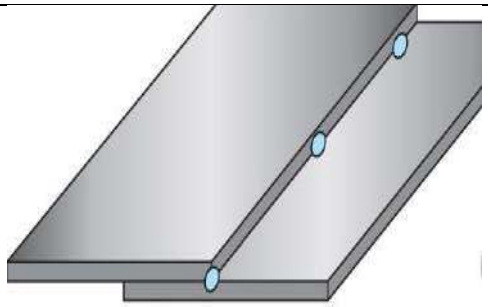


5. The ground clamp is fastened to the welding table.



6. Wearing the apron, hand gloves, using the face shield and holding the over lapped pieces the arc is struck and the work pieces are tack-welded at the ends of both the sides.

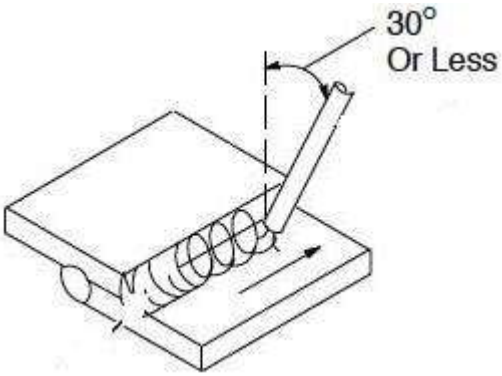




Tack welds on a lap joint

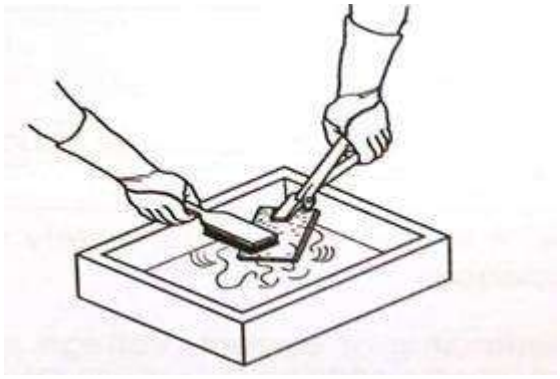
7. The alignment of the lap joint is checked and the tack-welded pieces are reset, if required.

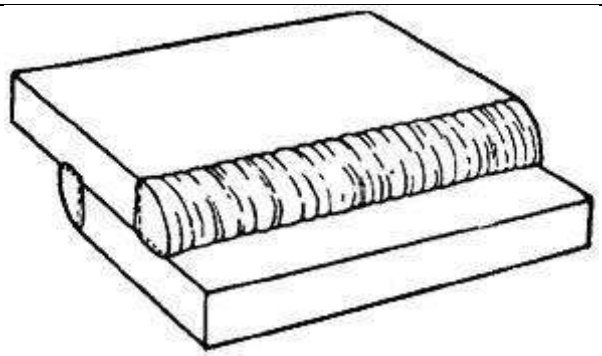
8. Welding is then carried out throughout the length of the lap joint, on both the sides.

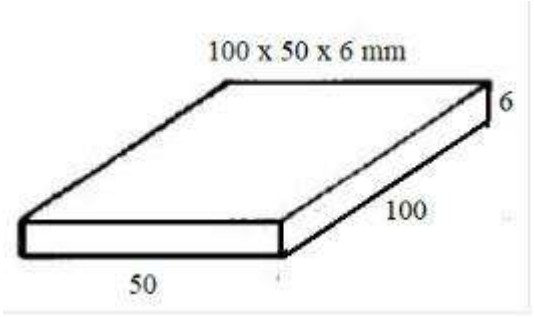
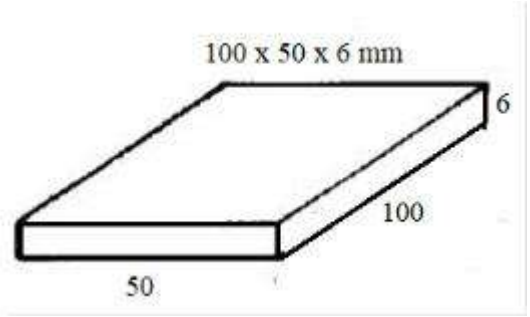


9. The scale formed on the welds is removed by using the chipping hammer.

10. Clean the work piece with the wire brush.

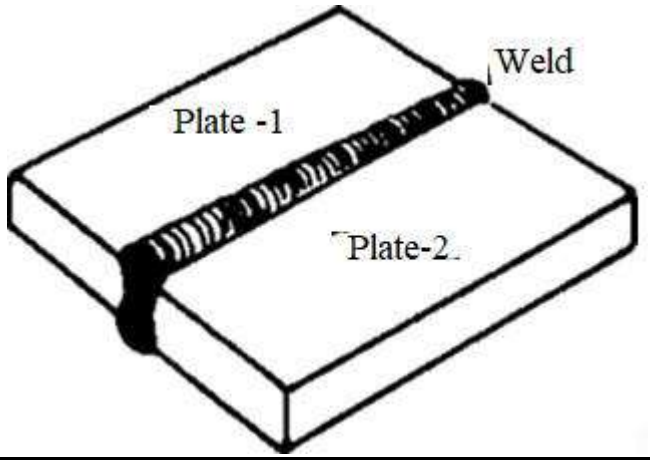
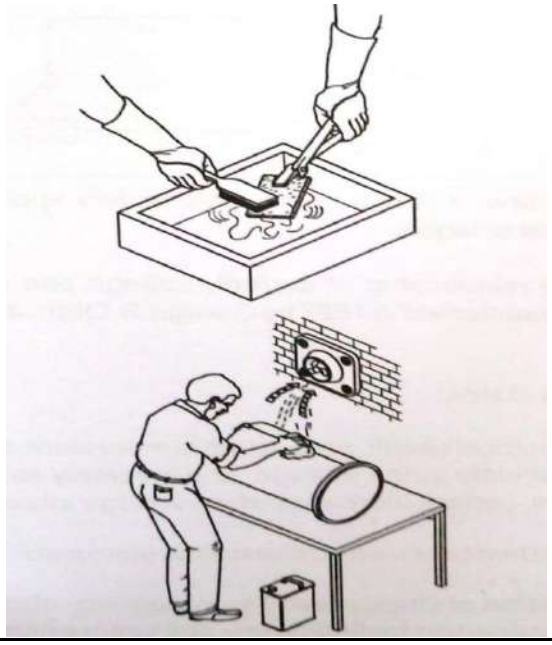


