

Expt. No. / Name:

WORK SHOP

MANUALS

MANUALS

1st YEAR

1st AND 2nd SEMESTER

ALL BRANCHES

CIVIL, ELECTRICAL, MECHANICAL,  
METALLURGICAL, COMPUTER SCIENCE

DIPLOMA  
WORK SHOP PRACTICE.

1 - TURNING

2 - FITTING

3 - SHEET METAL

4 - WELDING

TURNING

MECHANICAL

WORK SHOP PRACTICE  
FOR

ALL BRANCHES

(CIVIL, ELECTRICAL, MECHANICAL  
METALLURGICAL, COMPUTERSCIENCE)

DIPLOMA

## SYLLABUS

### JOB

9 - STEP TAPER PIN

ANSWERING CALLS

WASHING

1st JOB TAPER PIN (TURNING  
SHOP) page 1

Job: JOB-1

Job's name:- TAPER PIN

Material Required:- 110 mm. Length x 32 mm.

Tools & equipment Required:- centre lathe,  
Vernier calliper, Steel Rule, outside  
calliper, Scissors, H.S.S. Right hand -  
cutting tools, parting tools, V-tools (threading)  
Sand paper, file (flat, half round, triangular)

procedure:- At first study the  
drawing from the blackboard care-  
fully. Then cut the metal by the  
power saw according to given speci-  
fication. Then hold the job by  
the help of the chuck of the lathe  
machine. Then facing the metal  
by the right hand cutting tools. Then  
parallel turning operation done on the  
job and make the job diameter ~~as~~ according  
to the job fig. Then grooving operation  
done on the job by the grooving -  
tools according to the job fig.  
Then finishing operation done on the  
job by the help of flat file and sand  
paper. Then parting operation done on the

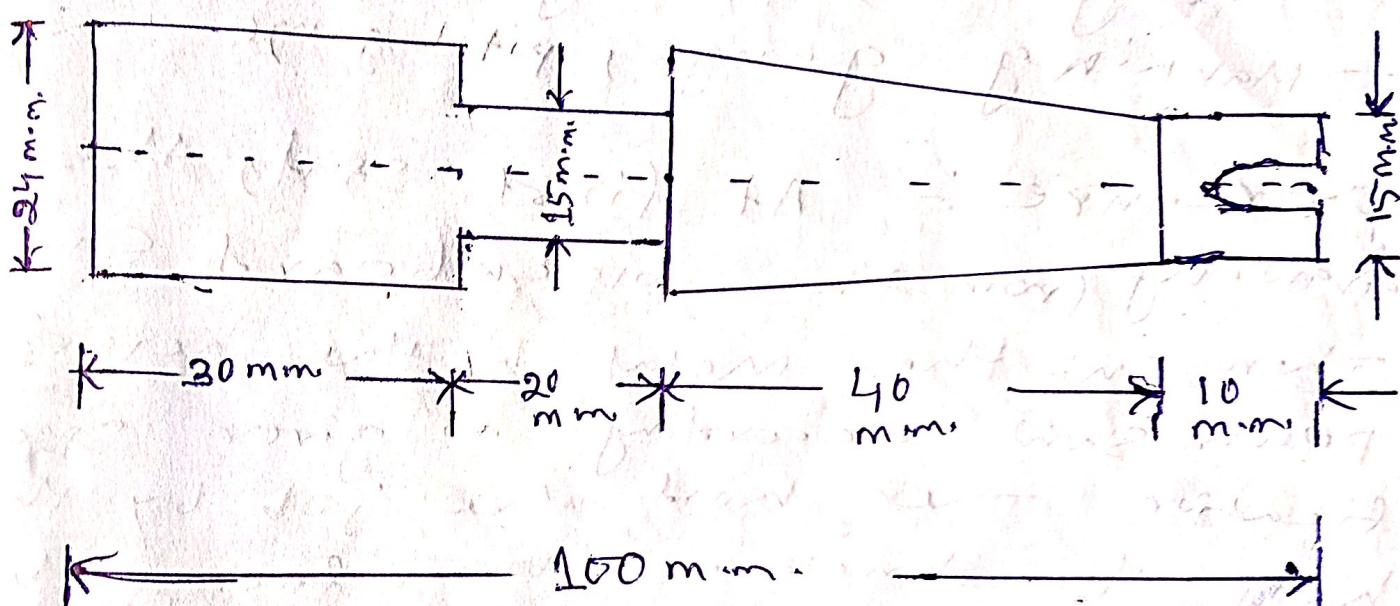
## Job figures

page 2

- precautions :-
- ① Don't start the machine without any instruction.
  - ② Don't touch the running parts by naked hand.
  - ③ maintain the ~~discipline~~ discipline when working in the workshop.

Job fig :-

### TAPER PIN



FITTING  
MECHANICAL  
WORK SHOP PRACTICE  
FOR  
ALL BRANCHES 1ST YEAR

( CIVIL, ELECTRICAL, MECHANICAL,  
METALLURGICAL, COMPUTER SCIENCE )

DIPLOMA

## SYLLABUS

### JOB

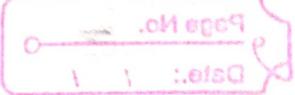
a - MALE AND FEMALE JOINT

b - STUD AND SQUARE NUT

Job-2.

Male & Female Joint

V' Shop



Page No. 1

Date: / /

Aim of the Job: To make a Male & Female joint (V Fit) from given Mild Steel flat.

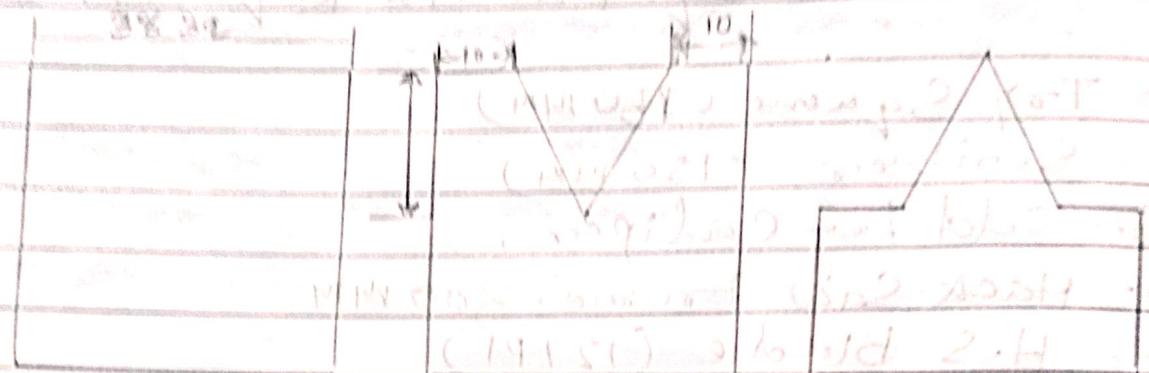
Raw Material Required:- Mild Steel flat size (40x40x6)mm-pcs 100 pieces.

Tools and Equipments Required:

- 1- Try Square (150 mm)
- 2- Scriber (150 mm)
- 3- Odd leg Caliper.
- 4- Hack Saw Frame - 300 MM
- 5- H.S Blade (12 TPI)
- 6- Rough File (300 mm)
- 7- Smooth File (300 mm)
- 8- Triangular File (150 mm)
- 9- Knife edge File (150 mm)
- 10- Dot Punch
- 11- Ball peen Hammer
- 12- Steel Rule

Sequence of operations:

- 1- Filling
- 2- Marking
- 3- punching
- 4- sawing/cutting
- 5- filling
- 6- finishing



### Procedure

- 1 - The given mild steel flat piece is checked for given dimensions for work.
- 2 - One edge as given is filed with rough and smooth files and checked having try square for straightness.
- 3 - An adjacent edge also filed such that it is square to first edge and checked with try square.
- 4 - Wet chalked is applied on one side of the flat and dried for marking.
- 5 - Lines are marked according to given figure, using odd leg caliper and steel rule.
- 6 - Using the dot punch, punches are made along with marked lines.
- 7 - The excess materials removed from the two edges with files.
- 8 - Finally burrs are removed by the

filling on the surface of the fitted job.

precautions, bad habit to have.

1- The perpendicularity of face ends edges is checked perfectly by using try square.

2- Finishing is given by using only smooth files.

3- Marking is done correctly.

Result -

The 'V' shape (fit) is done perfectly.

Aim: To make stud and square nut from given mild steel Rod and flat.

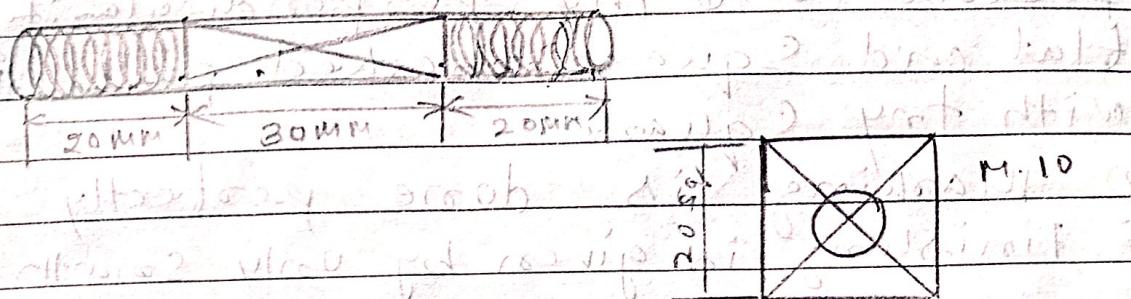
Raw Material Required: 70 mm length x 10 mm diameter and 26 x 20 x 6 mm M.S Flat.

### Tools and Equipment Required:

- 1- Try Square 100 mm
- 2- Steel Rule 150 mm
- 3- Scriber 150 mm
- 4- Punch
- 5- Hammer
- 6- Hack Saw Frame - 300 mm
- 7- H. S Blade (12 TPI)
- 8- Rough file - 200 mm
- 9- Smooth File - 200 mm
- 10- Stock Die Set. 10 mm
- 11- Taps Set. 10 mm
- 12- Twist drill 8.5 mm

### Sequence of Operation:-

- 1- Filling
- 2- Marking
- 3- Puncturing
- 4- cutting
- 5- Drilling
- 6- Tapping
- 7- Filling
- 8- Finishing



### Procedure:-

- 1- The given mild Steel Rod and Flat is checked for given dimension is for work
- 2- File the stud at both ends
- 3- Square the middle portion with files
- 4- Make external threads on both ends with help of die
- 5- Chamfer the both ends.
- 6- File the adjacent sides of the flat
- 7 wet chalk is applied on one side of the flat.
- 8- Marking is done on the metal
- 9- Using the dot punch, punches are made along with mark lines.
- 10- punch the centre for drilling.
- 11- Excess materials are removed from the flat with file
- 12- Drill hole is made on the centre
- 13- Make an internal thread on the centre with tongs.
- 14- Finally burrs are removed by the

Filing on the flat.

- Precaution -
- ① The perpendicularity of flat and square checked perfectly by with try square.
  - ② Marking is done perfectly.
  - ③ Finishing is given by only smooth files.

Result.

The stud and Square nut fit is done perfectly.

# SHEET METAL

MECHANICAL  
WORK SHOP PRACTICE

FOR  
ALL BRANCHES 1ST YEAR

( CIVIL, ELECTRICAL, MECHANICAL, METALLURGICAL,  
COMPUTER SCIENCE ENGG )

DIPLOMA

# SYLLABUS

## JOB

### a- TAPER TRAY

### b- FUNNEL

ALL BRANCHES

### TAPER TRAY

AIM:- To make a Taper Tray.

SIZE:- Depth- 30mm x length and wide- 210 mm square.