	
SAFETY PRECAUTIONS	1. To prevent the electrical shocks: -Do not touch live electrical parts -Wear dry, hole-free insulating gloves and body protection -Insulate yourself from work and ground using dry insulating -When making input connections, attach proper grounding conductor first -Ground the work piece to a good electrical (earth) ground -Keep the welding equipment, work area and your gloves dry to avoid electric shocks. 2. Check workspaces and walkways to ensure no slip/trip hazards are present. 3. To protect against fumes and gases: - Keep your head out of the fumes, do not breathe the fumes -If inside, ventilate the area and/or use extractor at the arc to remove welding fumes and gases -Start the fume extraction unit before beginning to weld. 4. To protect against fire or explosion: -Protect yourself and others from flying sparks and hot metal -Do not weld where flying sparks can strike flammable material -Remove all flammables within 10m of the welding arc. 5. To protect against flying sparks and hot metal: -Wear approved face shield or safety goggles -Wear proper body protection to protect skin.
ACCURACY OF FINISH	± 1.0 mm
NAME OF THE STUDENT	SIGNATURE OF STAFF

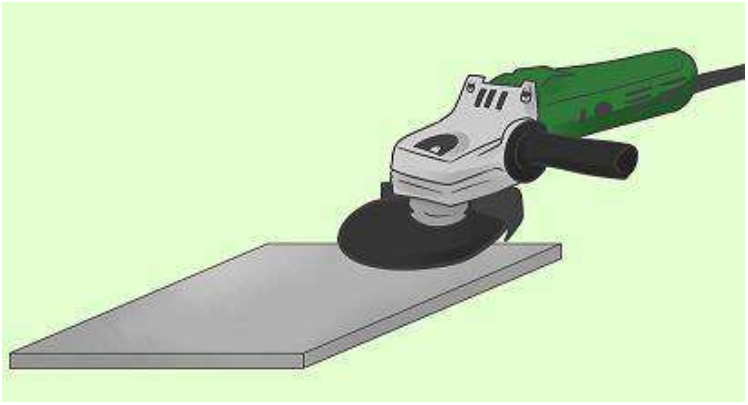
NAME OF THE STUDENT		PIN :	EXERCISE : 3.3
MACHINE SHOP	TITLE	**Preparing of Butt Joint by using Arc Welding Machine.**	
AIM	To make a Butt joint, using the given two M.S plates with arc welding.		
OUTCOMES	**The student shall be able to learn** a) Decide the type of polarity connection required depending on the situation. b) Understand the butt joint and its application. c) Perform the arc weld on a given M.S. specimen.		
SPECIFICATIONS OF WORK PIECE TO BE TAKEN	Two Mild Steel Flats : Length 100 mm x Width 50 mm x Thickness 6 mm  		

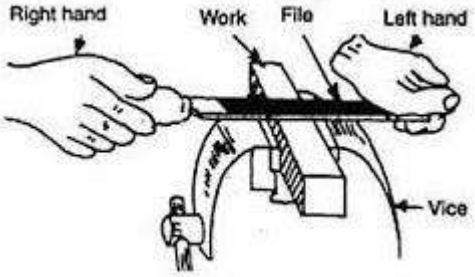
S No	Competency	Cognitive skills	Psychomotor Skills	Affective skills
1.	Weld a bead on a work piece	1. Butt joint and its applications 2. Knowing the relation between the work piece thickness and the amperage required. 3. Knowing the selection of electrode depending on the base material and work piece thickness.	1. Filing the work piece. 2. Fixing the electrode in the electrode holder. 3. Removal of blurs at the edges. 4. Performing the welding to complete butt joint 5. Removal of slag and cleaning.	1. Adopting procedural and safety precautions. 2. Maintain cleanliness. 3. Coordinating and communicating with fellow colleagues.

TOOLS , EQUIPMENT AND PROTECTION WEARABLES	**Arc Welding machine, Work table, Electrodes, M.S. Plate, Hand grinder, Chipping hammer, Wire brush, Face shield, Shoes, Goggles, Apron and Gloves.**  

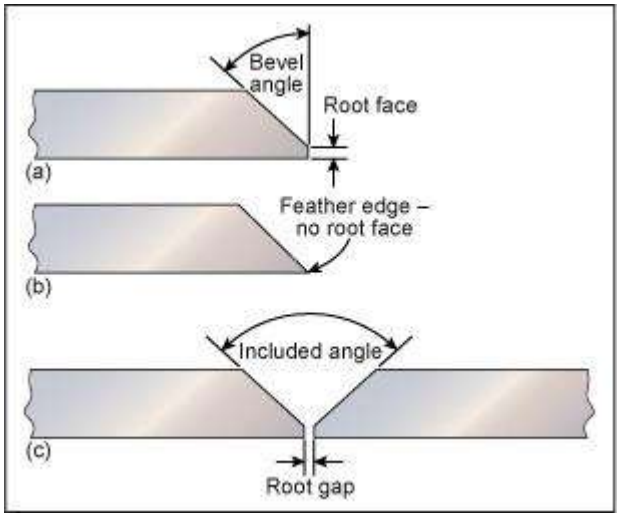
SKETCH OF FINISHED WORK-PIECE	
TASKS	1. The given two M.S pieces are thoroughly cleaned of rust and scale. 2. Remove the sharp corners and burrs by filing or grinding and prepare the work pieces. 3. Prepare the bevel edges for both the work pieces 4. The two pieces are positioned on the welding table such that, the two pieces overlapped one over the other. 5. The electrode is fitted in the electrode holder and the welding current is set to be a proper value. 6. The ground clamp is fastened to the welding table. 7. Turn the pieces over. 8. Wearing the apron, hand gloves, using the face shield and holding the pieces the arc is struck and the work pieces are tack-welded at the ends of both the sides. 9. Flip the metal pieces over to be welded. 10. Welding is then carried out throughout the length of the butt joint, on both the sides. 11. The scale formed on the welds is removed by using the chipping hammer. 12. Clean the work piece with the wire brush.
WORKING PROCEEDURE	1. The given M.S pieces are thoroughly cleaned of rust and scale. 