TOOLS REQUIRED:-

① Steel rule

② Try square

③ Divider

④ Scriber

⑤ Straight Snip

⑥ Mallet

⑦ Ball peen hammer

⑧ Hatchet stake, ⑨ Degree protector

RAW MATERIAL:- G.I. sheet 24 gauges. ⑩ Soldering iron

OPERATIONS:-

① Marking and measuring operation

② Cutting operation

③ Bending operation

PROCEDURE:-

① The size of the given sheet is checked with the steel rule.

② The layout of the tray is marked on the given sheet by steel rule, Try square and Degree protector and scriber.

③ Then mark the measurement and mark the development surface stretch the diagram.

④ The layout of the tray is cut by using the straight snip.

⑤ The four sides of the tray are bent to the required shape using hatchet stake and mallet.

⑥ The allowances on edges are folded to overlap each other and stuck with a mallet to get the required joints.

⑦ The joint is made on the four sides of the tray soldering or riveting.

SAFETY PRECAUTION:-

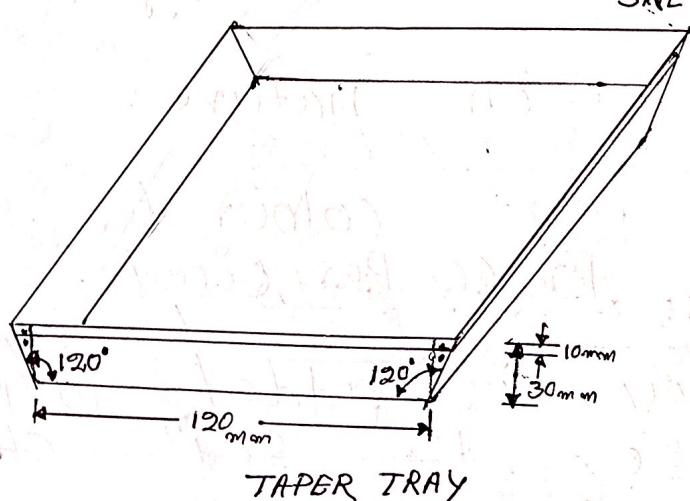
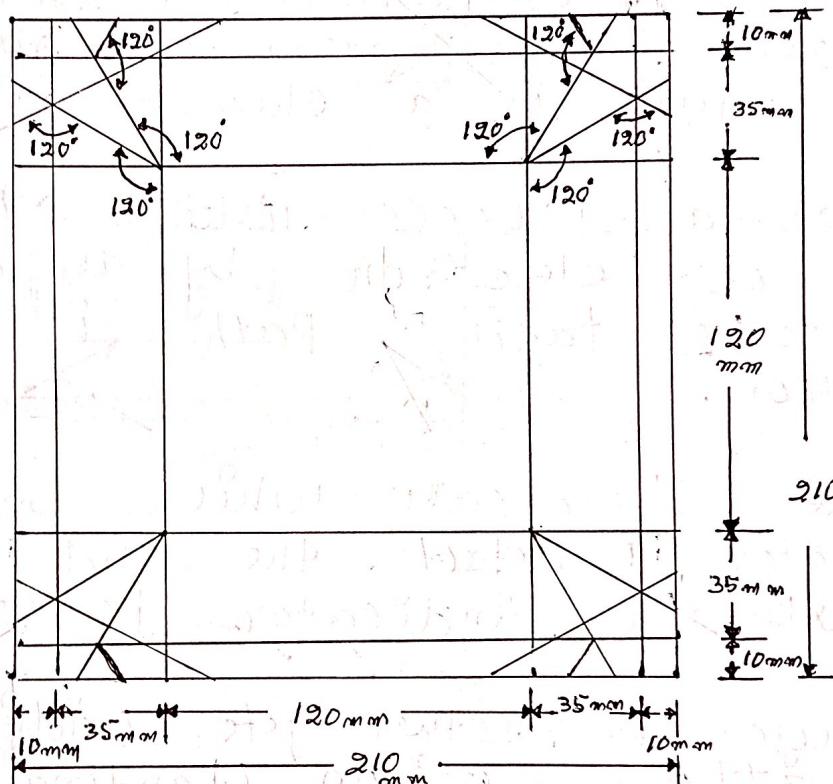
① Avoid feeling the cut portion by hand while cutting with snip.

② Do not let sheet metal slip through your hands. Most cuts from sheet metal results from allowing it to the sides through the hand.

③ Hand snips should never be used to cut wider. Such practice ruins the cutting edges of the blade.

④ Use snip only for metal that can be cut by force applied by hand.

**RESULT:-** The taper tray is done successfully made from the given sheet metal.



SHEET METAL  
1st and 2nd SEMESTER

Page-3

ALL BRANCHES

FUNNEL

AIM:- To make a funnel.

RAW MATERIAL REQUIRED:- G.I. sheet 24 gauges.

TOOLS REQUIRED:-

- ① steel rule 300mm.
- ② Divider.
- ③ Protractor.
- ④ Scriber.
- ⑤ straight and bent snips.
- ⑥ Mallet
- ⑦ Funnel stakes.
- ⑧ Soldering iron.

Operation:-

- ① Measuring and marking operation.

② cutting operation.

③ Bending operation.

④ ~~joining~~ Joining operation.

① The size of the given sheet is checked with a steel rule.

Procedure:-

② The development of the funnel (cone and taper cylinder) is marked on the given sheet metal using

③ by steel rule, Protractor and scriber.

④ The angle subtended by the arc of the sector is calculated from the relation.  $\theta = 360^\circ \times \text{radius of the base circle of the cone and taper cylinder slant height}$ .

⑤ The allowance for folding and bending is added to the development.

⑥ The waste metal is cut away by using the straight and bent snips.

⑦ The development of the cone and taper cylinder are folded by using the funnel stakes after performing the single hemmed joint.

⑧ Now the edges are slightly bent to one is one side and other is opposite side using mallet.

⑨ The development of the funnel is made of the joint as soldering with using soldering iron.

④ The funnel is made successfully from the given sheet metal.

**SAFETY PRECAUTION:** - ① Avoid feeling the cut position by hand while cutting with snip.

② DO not let sheet metal slip through your hands. Most cuts from sheet results from allowing it to slide through the hands.

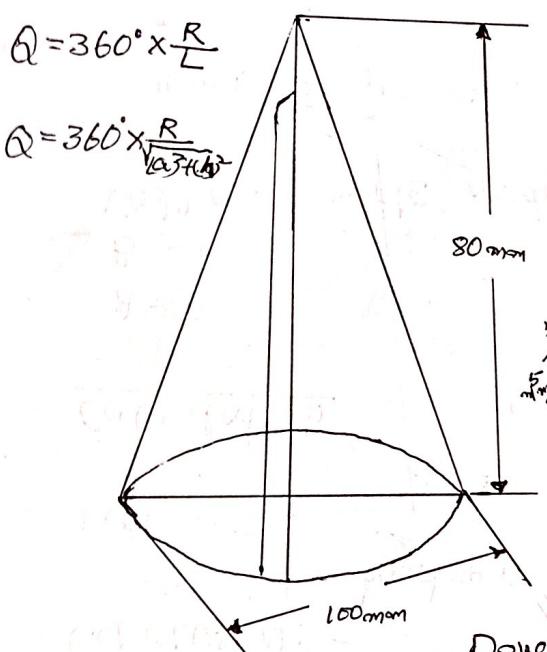
③ Use snips only for metal that can be cut by force applied by hand.

④ Hand snips should never be used to cut wires. Seek practice during the cutting edges.

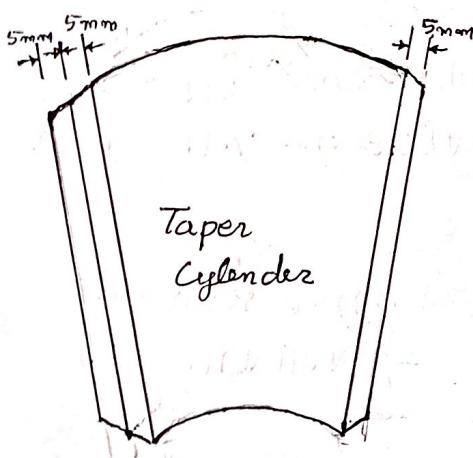
**RESULT:-** The funnel is made successfully from the given sheet metal.

$$\theta = 360^\circ \times \frac{R}{L}$$

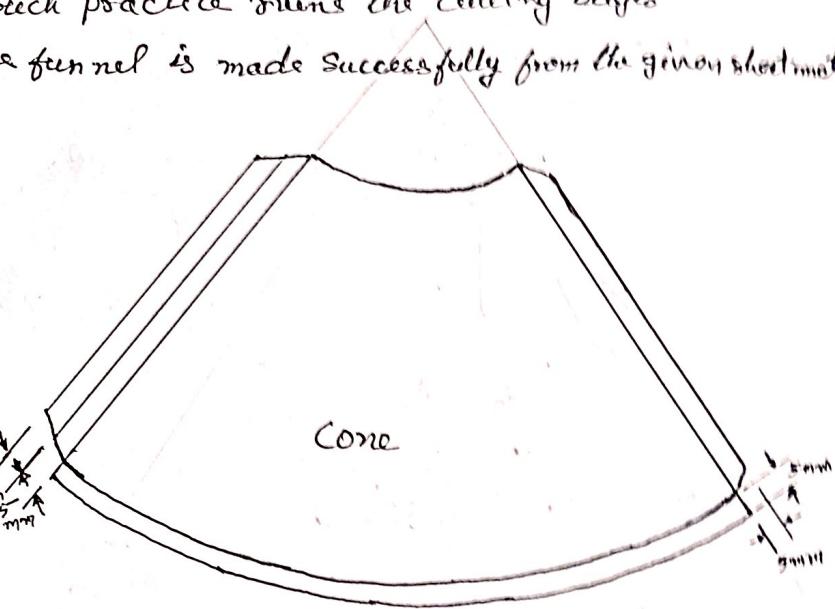
$$\theta = 360^\circ \times \frac{R}{(234.6)^2}$$



Development



FUNNEL



WELDING,  
MECHANICAL  
WORK SHOP PRACTICE

FOR  
ALL BRANCHES 1st YEAR

(CIVIL, ELECTRICAL, MECHANICAL,  
METALLURGY, COMPUTER SCIENCE)

DIPLOMA

## SYLLABUS

AS DOB RAP GOTHS SHOW

a~ SQUARE BUT JOINT,

(CIVIL ENGINEERING CLASSIFICATION OF  
CONCRETE BY CEMENT CONTENT)  
DETAILED

NAME:-, WORKSHOP PRACTICE, WELDING SHOP  
JOB NO - 3. II<sup>nd</sup> SEM. COMMENCO.  
NAME OF THE JOB. - SQUARE BUTT JOINT -  
arc branch.

RAW MATERIAL REQUIRED → 100mm. Length  
X 50mm. breadth X 6mm. thickness  
as two pieces as m.s. Flat.