2. Remove the sharp corners and burrs by filing or grinding and prepare the work pieces.

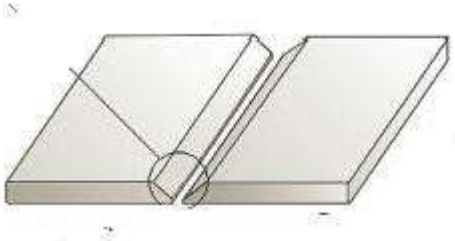




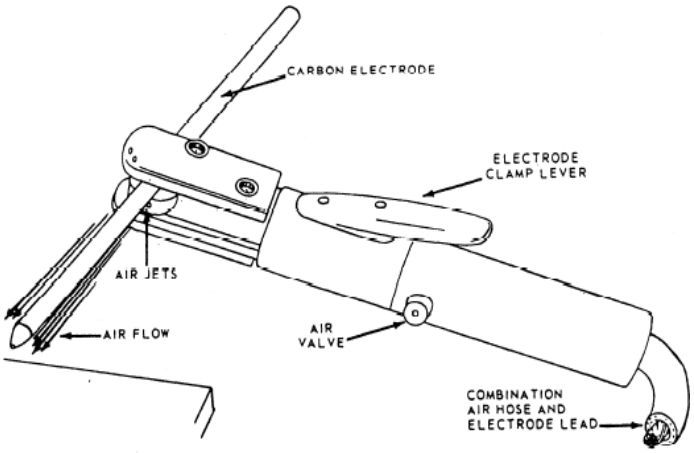
3. Prepare the bevel edges for both the work pieces



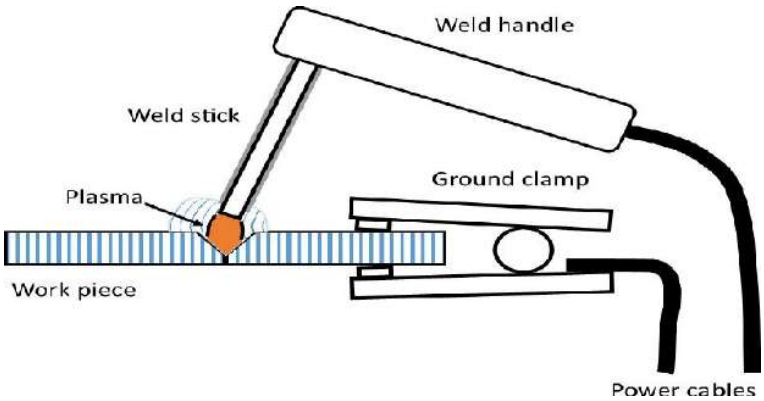
4. The two pieces are positioned on the welding table such that, the two pieces overlapped one over the other.



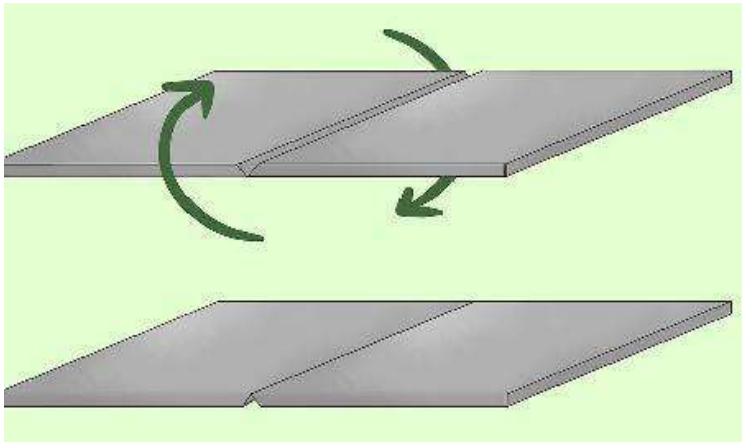
5. The electrode is fitted in the electrode holder and the welding current is set to be a proper value.



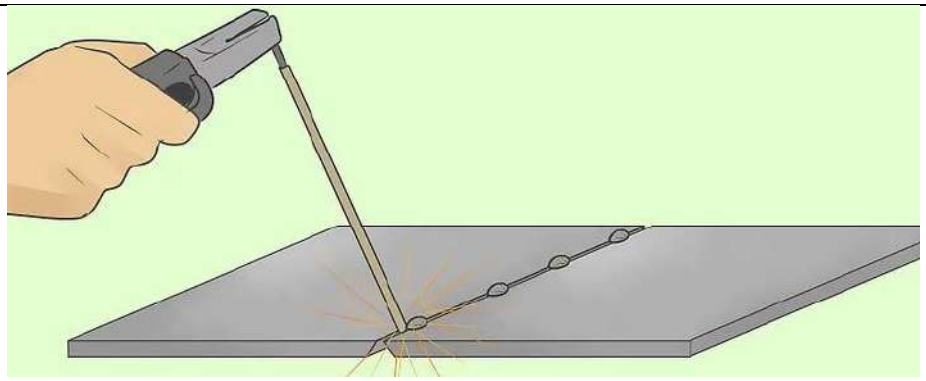
6. The ground clamp is fastened to the welding table.



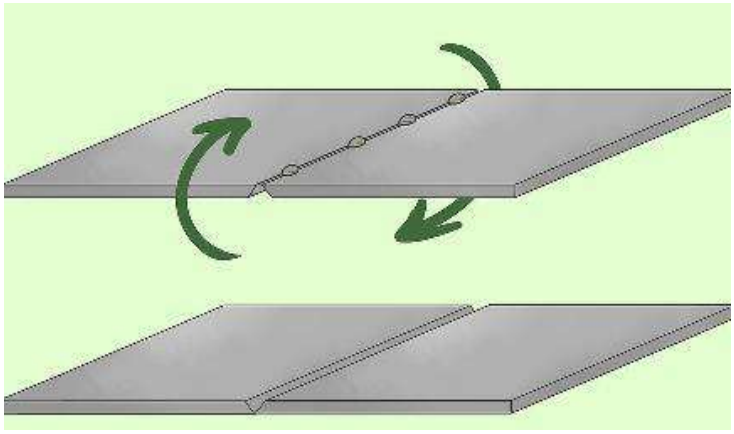
7. Turn the pieces over.



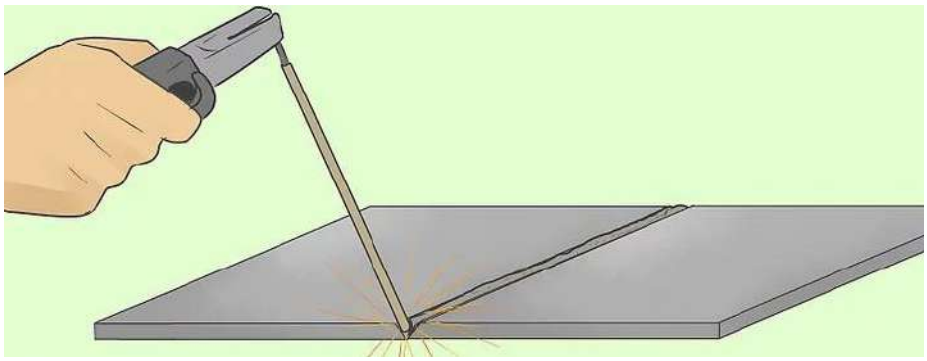
8. Wearing the apron, hand gloves, using the face shield and holding the pieces the arc is struck and the work pieces are tack-welded at the ends of both the sides.