TOOLS & EQUIPMENT REQUIRED

- ① AC or D.C welding machine
- ② Welding cable ③ Electro holder
- ④ Earthing cable, ⑤ Welding rod or electrode , ⑥ Welding table ,
- ⑦ Hack saw , ⑧ Flat file ⑨ Steel rule
- (10) Tressquare , (11) Tongue ,
- (12) chipping hammer , (13) Hand glove
- (14) Hand Screen , (15) Apron (16) Wirebrush

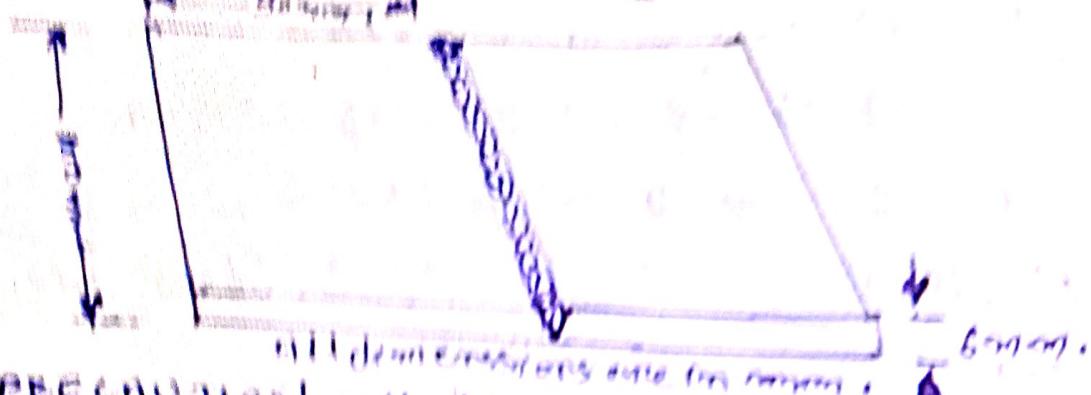
PROCEDURE:-

At first cut the m.s flat according to the given dimension by the help of Hack saw and remove the undesired material by the use of Flatfile and check the right angle by the help of Tressquare . Then keep the work piece on the working table and set the job in square butt joint inclined position. SUPPLY the current 120 to 150Amp.

## Welding

Then apply the fluxed weld to set the  
JAW big welding hammer, old coated electric  
arc welding example the weld don't turn orange  
when welding after welding a new box  
should rusting and remove the slag by the  
wire arc welding hammer then clean the  
surface by the help of wire brush

### Jaw Prof., Solder Butt Joint



PRECAUTION - (1) Always use torch for holding the job. (2) Always use hand screen during welding. (3) Always use hand hand stone box protect the hand from Sparc or heat.

- (4) Use proper apron to protect the body.
- (5) Don't remove the slag in other thing without chipping hammer.

### Conclusion

checked the job properly  
and finishing then sum up the  
problem and submitted to the  
Instructor.

MANUALS

2nd YEAR

3rd SEMESTER

MECHANICAL ENGINEERING

WORK SHOP PRACTICE

DIPLOMA

1 - FITTING

2 - CARPENTRY

3 - WELDING

FITTING  
MECHANICAL  
WORK SHOP PRACTICE  
FOR  
3rd SEMESTER  
MECHANICAL ENGINEERING  
DIPLOMA

# SYLLABUS

JOB

a - BALL PEEN HAMMER

b - OUT SIDE CALIPER

# Job-2 Ball peen Hammer

Page No. 1  
Date: / /  
Design No. 1

Aim - To make a Ball peen Hammer.

Material Required:- M.I.S Rod 25mm dia and 95mm length

Tools and Equipments Required:

- 1- Try Square
- 2- Steel Rule
- 3- Scriber
- 4- V Block
- 5- Vice
- 6- Hammer
- 7- Hack saw frame 300mm
- 8- H.S.S. Blade - 12 T.P.I
- 9- Rough File - 300mm
- 10- Smooth File - 300mm
- 11- Knife Edge File - 300mm
- 12- Round File - 300mm, 150mm
- 13- Half Round File - 150mm
- 14- Twist Drill - 20mm

Sequence of operations:-

- 1- Cutting
- 2- Filling
- 3- Drilling
- 4- Finishing

Procedure:-

- 1- Given mild steel Rod is checked for work.
- 2- File the rod at both ends.
- 3- Wet chalk is applied on the whole

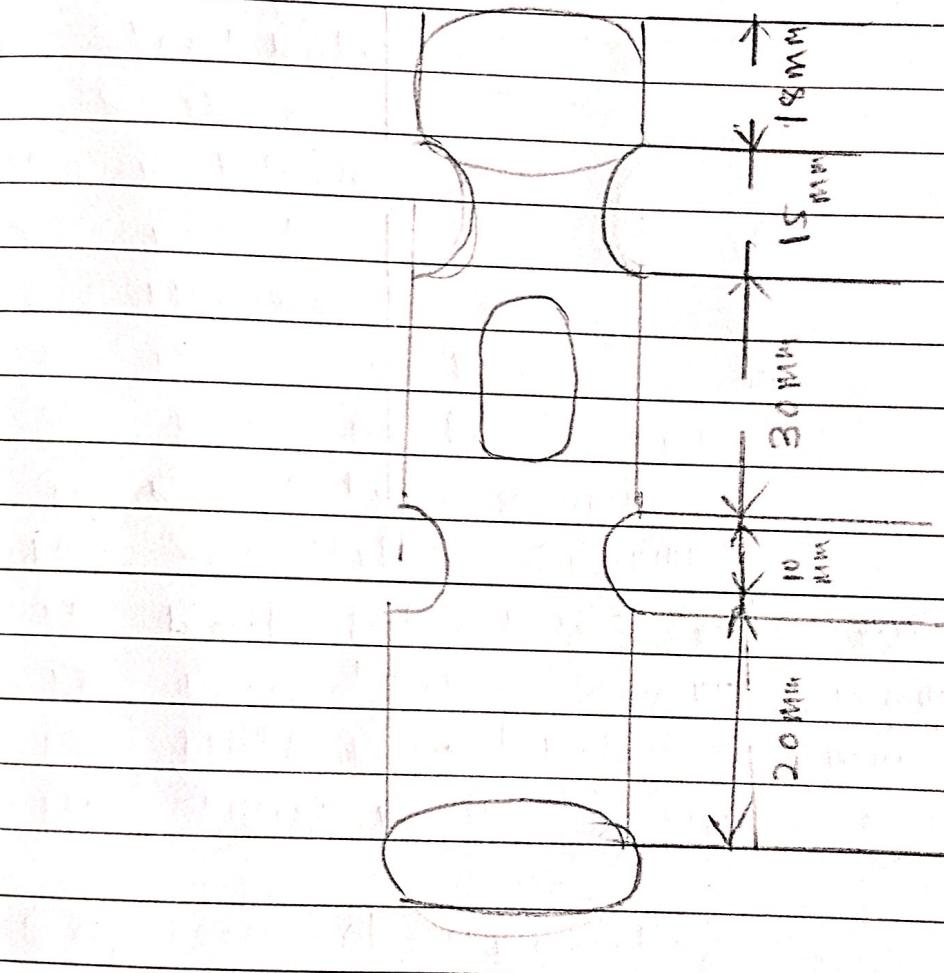
- body of the job.
- 3- Lines are marked according to the figure
  - 4- Using the dot punch, punches are made along with mark lines by placing the job on 'V' block.
  - 5- Necks are filed with the help of half-round files.
  - 6- Head is filed with knife edge files.
  - 7- Face is filed with rough files.
  - 8- A 20mm hole is drill on the middle.
  - 9- With the help of half-round file the drill hole is given oval shape.
  - 10- Finally burr is removed from the total body.

~~Personal~~ precautions:

- 1- Marking is done correctly.
- 2- Use of Round files and knife edge files is done perfectly.
- 3- To give oval shape to the drill hole done perfectly.

Result-

The Ball peen Hammer is made successfully.



Ball peen Hammer

## To make a outside caliper

Page No. 4

Date: / /

Aim: To make a outside caliper

Material Required:- M.S flat ( $150 \times 20 \times 3$ ) mm

Steel Rivet (4mm size) Two pieces

Steel Rivet (4mm size) 1 piece

Tools and Equipments Required:-

1- Try Square - 200 mm

2- Steel Rule - 150 mm

3- Scribes - 150 mm

4- Punch

5- Hammer

6- Hacksaw Frame - 300 mm

7- H.S Blade - (12 TPI)

8- Rough File - 300 mm

9- Smooth File - 300 mm

10- Twist Drill - 8 mm.

Sequence of operation:-

1- Filling

2- marking

3- punching

4- cutting of blank with the required tools

5- Drilling

6- Rivetting

7- Filling

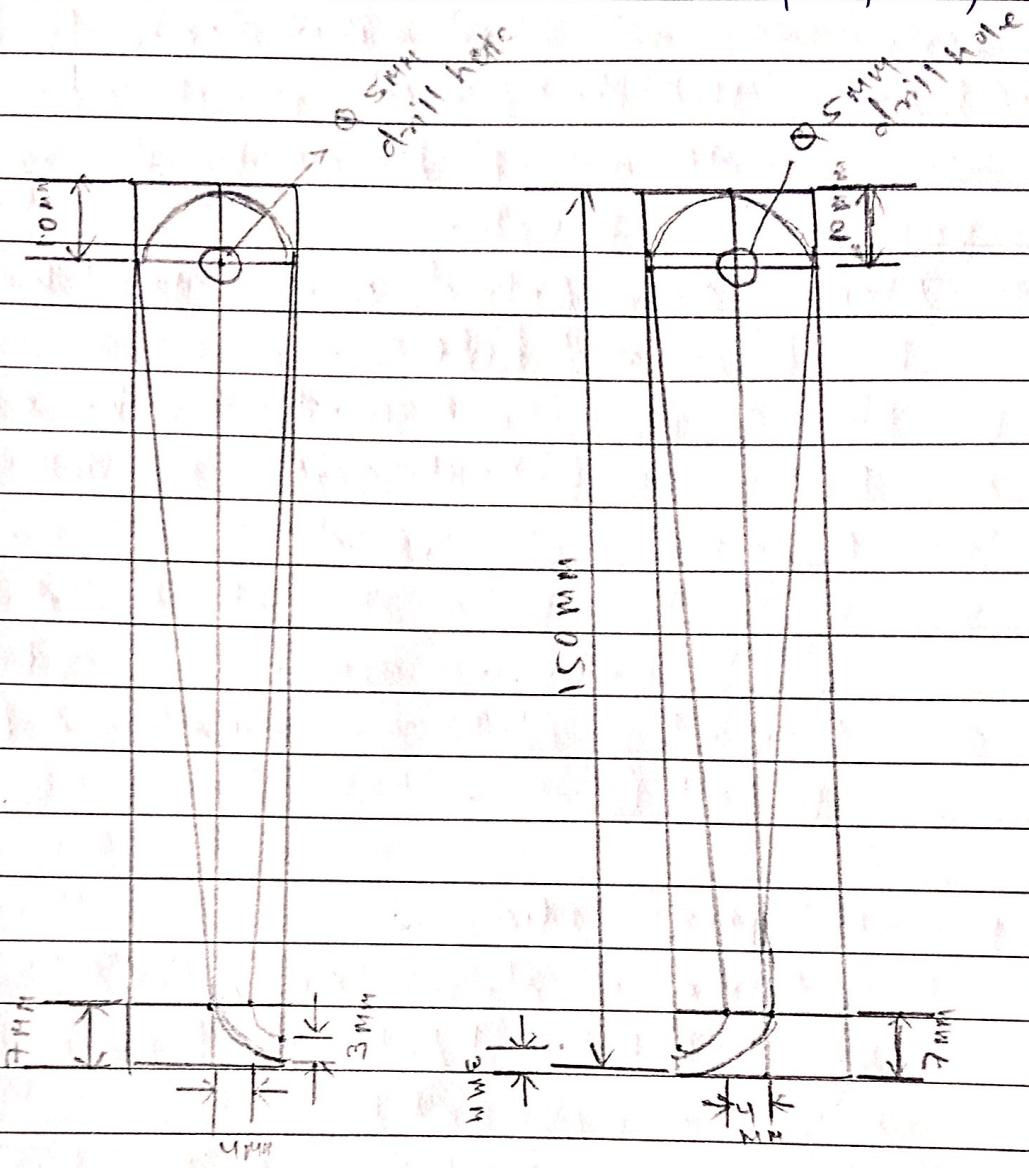
8- Finishing

- procedure:-
- 1- The given mild steel flats are checked for given dimensions for work.
  - 2- One edge of the flat given is filed with rough and smooth files and checked with the try square for flatness.
  - 3- An adjacent edge also filed such that it is square to first edge and checked with try square in two riveted pieces.
  - 4- Wet chalked is applied on one side of the flat and dried for marking.
  - 5- Lines are marked according to given figure using odd leg caliper, steel Rule and Scriber.
  - 6- Using the dot punch, punches are made along with marked lines.
  - 7- The excess materials are removed from the two edges with files.
  - 8- Drill a hole on the centre of the metal at the top for riveting.
  - 9- Riveting is done with the help of the hammer.
  - 10- Finally burrs are removed by the file from the surface of the fitted job.

#### Precautions:-

- 1- The perpendicularity of faces is checked perfectly by using try square.
- 2- Riveting is done properly.
- 3- Marking is done correctly.

Result:- The caliper it made properly.



Outside caliper

# CARPENTRY

MECHANICAL  
WORK SHOP PRACTICE

FOR  
3rd Semester

MECHANICAL AND ELECTRICAL  
ENGINEERING

DIPLOMA

# SYLLABUS

## JOB

a - SLOT, MORTISE, NOTCH & TENON

b - MORTISE AND TENON JOINT

c - SINGLE DOVETAIL JOIN

3rd SEMESTER  
MECHANICAL AND ELECTRICAL  
ENGINEERING

SLOT, MORTISE, NOTCH AND TENON

**AIM -** To make slot, mortise, notch and tenon.

**RAW MATERIAL -** Gombari wood

size -  $50\text{mm} \times 50\text{mm} \times 250\text{mm} = 1\text{ No.}$

**TOOLS REQUIRED -**

- ① Steel rule
- ② Try Square
- ③ Marking knife or Pencil
- ④ Marking gauge
- ⑤ Mortise gauge
- ⑥ Cross cut saw (Hand saw)
- ⑦ Tenon Saw
- ⑧ Fitter Chisel
- ⑨ Mortise chisel
- ⑩ Mallet
- ⑪ Bench vice

**OPERATIONS**

-01- Planing operation

02- Marking and measuring operation

03- Cutting operation -

04- Sawing and chiseling

04 - Finishing operation

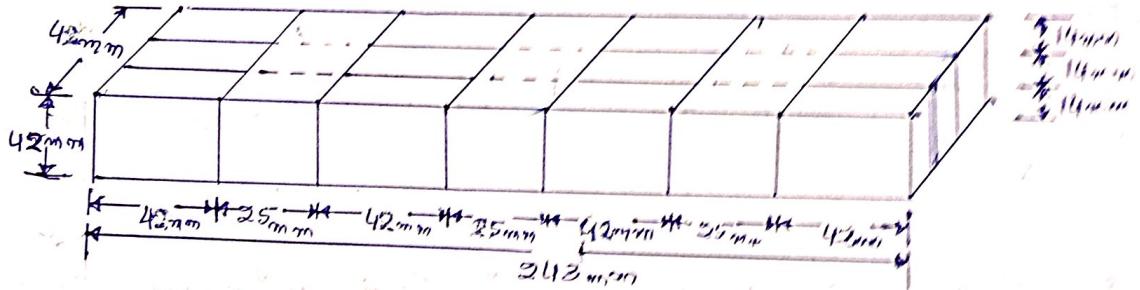
**PROCEDURE -**

Planing operation

Planing first near two sides straight and parallel and suitability to make the model as per required. Plane the adjacent side of the block (wooden block) and checked geometrical accurate with using the try square. Mark the thickness and width as per given size with using the marking gauge. Finishing the planing operation and checked the dimensions.

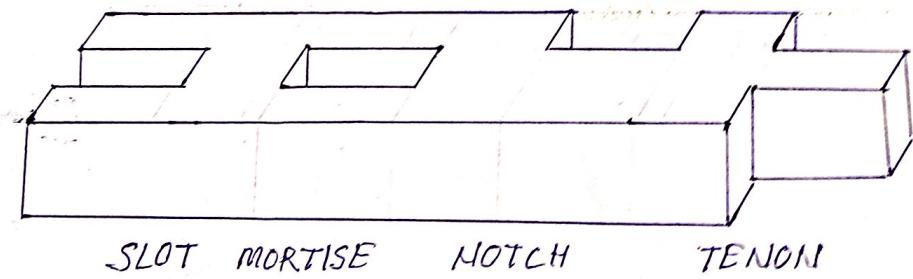
### Mortising operation

Mark the pencil lines to the wooden block with the entire section of the length as per given dimensions. Then the marks, mortise gauge, make double parallel lines at the times. All these dimensions are checked thoroughly and finally.



### Cutting operation

Cut the wooden block in to slot, mortise, notch and tenon with using cross cut saw and tenon saw and layout the dimensions of the job. Remove the excess wood by saw cutting and chiseling the bearing allowance for final chiseling. Finish all chiseling operations with the help of firmer chisel, mortise chisel and mallet.



### Finishing operation

Finish the job by correct the surface of the parts and checked all the dimensions of slot, mortise, notch and tenon. At last the job is finished.

3rd SEMESTER  
MECHANICAL AND ELECTRICAL  
ENGINEERING

MORTISE AND TENON JOINT

**AIM** - To make a mortise and tenon joint with mitred shoulder

**RAW MATERIAL** - Barnkari wood

size - 50mm x 50mm x 150mm = 20 Nos.

**TOOLS REQUIRED** - 01 - steel rule

02 - Try square

03 - Marking knife or Pencil

04 - Marking gauge

05 - Iron jack plane

06 - Mortise gauge

07 - Tenon saw

08 - Mortise chisel

09 - Firmer chisel

10 - Mallet

11 - Bench vice

**OPERATIONS** - 01 - Planing operation

02 - Marking and measuring operation

03 - Cutting operation -

Sawing and Chiseling

04 - Finishing and joining operation

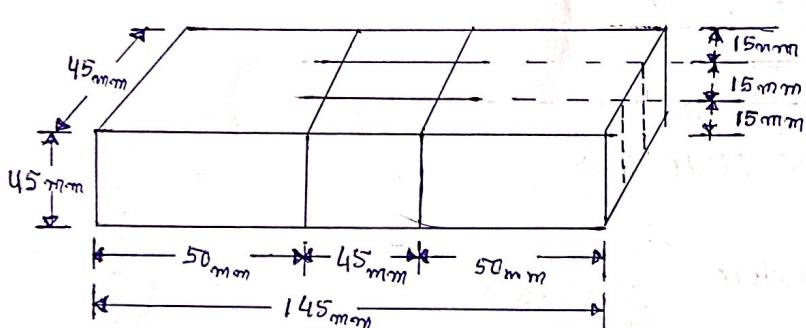
**PROCEDURE** - Planing operation

The mortises and tenon joints are prepared with four flat sides, all at right angle to one another and with flat end at right angle to all the four sides; with the help of iron jack plane, Try square, marking gauge, and Bench with Bench vice.

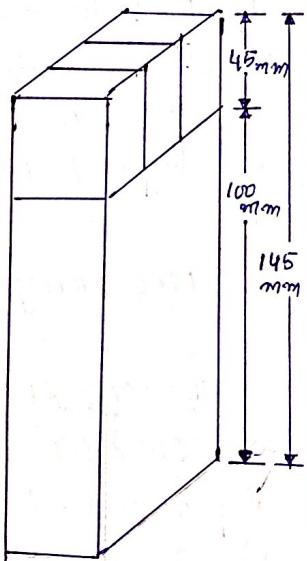
**Marking operation**  
mortise size is selected which is one-third the size of

of the component (given wooden block) thickness with help of a mortise gauges pin set the same distance apart. The mortise gauge stack is set to position the mortise in the middle of the components thickness.

Tenon shoulder are positioned, so that the end of the tenon remains a good distance apart from the opposite side mortise component. Make a tenon length at least the thickness to make the mortise. Marking the lines all round the block with the help of try square, steel rule, mortise gauges, marking knife or pencil.



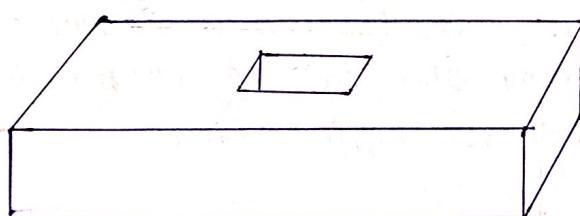
MORTISE MARKING VIEW



Cutting operation

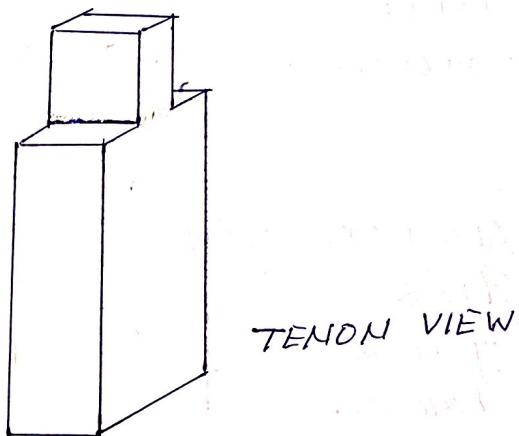
TENON MARKING VIEW

**Chiseling** - The mortise is cut near the knife lines with light cuts to prevent shifting the lines. These cut should be perfectly vertical by the time end is reached the mortise is completed with perfectly rectangular hole.



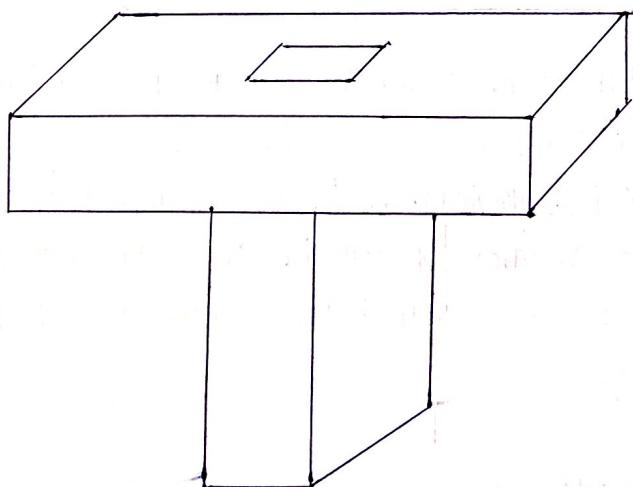
MORTISE VIEW

Cheseling Sawing — The tenon cut lines left by the gauge and keeping the kerf on the waste side of the lines. Sawing more waste will be okay, and easily recoverable. But shaving inside the lines will require the tenon to saw it again. Saw the shoulder, releasing the waste from both sides with the help of tenon saw and bench vice.



### Finishing operation

At last the job is done, with the joint both block mortise and tenon. The joint should be nice and tight fitting.