9. Flip the metal pieces over to be welded.

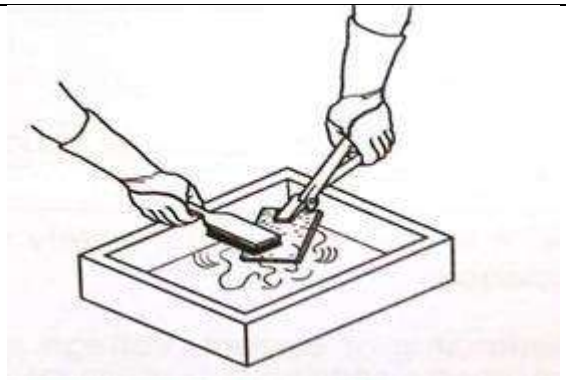


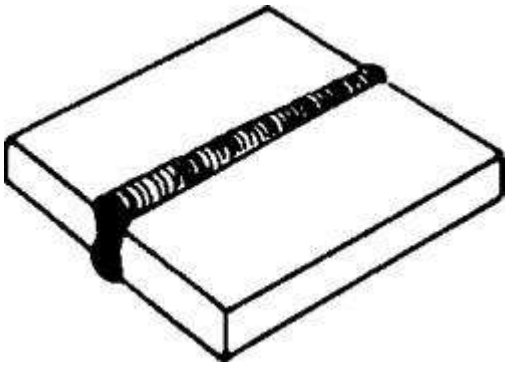
10. Welding is then carried out throughout the length of the butt joint, on both the sides.



11. The scale formed on the welds is removed by using the chipping hammer.

12. Clean the work piece with the wire brush.

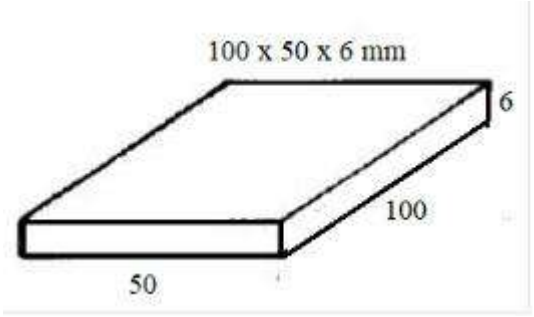




SAFETY PRECAUTIONS

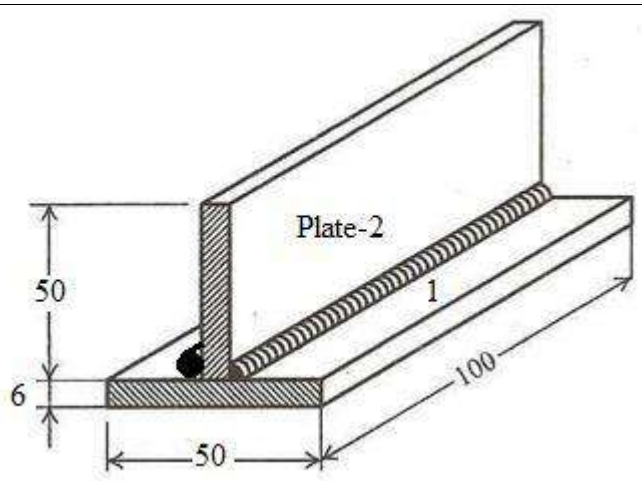
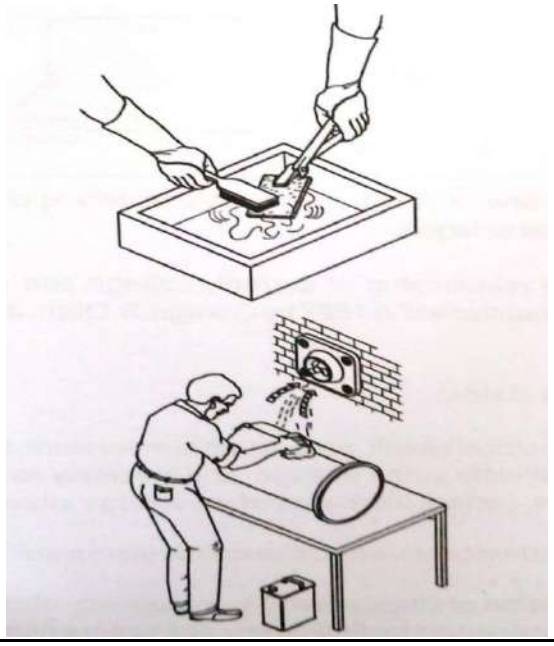
1. To prevent the electrical shocks:
   -Do not touch live electrical parts
   -Wear dry, hole-free insulating gloves and body protection
   -Insulate yourself from work and ground using dry insulating
   -When making input connections, attach proper grounding conductor first
   -Ground the work piece to a good electrical (earth) ground
   -Keep the welding equipment, work area and your gloves dry to avoid electric shocks.
2. Check workspaces and walkways to ensure no slip/trip hazards are present.
3. To protect against fumes and gases:
   - Keep your head out of the fumes, do not breathe the fumes
   -If inside, ventilate the area and/or use extractor at the arc to remove welding fumes and gases
   -Start the fume extraction unit before beginning to weld.
4. To protect against fire or explosion:
   -Protect yourself and others from flying sparks and hot metal

	-Do not weld where flying sparks can strike flammable material -Remove all flammables within 10m of the welding arc. 5. To protect against flying sparks and hot metal: -Wear approved face shield or safety goggles -Wear proper body protection to protect skin.
ACCURACY OF FINISH	± 1.0 mm
NAME OF THE STUDENT	SIGNATURE OF STAFF