MORTISE AND TENON JOINT  
WITH  
MITRED SHOULDER

3rd SEMESTER  
MECHANICAL AND ELECTRICAL  
ENGINEERING

SINGLE DOVETAIL JOINT

AIM - To make a single dovetail joint

RAW MATERIAL - Gantkari wood

Size - 50mm x 50mm x 150mm = 2 Nos

TOOLS REQUIRED - 01- Steel rule

02- Iron jack plane

03- Try Square

04- Marking knife or Pencil

05- Marking gauge

06- Mortise gauge

07- Cross cut saw

08- Tenon saw

09- Fidmer chisel

10- Mortise chisel

11- Mallet

12- Bench Vice

OPERATIONS - 01- Planing operation

02- Marking and measuring operation

03- Cutting operation - Sawing and Chiseling

04- Finishing and joining operation

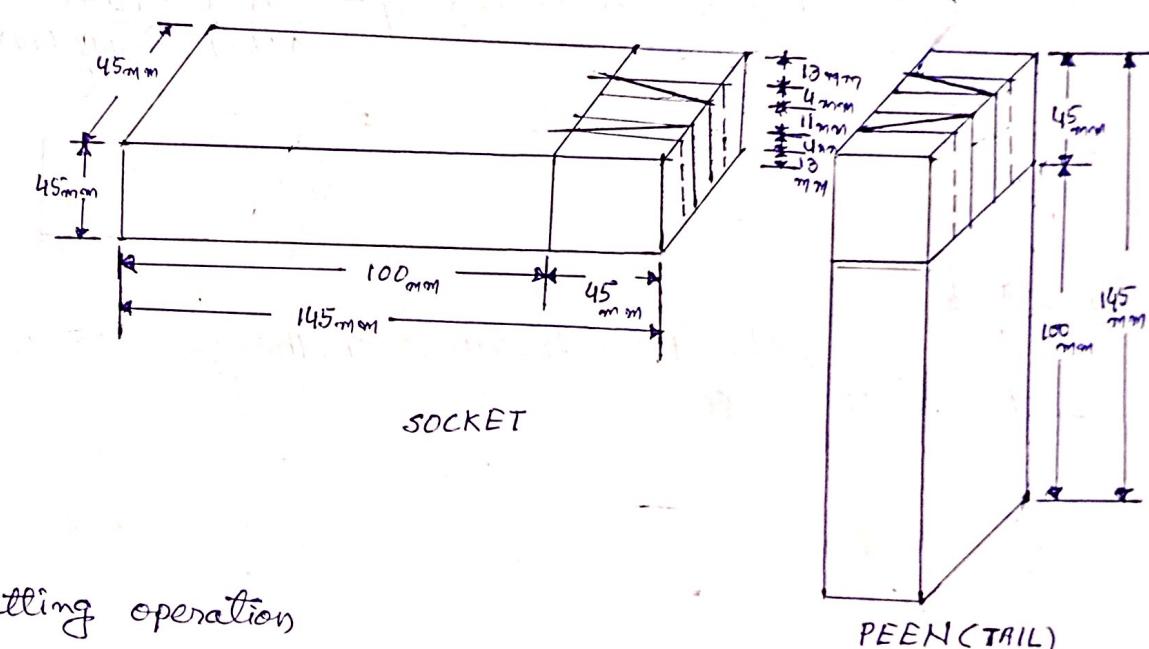
PROCEDURE - Planing operation

At first the given reaper is checked to ensure its correct size. Then the reaper (blocks) is firmly clamped in the bench vice, and any two adjacent face are planed by the iron jack plane, and the two face are checked by try square ~~at 90°~~ with the ninety degree squareness. Planed the other two side

after marking with the marked line to proper thickness with the help of marking gauge. Planed at right angle all the four sides of both components.

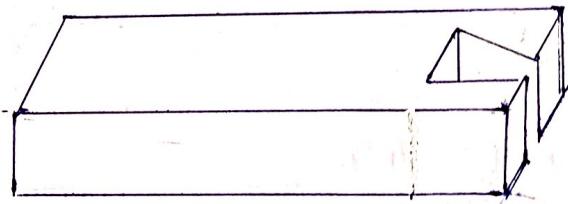
### Marking operation

The socket and Peen are marked to lines. Mortises are fitted narrow and flat both sides. The mortise gauge stock is set to position the socket and peen in middle of the components thickness. The single end sides are marked lines all round the components with the help of marking knife or pencil, try square, mortise gauges.

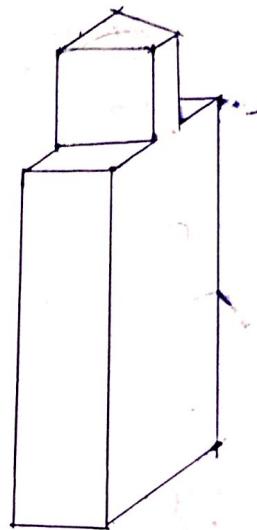


### Cutting operation

Using the crosscut saw the wast portions to be removed and cut in both components. Socket and peen are separated by taper cutting and cross cutting with help of tenon saw followed by chiseling and also the parts. The ends of both components are chiseled to exact lengths.



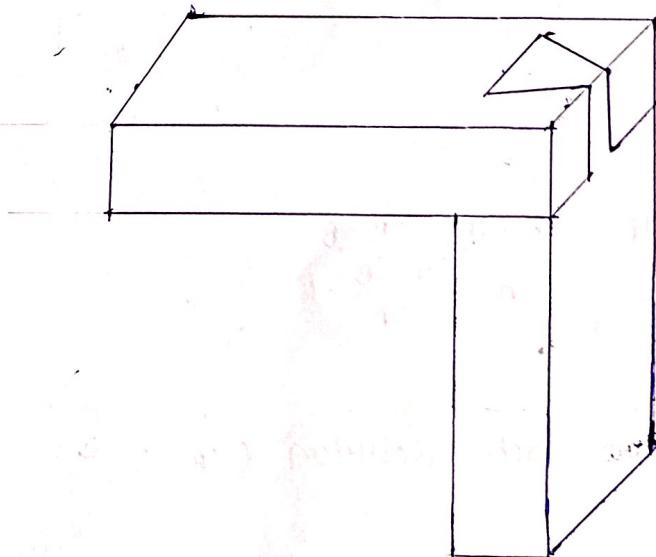
SOCKET VIEW



PEEN VIEW

### Finishing operation

At last a fine finishing is given to the both blocks. This is required so that proper fitting is obtained at the joint. The blocks are fitted to obtain a slightly tight joint.



SINGLE DOVETAIL JOINT

WELDING,  
MECHANICAL  
WORK SHOP PRACTICE  
FOR  
3rd SEMESTER  
MECHANICAL ENGINEERING  
DIPLOMA

~~SYLLONBUS~~

~~SYLLONBUS~~

~~SYLLONBUS~~

~~SYLLONBUS~~

WORKSHOP PRACTICE, WELDING SHOP  
Page No. 1, JOB NO - 3. III<sup>rd</sup> sem. assignment -

NAME OF THE JOB.- SQUARE BUTT JOINT -

BY ARC WELDING,

RAW MATERIAL REQUIRED → 100mm. Length,  
X 50mm. breadth X 6mm. thickness  
as two pieces of m.s. Flat.

TOOLS & EQUIPMENT REQUIRED:

- ① AC or D.C welding Machine
- ② Welding cable ③ Electro holder
- ④ Earthing cable, ⑤ Welding rod or electrode, ⑥ Welding table,
- ⑦ Hack saw, ⑧ Flat file & Steel rule
- ⑨ Tressquare, ⑩ Tongue;
- ⑪ chipping hammer, ⑫ Hand glove
- ⑬ Hand screen, ⑭ Apron ⑮ Wirebrush

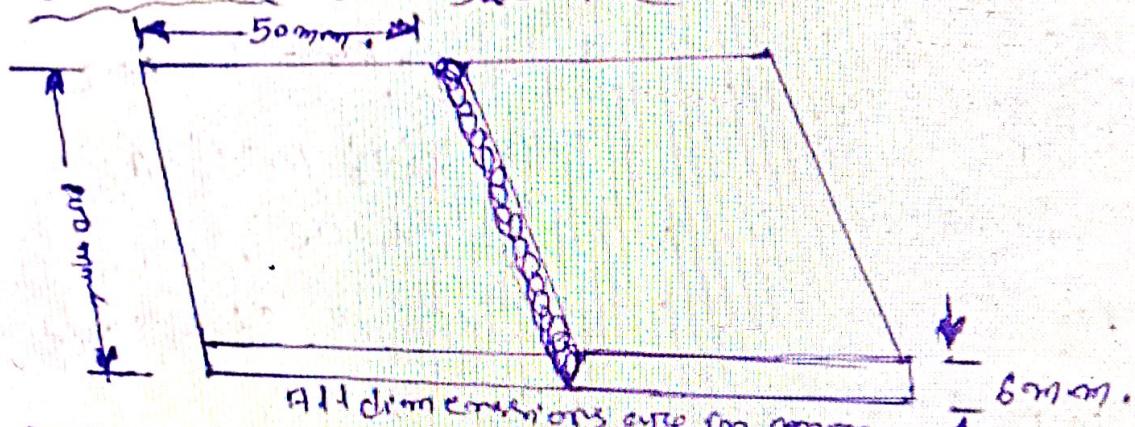
PROCEDURE:-

At first cut the m.s flat according to the given dimension by the help of Hack saw and remove the undesired material by the use of Flatfile and check the right angle by the help of tressquare. Then keep the work piece on the working table and set the job in square butt joint inclined position. Supply the current 120 to 150 Amp.

PAGE - 2,

Then apply a tack weld to set the job by using 4 mm. dia. E60 coated electrode and complete the weld joint in a single run welding. After welding allow for slow cooling and remove the slag by the use of chipping hammer then clean the surface by the help of wire brush.

JOB-Fig. : - square butt joint.



PRECAUTION - (1) Always use tong gauge for holding the job. (2) Always use hand screen during welding. (3) Always use hand hand glove box protect the hand from spark or heat. (4) Use Proper apron box to protect the body. (5) Don't remove the slag in other thing about chipping hammer.

CONCLUSION.

Checked the job properly and finishing them punch the bottom number and submitted to the instructor.

MANUAL

2nd YEAR

3rd SEMESTER

ELECTRICAL ENGINEERING

WORK SHOP PRACTICE

DIPLOMA

1 - TURNING

2 - CARPENTRY

TECHNICAL  
TURNING  
MECHANICAL  
WORK SHOP PRACTICE  
FOR  
3rd SEMESTER  
ELECTRICAL ENGINEERING

DIPLOMA

# SYLLABUS

## JOB

a - KNULED THREADED  
TAPER PIN

Page - 1

# TURNING SHOP FOR 4th year Mechanical Engineering

JOB :- Knurled Threaded

Taper 8 mm

Electrical

Raw material required:- 40 mm / 17.5 mm

Length M.S. Rod

Tool and equipment required:- Centre  
Centre Lathe, vernier calliper, steel rule,  
outside calliper, H.S.S. cutting tools,  
knurling tool, parting tool, centre gauge  
& marking gauge, pitch gauge.

Procedure :- At first study the  
drawing from the blackboard carefully.  
Then cut the metal by the help of  
power saw according to given spec-  
ification. Then hold the job by the  
help of chuck & then facing the  
job by the facing tool (right hand turning  
tool)

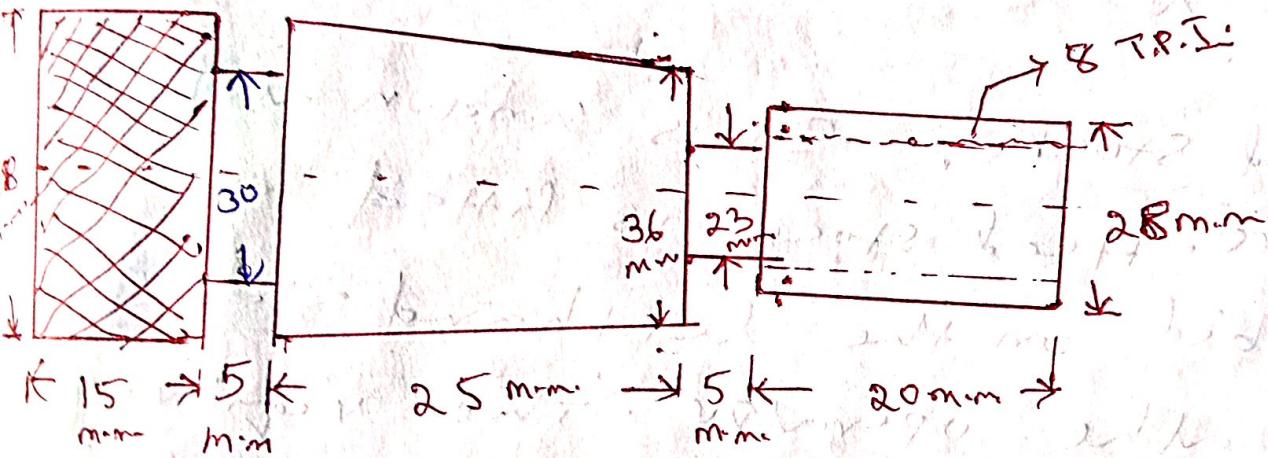
then drill centre hole is mounted  
on the tail stock. then grooving  
the job according to the required  
dimension. then tapping the job by  
the tapping tool. then knurl  
knurling operations on the job by  
the knurling tool. Then threading  
operations the job by "V" tool as shown  
in the sketch. Then finished the

m.m. m.m. m.m. m.m.