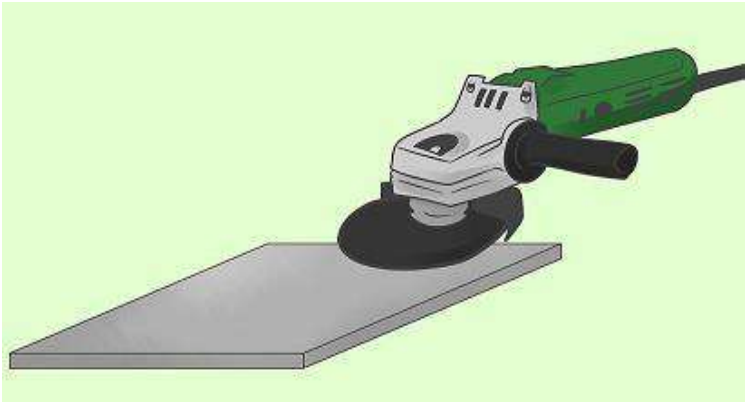
NAME OF THE STUDENT		PIN :	EXERCISE : 3.4
MACHINE SHOP	TITLE	**Preparing of T-Joint by using Arc Welding Machine.**	
AIM	To make a T-joint, using the given two M.S plates with arc welding.		
OUTCOMES	**The student shall be able to learn** a) Decide the type of polarity connection required depending on the situation. b) Understand the T- joint and its application. c) Perform the arc weld on a given M.S. specimens.		
SPECIFICATIONS OF WORK PIECE TO BE TAKEN	Two Mild Steel Flats : Length 100 mm x Width 50 mm x Thickness 6 mm 		

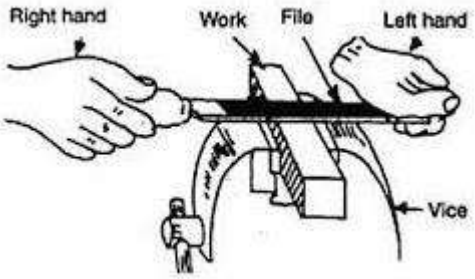
S No	Competency	Cognitive skills	Psychomotor Skills	Affective skills
1.	Weld a bead on a work piece	1. T- joint and its applications 2. Knowing the relation between the work piece thickness and the amperage required. 3. Knowing the selection of electrode depending on the base material and work piece thickness.	1. Filing the work piece. 2. Fixing the electrode in the electrode holder. 3. Removal of blurs at the edges. 4. Performing the welding to complete T- joint 5. Removal of slag and cleaning.	1. Adopting procedural and safety precautions. 2. Maintain cleanliness. 3. Coordinating and communicating with fellow colleagues.

TOOLS , EQUIPMENT AND PROTECTION WEARABLES	**Arc Welding machine, Work table, Electrodes, M.S. Plate, Hand grinder, Chipping hammer, Wire brush, Face shield, Shoes, Goggles, Apron and Gloves.**  

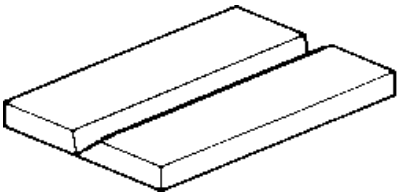
SKETCH OF FINISHED WORK-PIECE	
TASKS	1. The given two M.S pieces are thoroughly cleaned of rust and scale. 2. Remove the sharp corners and burrs by filing or grinding and prepare the work pieces. 3. The two pieces are positioned on the welding table such that, the two pieces are at right angles to the other as shown in the figure. 4. The electrode is fitted in the electrode holder and the welding current is set to be a proper value. 5. The ground clamp is fastened to the welding table. 6. Wearing the apron, hand gloves, using the face shield and holding the over lapped pieces the arc is struck and the work pieces are tack-welded at the ends of both the sides. 7. The alignment of the T- joint is checked and the tack-welded pieces are reset, if required. 8. Welding is then carried out throughout the length of the T- joint, on both the sides. 9. The scale formed on the welds is removed by using the chipping hammer. 10. Clean the work piece with the wire brush.
WORKING PROCEEDURE	1. The given two M.S pieces are thoroughly cleaned of rust and scale. 

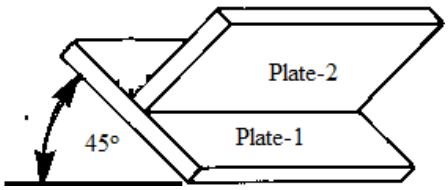
2. Remove the sharp corners and burrs by filing or grinding and prepare the work pieces.



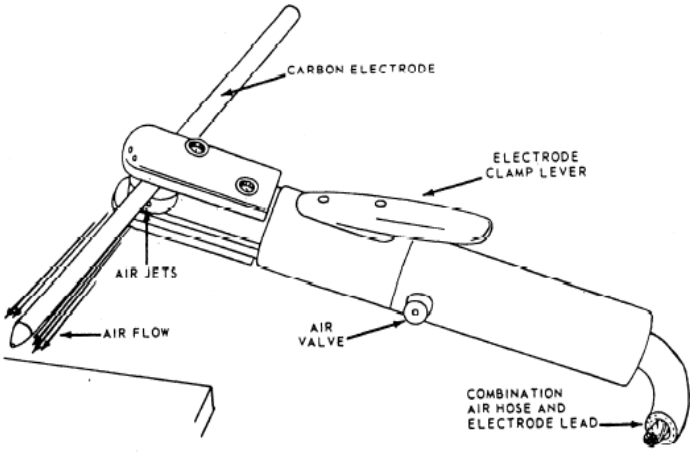


3. The two pieces are positioned on the welding table such that, the two pieces are at right angles to the other as shown in the figure.

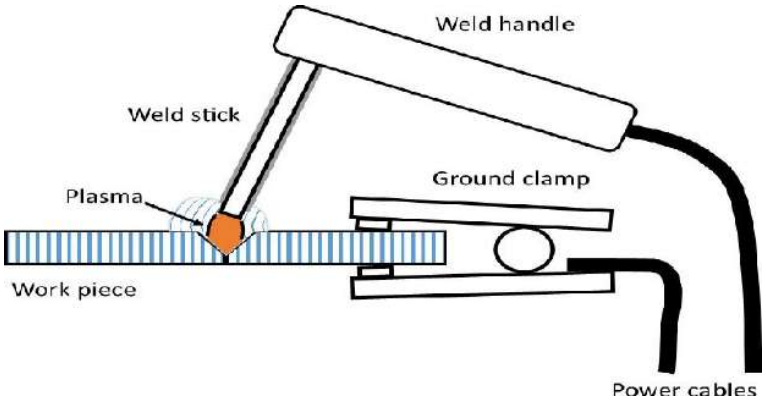




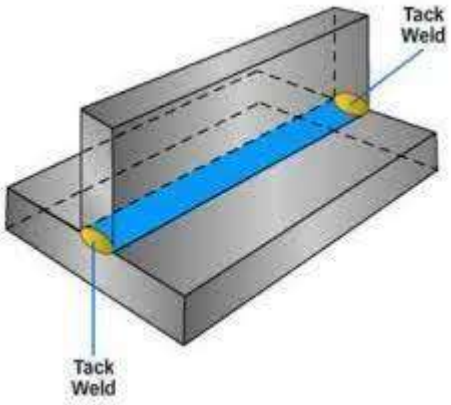
4. The electrode is fitted in the electrode holder and the welding current is set to be a proper value.