70 n.m. ~~1000 ft~~ page -2

precaution:-

- ① Don't start the machine without instruction.
- ② Don't touch the parts of machine.
- ③ Maintain discipline at the machine.



Knurled threaded Taper pin

# CARPENTRY

MECHANICAL  
WORK SHOP PRACTICE

FOR  
3rd Semester

MECHANICAL AND ELECTRICAL

ENGINEERING

DIPLOMA

# SYLLABUS

## JOB

a - SLOT, MORTISE, NOTCH & TENON

b - MORTISE AND TENON JOINT

c - SINGLE DOVETAIL JOIN

3rd SEMESTER  
MECHANICAL AND ELECTRICAL  
ENGINEERING,

SLOT, MORTISE, NOTCH AND TENON

**AIM -** To make slot, mortise, notch and tenon.

**RAW MATERIAL -** Gambary wood

SIZE -  $50\text{mm} \times 50\text{mm} \times 250\text{mm} = 1\text{ No.}$

**TOOLS REQUIRED -**

- ① Steel rule
- ② Try square
- ③ Marking knife or Pencil
- ④ Marking gauge
- ⑤ Mortise gauge
- ⑥ Cross cut saw (Hand saw)
- ⑦ Tenon saw
- ⑧ Firmer chisel
- ⑨ Mortise chisel
- ⑩ Mallet
- ⑪ Bench vice

**OPERATIONS**

01- Planing operation

02- Marking and measuring operation

03- Cutting operation

04- Sawing and Chiseling

05- Finishing operation

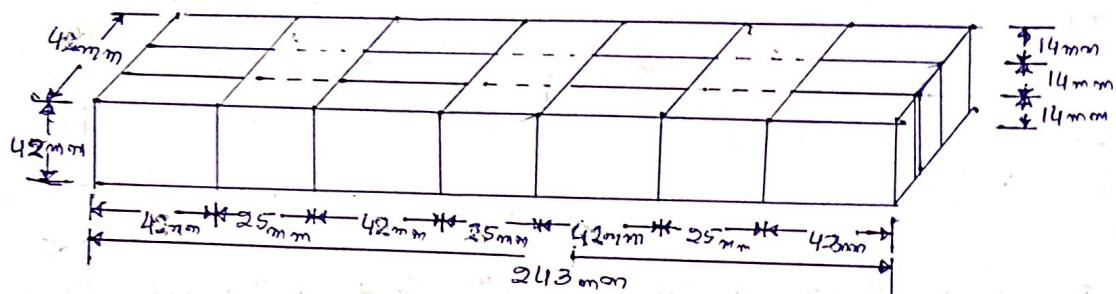
**PROCEDURE -**

Planing operation

Planing first near two sides straight and parallel and suitability to make the model as per required. Plane the adjacent side of the block (wooden block) and checked geometrical accurate with using the Try square. Mark the thickness and width as per given size with using the marking gauge. Finishing the planing operation and checked the dimensions.

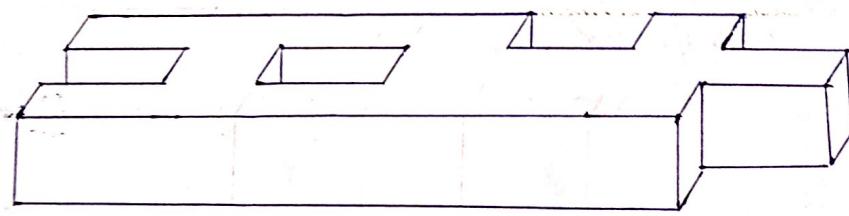
### Marking operation

Mark the pencil lines to the wooden block at the cross section of the length as per given dimensions. Then the mortise gauge make double parallel lines at the time. All the dimensions are checked correctly and exactly.



### Cutting operation

Cut the wooden block in to slot, mortise, notch and tenon with using cross cut saw and tenon saw and layout the dimensions of the job. Remove the excess wood by saw cutting and chiseling the keeping allowance for final chiseling. Finish all chiseling operations with the help of firmer chisel, mortise chisel and mallet.



SLOT      MORTISE      NOTCH      TENON

### Finishing operation

Finish the job by correct the surface of the parts and checked all the dimensions of slot, mortise, notch and tenon. At last the job is finished.

3rd SEMESTER  
MECHANICAL AND ELECTRICAL  
ENGINEERING

MORTISE AND TENON JOINT

**AIM** - To make a mortise and Tenon joint with mitred shoulder

**RAW MATERIAL** - Gambhari wood

size - 50mm x 50mm x 150mm = 2 Nos.

**TOOLS REQUIRED** - 01 - steel rule

02 - Try square

03 - Marking knife or Pencil

04 - Marking gauge

05 - Iron jack plane

06 - Mortise gauge

07 - Tenon saw

08 - Mortise chisel

09 - Firmer chisel

10 - Mallet

11 - Bench vice

**OPERATIONS** - 01 - Planing operation

02 - Marking and measuring operation

03 - Cutting operation -

Sawing and Chiseling

04 - Finishing and joining operation

**PROCEDURE** - Planing operation

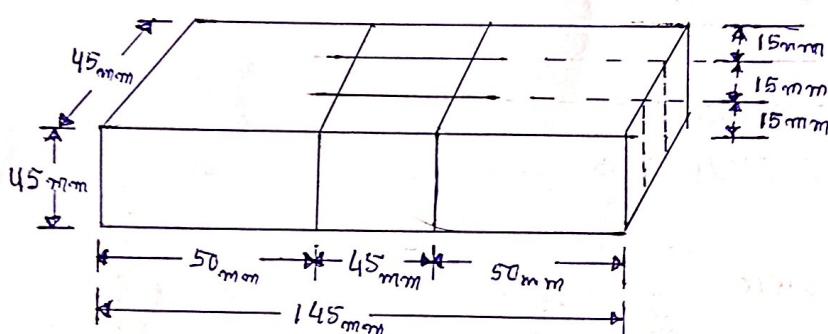
The mortise and Tenon joints are prepared with four flat sides, all at right angle to one another and with flat end at right angle to all the four sides; with the help of Iron jack plane, Try square, Marking gauge, and Bench with Bench vice.

Marking operation

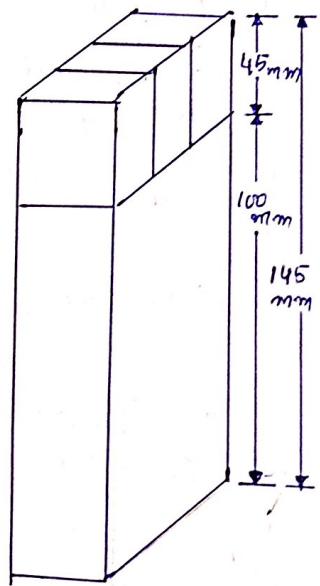
Mortise size is selected which is one-third the size of

of the component (given wooden block) thickness with help of a mortise gauge pin set the same distance apart. The mortise gauge stock is set to position the mortise in the middle of the components thickness.

Tenon shoulder are positioned, so that the end of the tenon remains a good distance apart from the opposite side mortise component. Make a tenon length at least the thickness to make the mortise. Marking the lines all round the block with the help of try square, steel rule, mortise gauges, marking knife or pencil.



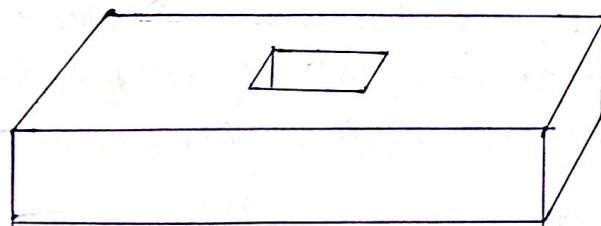
MORTISE MARKING VIEW



Cutting operation

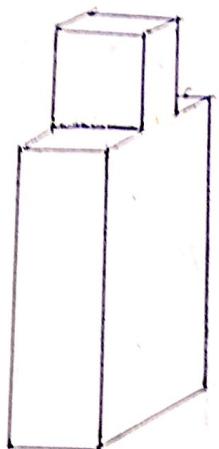
TENON MARKING VIEW

**Chiseling** - The mortise is cut near the knife lines with light cuts to prevent shifting the lines. These cut should be perfectly vertical by the time end is reached the mortise is completed with perfectly rectangular hole.



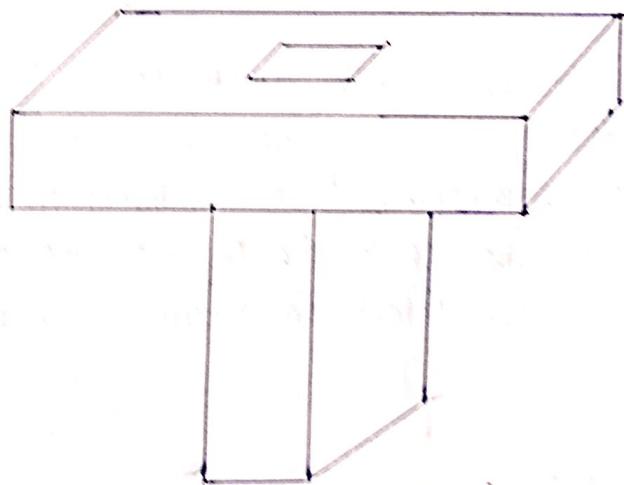
MORTISE VIEW

Chamfering Sawing — The tenon cut lines left by the gauge and keeping the kerf on the waste side of the lines ensuring more waste will be okay, and easily recoverable. But shaving inside the lines will require the tenon to saw it again. Saw the shoulder, releasing the waste from both sides with the help of Tenon Saw and Bench vice.



### Finishing operation

At last the job is done, with the joint both block mortise and Tenon. The joint should be nice and tight fitting.