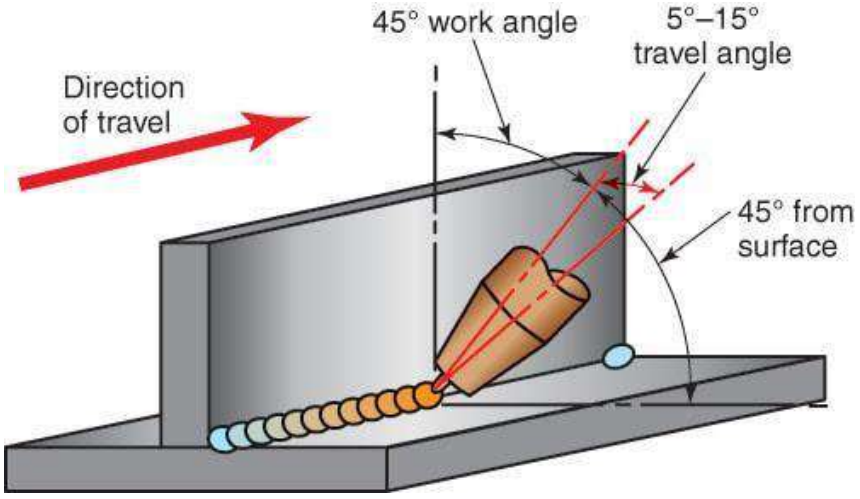
5. The ground clamp is fastened to the welding table.



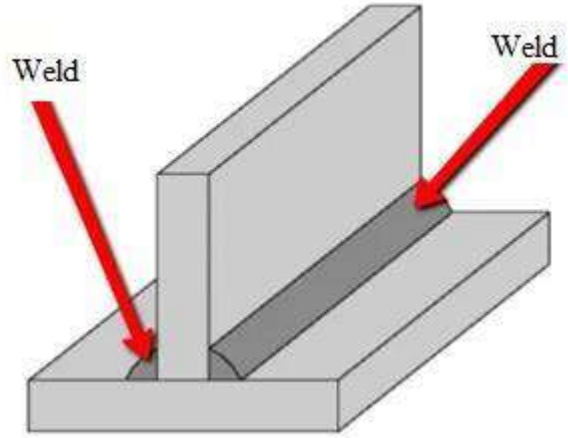
6. Wearing the apron, hand gloves, using the face shield and holding the pieces the arc is struck and the work pieces are tack-welded at the ends of both the sides.



7. Start welding as shown in the figure.

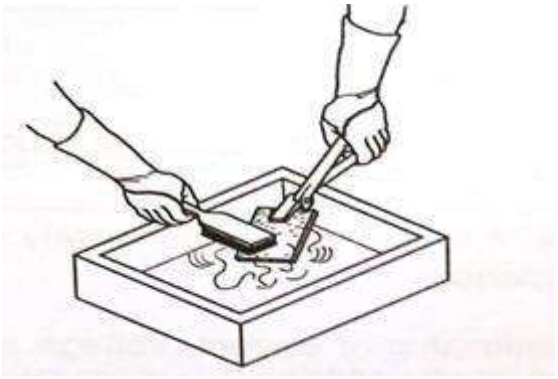


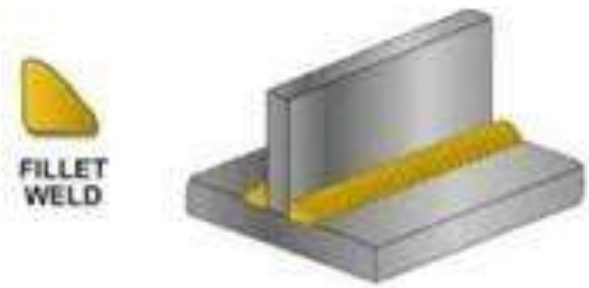
8. Welding is then carried out throughout the length of the joint, on both the sides.



9. The scale formed on the welds is removed by using the chipping hammer.

10. Clean the work piece with the wire brush.





SAFETY PRECAUTIONS	1. To prevent the electrical shocks: -Do not touch live electrical parts -Wear dry, hole-free insulating gloves and body protection -Insulate yourself from work and ground using dry insulating -When making input connections, attach proper grounding conductor first -Ground the work piece to a good electrical (earth) ground -Keep the welding equipment, work area and your gloves dry to avoid electric shocks. 2. Check workspaces and walkways to ensure no slip/trip hazards are present. 3. To protect against fumes and gases: - Keep your head out of the fumes, do not breathe the fumes -If inside, ventilate the area and/or use extractor at the arc to remove welding fumes and gases -Start the fume extraction unit before beginning to weld. 4. To protect against fire or explosion: -Protect yourself and others from flying sparks and hot metal -Do not weld where flying sparks can strike flammable material -Remove all flammables within 10m of the welding arc. 5. To protect against flying sparks and hot metal: -Wear approved face shield or safety goggles -Wear proper body protection to protect skin.
ACCURACY OF FINISH	± 1.0 mm
NAME OF THE STUDENT	SIGNATURE OF STAFF

VIVA QUESTIONS - WELDING

1. **Define welding. List out its uses.**
2. **What are the types of welding? Give examples.**
3. **What is arc welding?**
4. What is a bead in welding
5. What are the five essential tools and equipment in arc welding?
6. What is the temperature of arc in case of arc welding?
7. In arc welding, what is the order of arc initiation voltage
8. How much gap is to be maintained between electrode and work piece for producing sound weld
9. Name the equipment and tools used in welding.
10. How arc is produced in arc welding.
11. State the welding process which uses non-consumable electrode?
12. In arc welding, name the elements to be controlled to obtain satisfactory welding operation.
13. What is effect of using high current during welding process
14. What is the effect of using low current during welding process
15. What is the difference between welding transformer and welding generator?
16. How do you remove the slag formed on weld bead?
17. List out different types of electrodes used in welding.
18. What is the difference between consumable and non-consumable electrodes?
19. Name the welding processes which used non-consumable electrode.
20. What are the different types of arc welding?
21. What is the length of arc generally?
22. How do you maintain arc length?
23. Which power source is used in arc welding?
24. What is the difference between arc welding and gas welding
25. What are the different types of welding joints?
26. What is the arc travel speed?

Length Units

Millimeters	Centimeters	Meters	Kilometers	Inches	Feet	Yards	Miles
mm	cm	m	km	in	ft	yd	mi
1	0.1	0.001	0.000001	0.03937	0.003281	0.001094	6.21e-07
10	1	0.01	0.00001	0.393701	0.032808	0.010936	0.000006
1000	100	1	0.001	39.37008	3.28084	1.093613	0.000621
1000000	100000	1000	1	39370.08	3280.84	1093.613	0.621371
25.4	2.54	0.0254	0.000025	1	0.083333	0.027778	0.000016
304.8	30.48	0.3048	0.000305	12	1	0.333333	0.000189
914.4	91.44	0.9144	0.000914	36	3	1	0.000568
1609344	160934.4	1609.344	1.609344	63360	5280	1760	1

Area Units

Millimeter square	Centimeter square	Meter square	Inch square	Foot square	Yard square
mm^2	cm^2	m^2	in^2	ft^2	yd^2
1	0.01	0.000001	0.00155	0.000011	0.000001
100	1	0.0001	0.155	0.001076	0.00012
1000000	10000	1	1550.003	10.76391	1.19599
645.16	6.4516	0.000645	1	0.006944	0.000772
92903	929.0304	0.092903	144	1	0.111111
836127	8361.274	0.836127	1296	9	1

Volume Units

Centimeter cube	Meter cube	Liter	Inch cube	Foot cube	US gallons	Imperial gallons	US barrel (oil)
cm^3	m^3	ltr	in^3	ft^3	US gal	Imp. gal	US brl
1	0.000001	0.001	0.061024	0.000035	0.000264	0.00022	0.000006
1000000	1	1000	61024	35	264	220	6.29
1000	0.001	1	61	0.035	0.264201	0.22	0.00629
16.4	0.000016	0.016387	1	0.000579	0.004329	0.003605	0.000103
28317	0.028317	28.31685	1728	1	7.481333	6.229712	0.178127
3785	0.003785	3.79	231	0.13	1	0.832701	0.02381
4545	0.004545	4.55	277	0.16	1.20	1	0.028593
158970	0.15897	159	9701	6	42	35	1

Mass Units

Grams	Kilograms	Metric tonnes	Short ton	Long ton	Pounds	Ounces
g	kg	tonne	shton	Lton	lb	oz
1	0.001	0.000001	0.000001	9.84e-07	0.002205	0.035273
1000	1	0.001	0.001102	0.000984	2.204586	35.27337
1000000	1000	1	1.102293	0.984252	2204.586	35273.37
907200	907.2	0.9072	1	0.892913	2000	32000
1016000	1016	1.016	1.119929	1	2239.859	35837.74
453.6	0.4536	0.000454	0.0005	0.000446	1	16
28	0.02835	0.000028	0.000031	0.000028	0.0625	1

Density Units

Gram/milliliter	Kilogram/meter cube	Pound/foot cube	Pound/inch cube
g/ml	kg/m^3	lb/ft^3	lb/in^3
1	1000	62.42197	0.036127
0.001	1	0.062422	0.000036
0.01602	16.02	1	0.000579
27.68	27680	1727.84	1

Volumetric Liquid Flow Units

Liter/second	Liter/minute	Meter cube/hour	Foot cube/minute	Foot cube/hour	US gallons/minute	US barrels (oil)/day
L/sec	L/min	M^3/hr	ft^3/min	ft^3/hr	gal/min	US brl/d
1	60	3.6	2.119093	127.1197	15.85037	543.4783
0.016666	1	0.06	0.035317	2.118577	0.264162	9.057609
0.277778	16.6667	1	0.588637	35.31102	4.40288	150.9661
0.4719	28.31513	1.69884	1	60	7.479791	256.4674
0.007867	0.472015	0.02832	0.01667	1	0.124689	4.275326
0.06309	3.785551	0.227124	0.133694	8.019983	1	34.28804
0.00184	0.110404	0.006624	0.003899	0.2339	0.029165	1

Volumetric Gas Flow Units

Normal meter cube/hour	Standard cubic feet/hour	Standard cubic feet/minute
Nm^3/hr	scfh	scfm
1	35.31073	0.588582
0.02832	1	0.016669
1.699	59.99294	1

Mass Flow Units

Kilogram/hour	Pound/hour	Kilogram/second	Ton/hour
kg/h	lb/hour	kg/s	t/h
1	2.204586	0.000278	0.001
0.4536	1	0.000126	0.000454
3600	7936.508	1	3.6
1000	2204.586	0.277778	1

high Pressure Units

Bar	Pound/square inch	Kilopascal	Megapascal	Kilogram force/ centimeter square	Millimeter of mercury	Atmospheres
bar	psi	kPa	MPa	kgf/cm^2	mm Hg	atm
1	14.50326	100	0.1	1.01968	750.0188	0.987167
0.06895	1	6.895	0.006895	0.070307	51.71379	0.068065
0.01	0.1450	1	0.001	0.01020	7.5002	0.00987
10	145.03	1000	1	10.197	7500.2	9.8717
0.9807	14.22335	98.07	0.09807	1	735.5434	0.968115
0.001333	0.019337	0.13333	0.000133	0.00136	1	0.001316
1.013	14.69181	101.3	0.1013	1.032936	759.769	1

Low Pressure Units

Meter of water	Foot of water	Centimeter of mercury	Inches of mercury	Inches of water	Pascal
mH_2O	ftH_2O	cmHg	inHg	inH_2O	Pa
1	3.280696	7.356339	2.896043	39.36572	9806
0.304813	1	2.242311	0.882753	11.9992	2989
0.135937	0.445969	1	0.39368	5.351265	1333
0.345299	1.13282	2.540135	1	13.59293	3386
0.025403	0.083339	0.186872	0.073568	1	249.1
0.000102	0.000335	0.00075	0.000295	0.004014	1

Speed Units

Meter/second	Meter/minute	Kilometer/hour	Foot/second	Foot/minute	Miles/hour
m/s	m/min	km/h	ft/s	ft/min	mi/h
1	59.988	3.599712	3.28084	196.8504	2.237136
0.01667	1	0.060007	0.054692	3.281496	0.037293
0.2778	16.66467	1	0.911417	54.68504	0.621477
0.3048	18.28434	1.097192	1	60	0.681879
0.00508	0.304739	0.018287	0.016667	1	0.011365
0.447	26.81464	1.609071	1.466535	87.99213	1