MORTISE AND TENON JOINT  
WITH  
MITRED SHOULDER

3rd SEMESTER  
MECHANICAL AND ELECTRICAL  
ENGINEERING

SINGLE DOVETAIL JOINT

AIM - To make a single dovetail joint

RAW MATERIAL - Gambhari wood

size - 50mm X 50mm X 150mm = 2 Nos

TOOLS REQUIRED - 01- Steel rule

02- Iron jack plane

03- Try square

04- Marking knife or Pencil

05- Marking gauge

06- Mortise gauge

07- Cross cut saw

08- Tenon saw

09- Fisters chisel

10- Mortise chisel

11- Mallet

12- Bench Vice

OPERATIONS -  
01- Planing operation

02- Marking and measuring operation

03- Cutting operation - Sawing and chiseling

04- Finishing and joining operation

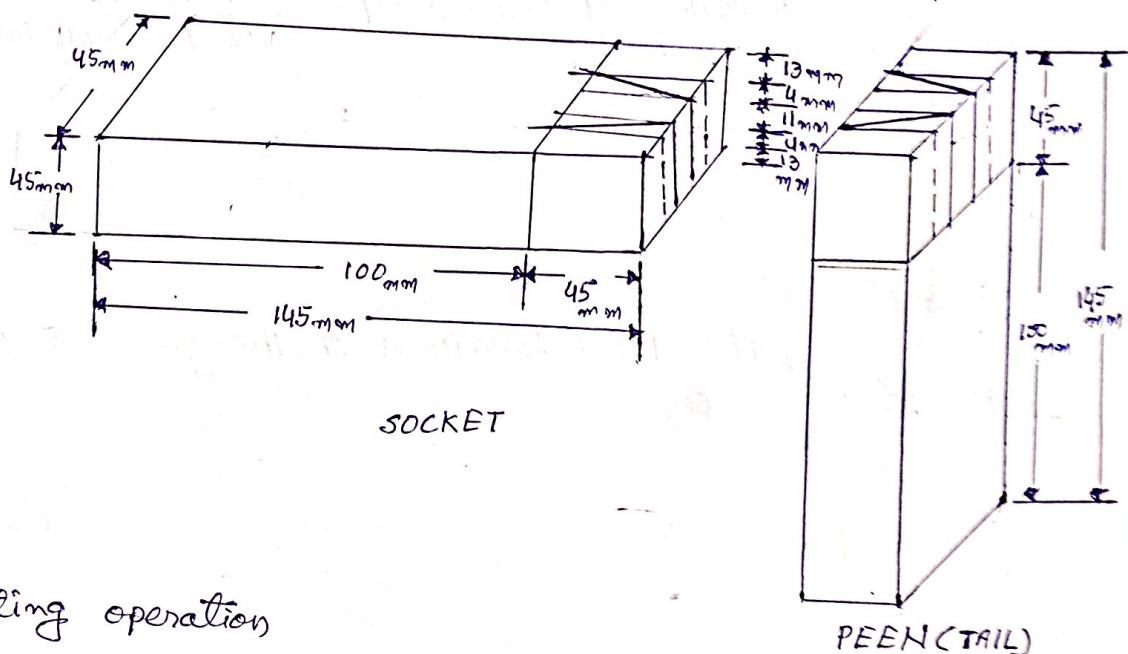
PROCEDURE - Planing operation

At first the given reaper is checked to ensure its correct size. Then the reaper (block) is firmly clamped in the bench vice, and any two adjacent face are planed by the iron jack plane, and the two face are checked by try square ~~with~~ with the ninety degree squareness. Planed the other two side

after marking with the marked line to proper thickness with the help of marking gauge. Planed at right angle all the four sides of both components.

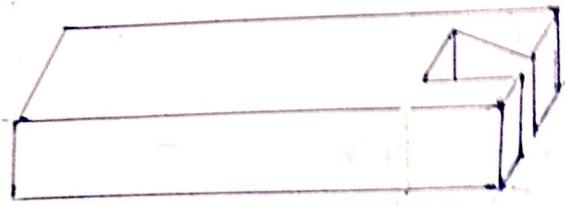
### Marking operation

The socket and Peen are marked to lines. Mortises are fitted narrow and flat both sizes. The mortise gauge stock is set to position the socket and peen in middle of the components thickness. The single end sides are marked lines all round the components with the help of marking knife or pencil, try square, mortise gauges.

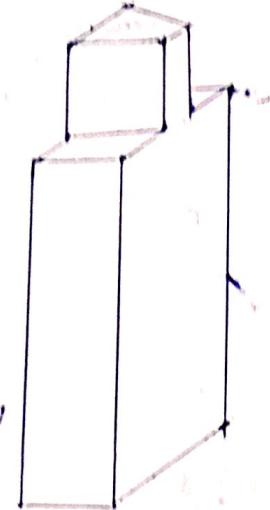


### Cutting operation

Using the cross cut saw the waste portions to be removed and cut in both components & socket and peen are separated by taper cutting and cross cutting with help of tenon saw followed by chiseling and also the parts. The ends of both components are chiseled to exact lengths.



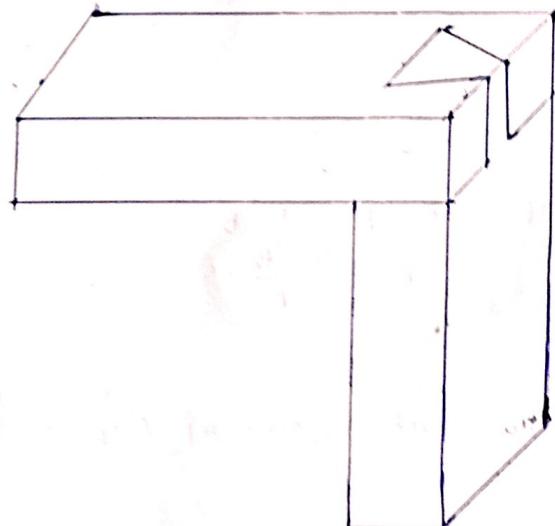
SOCKET VIEW



PEEN VIEW

### Finishing operation

At last a fine finishing is given to the both blocks. The required so that proper fitting is obtained the joint. The blocks are fitted to obtain a slightly tight joint.



SINGLE DOVE TAIL JOINT

**MANUAL**

**2nd YEAR**

**4th SEMESTER**

**MECHANICAL ENGINEERING**

**DIPLOMA**

**1- TURNING AND MACHINE**

**2- WELDING**

TURNING AND MACHINE  
MECHANICAL

WORK SHOP PRACTICAL

FOR

4th SEMESTER

MECHANICAL ENGINEERING

DIPLOMA

MACHINERY DIFFERENT

SYLLABUS

TOP

a - KNURLED & THREADED TAPER PIN

b - INTERNAL THREADED BUSH

c - 'V' BLOCK

d - SPUR GEAR

ANSWER

# TURNING SHOP FOR 4th SEM

JOB :- Knurled Threaded TAPER PIN

Mechanical (Dipu)  
3rd & B.A. Sem

Electrical

Raw material Required:- 40mm dia x 78mm

Length M.S. Rod

## Tool and equipment required:

Centre lathe, vernier caliper, Steel Rule  
Outside caliper, H.S.S. cutting tools,  
Knurling tool, parting tool, centre gauge  
& marking gauge, pitch gauge.

Procedure:- At first study the drawing from the blackboard carefully. Then cut the metal by the help of power saw according to given specification. Then hold the job by the help of chuck. Then facing the job by the facing tool (right hand turning tool). Then drill centre hole is mounted on the tail stock. Then grooving the job according to the required dimension. Then tapping the job by the tapping tool. Then Knurled knurling operations on the job by the knurling tool. Then threading operation the job by "V" tool as shown in the sketch. Then finished the job.

$\rightarrow 15 \text{ mm} \rightarrow 25 \text{ mm} \rightarrow 20 \text{ mm}$

mm. mm. mm.

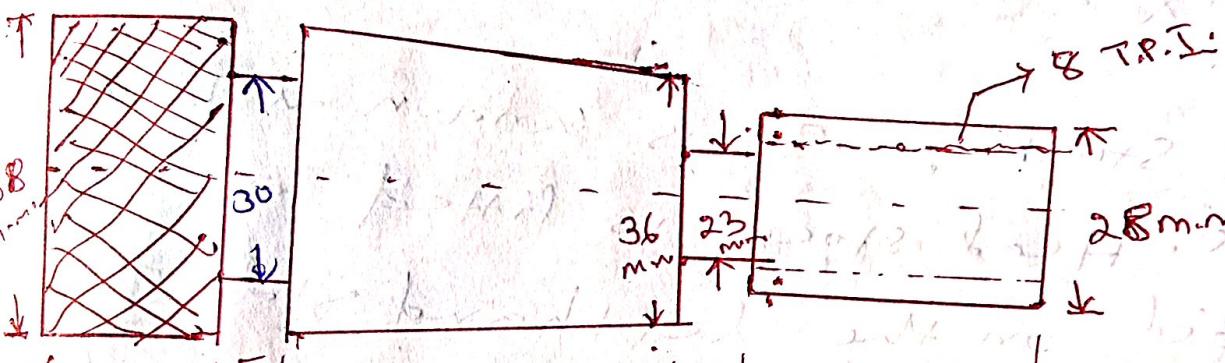
$\rightarrow 70 \text{ mm. } \rightarrow$

page-2

precaution:- ① Don't start the machine without instruction.

② Don't touch the running condition parts of machine.

③ Maintain discipline when working at the machine.



$\rightarrow 15 \text{ mm} \rightarrow 5 \text{ mm}, 25 \text{ mm} \rightarrow 5 \text{ mm} 20 \text{ mm} \rightarrow$

Knurled threaded Taper pin;

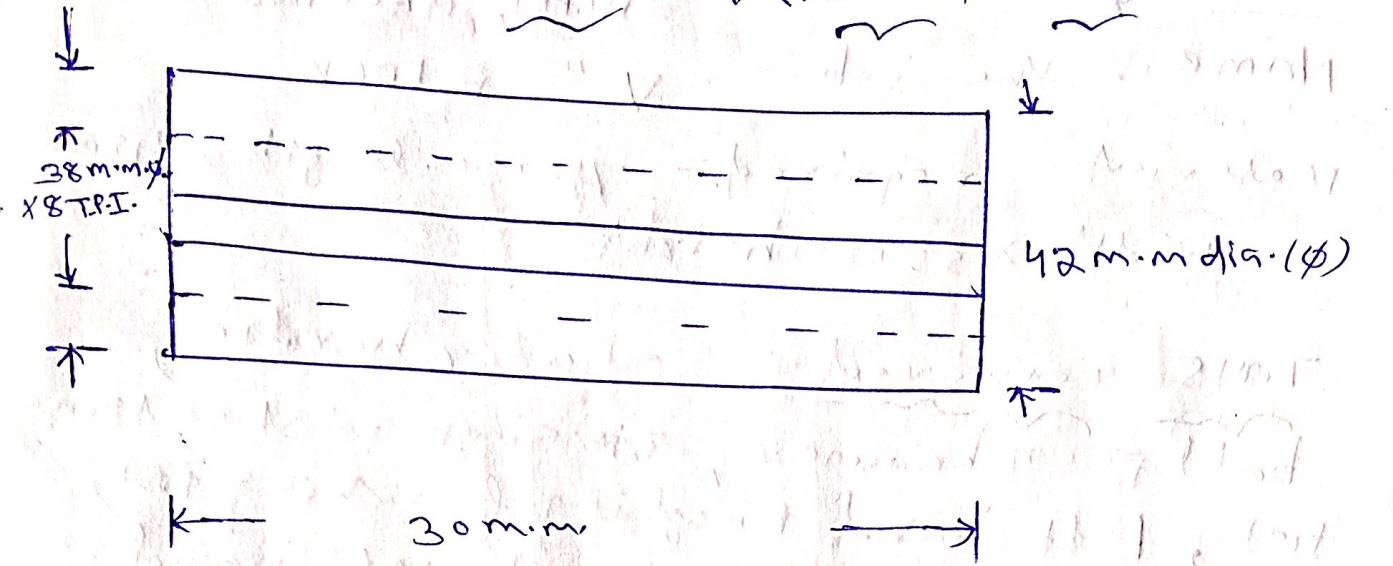
2m.)  
JOB :- Internal Threaded bush

Raw Material Required is  $50\text{ mm.} \phi \times 35\text{ mm.}$   
length

Tools required:- centre Lathe,  
vernier calliper, drill bit (10mm, 20mm,  
25mm.), Boring tool and holder,  
threading tool, centre gauge, pitch  
gauge and parting tool.

procedure:- At first cut the  
metal from raw material according  
to the fig. ( $50\text{ mm.} \phi \times 35\text{ mm.}$  length) by  
the power saw. Then hold the  
Job by the help of chuck of the  
Lathe machine. then facing the  
job by the facing tool (right hand)  
(turning tool).  
then drill hole on the job by help  
of drill bit up to  $25\text{ mm.} \phi$ .  
then bore the hole up to  $38\text{ mm.} \phi$   
Then Internal threading done in  
the hole of the job by Internal threading  
tool (threading - S.T.P.I.): Finally part  
the job from the raw material and  
finished the job by the help of  
flat file and sand paper.

Fig:- Internal Threaded bush Part-4



precaution:- ① Don't start the machine without instruction.

- ② Don't hold the tools by naked hand.
- ③ When working in the machine at the time you maintain discipline.

TOP 1 of 3rd Job FOR 4th Sem Mech. of Engg page 5  
STAMPER MACHINE ~~in degree~~

Name of the job :- V BLOCK

Material required:- 75 mm length x 48 mm width x 55 mm height

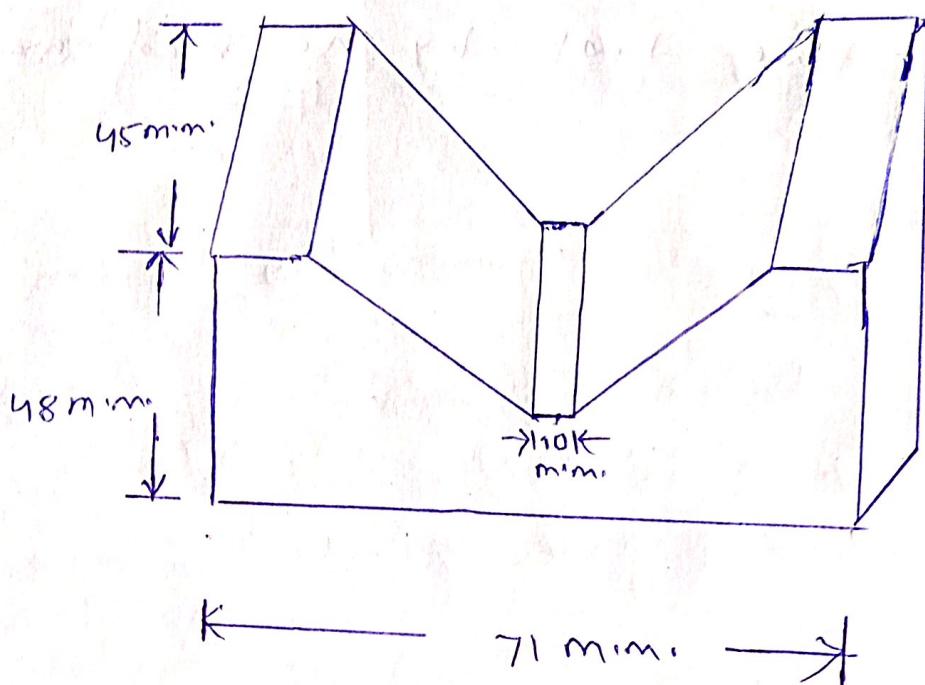
Tools required:- Shaper handle, ball peen hammer, single point cutting tool, left hand roughing finishing tool, left hand side facing tool, left hand dovetail cutting tool, parting and slotting tool.

Procedure:- At first cut the cast iron block from the big cast iron block by the power saw. It taken to the vice of shaper working table and fasten tightly and rigidly the iron block by the vice. With the help of left hand roughing tool finishing tool ~~machines~~ facing parallel finishing the horizontal surface of ~~the~~ the work piece. Then vertical surface working by the help of left hand side facing tool. Then finished the job by ~~dovetail~~ operate slow motion of cutting tool. Parallel finishing is done by the help of left hand roughing tool.

- Page - 6
- precaution :-
- ① Don't operate ~~the~~ any machine without instruction sheet.
  - ② Don't stand in front of shaper machine.
  - ③ Don't hold the tool by naked hand.

N BLOCK

Page - 7



JOB-74

MILLING MACHINE page-8

Aim of the experiment:- Spur gear

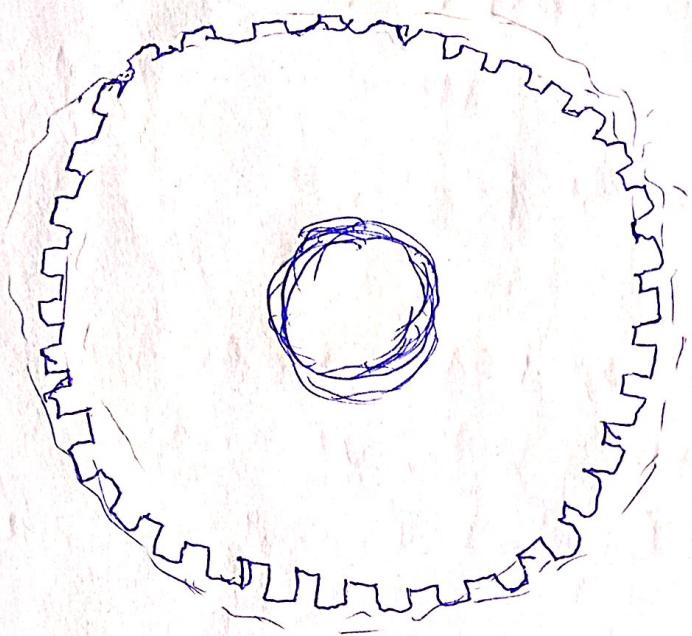
Material Required :- 42mm. dia x 5mm.  
thickness.

Tools & equipment Required:- Steel Rule,  
Spanner, milling cutter, Face mill cutter  
Ball mill cutter, Side mill cutter  
Single angle cutter, outside calliper,  
vernier calliper.

procedure:- At first study the drawing from the black board carefully. Then cut the metal by the power saw. Then hold the job by the vice of milling machine. Then mill cutter is fitted. Then start the machine. Then the job milling cutter to remove material from the surface of the job. The milling cutter is rotary cutting tool. As the milling cutter enters the work piece, the cutting edges of the tool repeatedly cut into and exit from the job material. Then finished the job. By sand paper and file - cleaning the chisel of the job.

# Fig. of Spur gear

page 9



Precaution:-

- ① Don't start the machine without instruction.
- ② Don't put the hand any running part of the machine.
- ③ Don't hold the tool & equipment by naked hand.

WELDING  
MECHANICAL  
WORK SHOP PRACTICE,  
FOR  
4th SEMESTER  
MECHANICAL ENGINEERING  
DIPLOMA

# SYLLABUS

JOB

or 'T' JOINT IN ARC WELDING

## WORKSHOP - WELDING

4th Sem. Mech.

NAME OF THE JOB = T.Joint in Arc Welding

RAW MATERIALS REQUIRED ⇒ 52 mm. Length  
52 mm. breadth and 6 mm. thickness of  
two pieces of M.S flat.

TOOLS & EQUIPMENT REQUIRED ⇒

- (1) A.C or D.C. Welding Machine
- (2) Welding cable
- (3) Electro holder
- (4) Earthing cable
- (5) Welding rod or electrode
- (6) Welding Table
- (7) Hack saw
- (8) Flat file
- (9) Steel rule
- (10) Try square (11) Chipping hammer
- (12) Hand screen (13) Hand glove
- (14) Apron. (15) Tongue
- (16) Wire brush,

PROCEDURE.

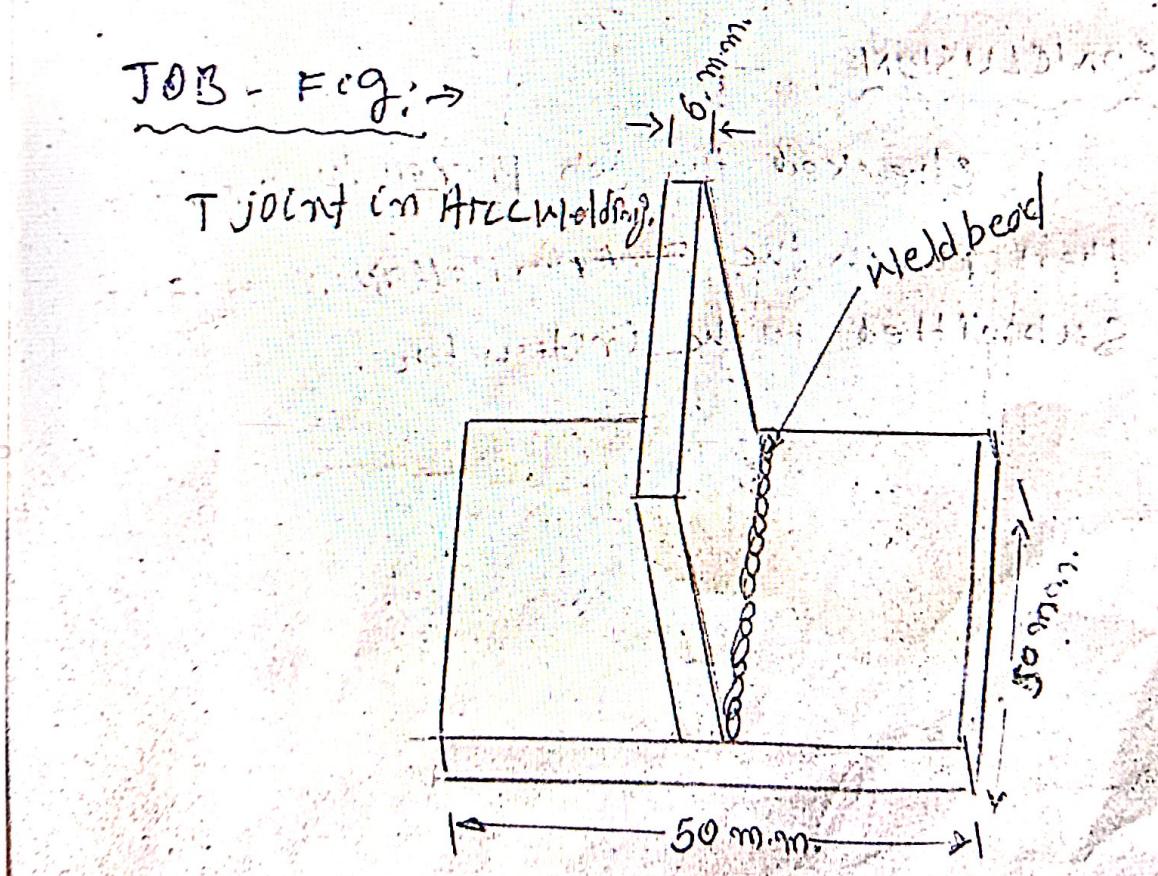
At first cut the M.S flat accord-  
ingly to given dimension by the help  
of Hack saw and remove the undimensioned  
material by the use of flat file.

\* ~~keep the work pieces~~

Keep the cut piece on the ~~the~~ working table and set the job in T joint flat position and check the right angle by the use of try square. Supply the current go to 100 volts, and complete the job in a single round weld by using 4 mm<sup>2</sup> coated electrode. After welding allow for slow cooling and remove the slag by the use of chipping hammer only. Clean the surface by the help of wire brush.

JOB - Fig.: →

T joint in Arc welding.



All dimensions are in mm.

## PRECAUTION.

- (1) Never touch the work piece in ~~neekce~~ hand.
- (2) Always used hand Screen during welding.
- (3) Don't Remove the Slag or other things about chipping hammer.
- (4) Always use hand glove for protect the hand from Spark or Spatter and heat.
- (5) Always use tongue for holding the job.
- (6) Always use apron for protect the body from heat and Sparking.

## CONCLUSION

checked the job properly and finishing then punch the ~~Pattern~~ for remember and submitted to the instructor.