Torque Units

Newton meter	Kilogram force meter	Foot pound	Inch pound
Nm	kgfm	ftlb	inlb
1	0.101972	0.737561	8.850732
9.80665	1	7.233003	86.79603
1.35582	0.138255	1	12
0.112985	0.011521	0.083333	1

Dynamic Viscosity Units

Centipoise*	Poise	Pound/foot·second
cp	poise	lb/(ft·s)
1	0.01	0.000672
100	1	0.067197
1488.16	14.8816	1

Kinematic Viscosity Units

Centistoke*	Stoke	Foot square/second	meter square/second
cs	St	ft^2/s	m^2/s
1	0.01	0.000011	0.000001
100	1	0.001076	0.0001
92903	929.03	1	0.092903
1000000	10000	10.76392	1

*note: centistokes x specific gravity = centipoise

Temperature Conversion Formulas

Degree Celsius (°C)	(°F - 32) x 5/9
	(K - 273.15)
Degree Fahrenheit (°F)	(°C x 9/5) + 32
	(1.8 x K) - 459.67
Kelvin (K)	(°C + 273.15)
	(°F + 459.67) ÷ 1.8

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REFERENCE BOOKS

1. A text book of welding Technology –Khanna O.P. DhanpathRai Publications
2. Principles of Foundry Technology by P L Jain (McGraw Hill)
3. Workshop Practice Vol- II by HajraChoudhury Media Promoters and Publishers Pvt Ltd.

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DIPLOMA PRACTICAL END EXAMINATIONS

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Duration : 03 hours UNIT TEST **– 1** Maximum Marks : 60

Note: Answer any one question from the following. Each question carries 60 Marks.

1	.	(a)	Draw the neat sketch of Lap weld joint in Arc welding.	06 M	CO3
		(b)	Identify the hand tools used for preparation of moulding preparation using solid bearing pattern.	20 M	CO1
		(c)	Prepare and observe skills required to perform plain turning operation on lathe machine.	28 M	CO2
		(d)	Viva voce.	06 M	
2	.	(a)	Draw the neat sketch of step turning.	06 M	CO2
		(b)	Prepare and observe skills of a weld bead on M S plate using arc welding. process.	20 M	CO3
		(c)	Prepare and observe skills of moulding preparation using flange coupling pattern in foundry .	28 M	CO1
		(d)	Viva voce.	06 M	
3	.	(a)	Draw the neat sketch of split bearing pattern..	06 M	C01
		(b)	Identify the tools and equipment for preparation of lap weld joint in arc welding..	20 M	CO3
		(c)	Prepare and observe skills required to perform taper turning operation on lathe machine.	28 M	CO2
		(d)	Viva voce	06 M	

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DIPLOMA PRACTICAL END EXAMINATIONS

C20 – M-311 – WORKSHOP PRACTICE- I

Duration : 03 hours UNIT TEST **– 1** Maximum Marks : 60

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DIPLOMA PRACTICAL END EXAMINATIONS

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Duration : 03 hours UNIT TEST **– 2** Maximum Marks : 60

Note: Answer any one question from the following. Each question carries 60 Marks.

1	.	(a)	Draw the neat sketch of Butt weld joint in Arc welding.	06 M	CO3
		(b)	Prepare and observe skills to perform turning collers operation on lathe machine.	20 M	CO2
		(c)	Prepare and observe skills of moulding preparation using connecting rod pattern in foundry.	28 M	CO1
		(d)	Viva voce.	06 M	
2	.	(a)	Draw the neat sketch of knurling diagram on MS rod..	06 M	CO2
		(b)	Identify the essential tools and equipment required for preparation of “T” weld joint in arc welding. process.	20 M	CO3
		(c)	Prepare and observe skills of moulding preparation using “V” pulley pattern in foundry.	28 M	CO1
		(d)	Viva voce.	06 M	
3	.	(a)	Draw the neat sketch of gear pulley pattern.	06 M	C01
		(b)	Prepare and observe skills required to perform facing operation on Lathe machine.	20 M	CO2
		(c)	Prepare and observe skills required for making “T” weld joint in Arc welding process.	28 M	CO3
		(d)	Viva voce	06 M	

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DIPLOMA PRACTICAL END EXAMINATIONS

C20 – M-311 – WORKSHOP PRACTICE- I

Duration : 03 hours **Formative Assessment** Maximum Marks : 60

Note: Answer any one question from the following. Each question carries 60 Marks.

1	.	(a)	Draw the neat sketch of Lap weld joint in Arc welding process.	06 M	CO3
		(b)	Identify the hand tools used for preparation of moulding process using solid bearing pattern in foundry.	20 M	CO1
		(c)	Prepare and observe skills required to perform plain turning operation on lathe machine.	28 M	CO2
		(d)	Viva voce	06 M	
2	.	(a)	Draw the neat sketch of step turning operation.	06 M	CO2
		(b)	Prepare and observe skills of weld bead on M S plate using arc welding process.	20 M	CO3
		(c)	Prepare and observe skills of moulding preparation using flange coupling pattern in foundry .	28 M	CO1
		(d)	Viva voce	06 M	
3	.	(a)	Draw the neat sketch of split bearing pattern.	06 M	C01
		(b)	Identify the tools and equipment required for preparation of lap weld joint in arc welding process.	20 M	CO3
		(c)	Prepare and observe skills required to perform tapper turning operation on lathe machine.	28 M	CO2
		(d)	Viva voce	06 M	
4	.	(a)	Draw the neat sketch of butt weld joint in Arc welding.	06 M	CO3
		(b)	Prepare and observe skills to perform turning collars operation on lathe machine.	20 M	CO2
		(c)	Prepare and observe skills for moulding preparation using connecting rod pattern in foundry.	28 M	CO1
		(d)	Viva voce	06 M	
5	.	(a)	Draw the neat sketch of knurling diagram on MS rod.	06 M	CO2
		(b)	Identify the essential tools and equipment required for preparation of “T” weld joint in Arc welding process.	24 M	CO3
		(c)	Prepare and observe skills of moulding preparation using ‘V’ pulley pattern in foundry.	30 M	CO1
		(d)	Viva voce	06 M	

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DIPLOMA PRACTICAL END EXAMINATIONS

C20 – M-311 – WORKSHOP PRACTICE- I

Duration : 03 hours **Formative Assessment** Maximum Marks : 60

6 .	(a)	Draw the neat sketch of gear pully pattern in foundry.	06 M	CO1
	(b)	Prepare and observe skills required to perform facing operation on lathe machine.	20 M	CO2
	(c)	Prepare and observe skills required for making “T” weld joint in arc welding process.	28 M	CO3
(d)	Viva voce		06 M	