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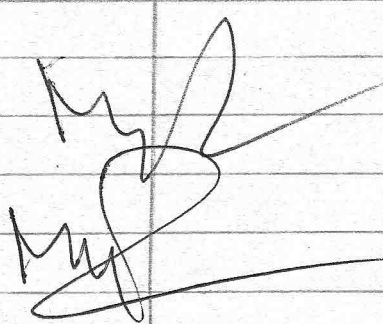
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CLASS:-BTECH(MECH.) II SEM.

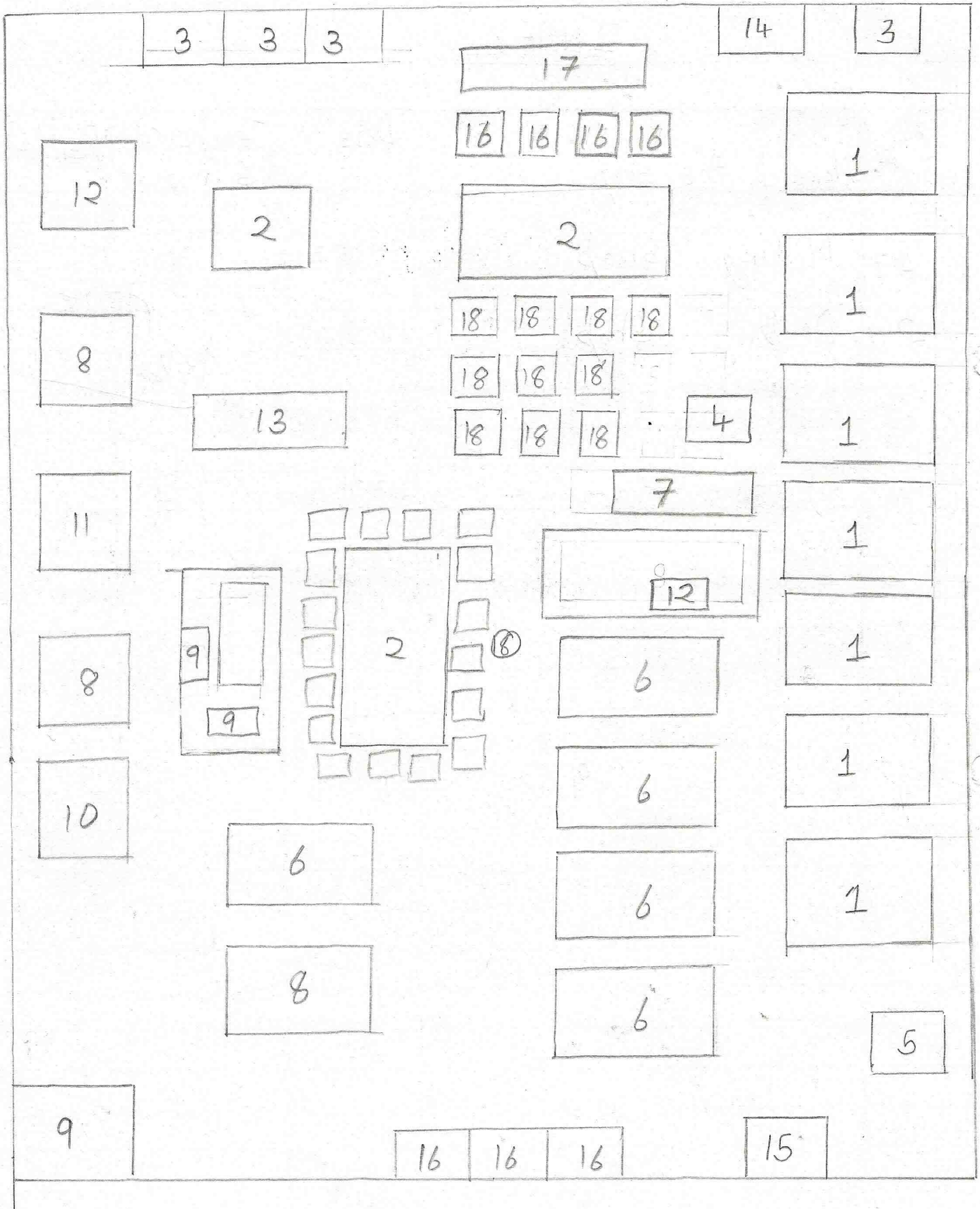
ROLL NO.-11-MES-41

WORKSHOP FILE

# INDEX

S.No.	Name of the Shop	Date	Teacher's Signature	Remarks
1-	Milling Shop	30/1/2012		
2-	Drilling Shop.	12/2/2012		
3-	Soldering & Brazing	6/3/2012		
4-	Lathe Machine	27/3/2012		
5-	Shaper Machine	18/4/2012		

# SHOP LAYOUT



# SHOP LAYOUT

- 1- Lathe Machine
- 2- Teacher's Table
- 3- Almirah
- 4- Power Hack saw
- 5- Grinding Machine
- 6- Shapering Machine
- 7- Slotting Machine
- 8- Horizontal Milling Machine
- 9- Bench type drilling machine
- 10- Cylindrical grinding machine
- 11- Column & knee vertical drilling machine
- 12- Radial drill Machine
- 13- EDM (Computer Controlled Machine)
- 14- Entrance
- 15- Windows
- 16- Teacher's Chair
- 17- Shulter.
- 18- Student's Chair

# 1 - Milling Shop

★ Object:- To make a job of a given workpiece by machining on a milling machine according to the given drawing specifications.

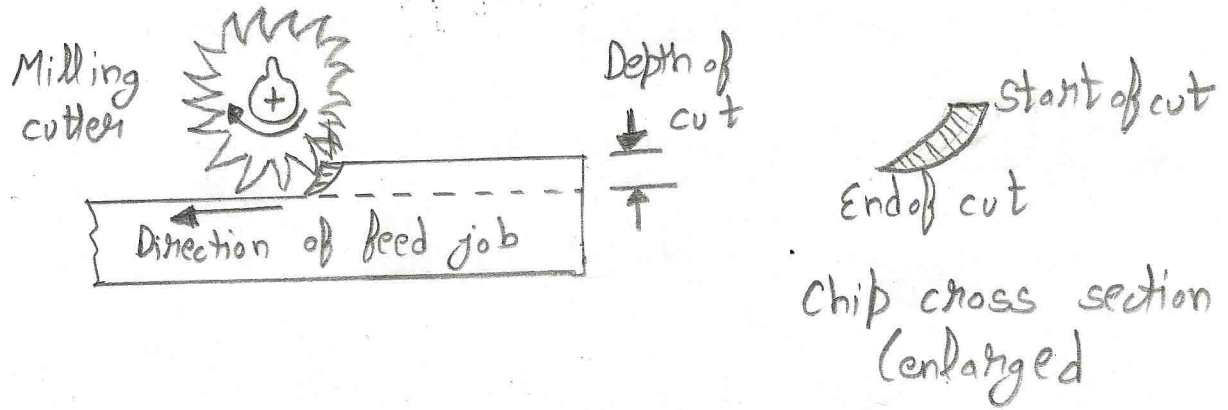
★ Introduction:- A milling machine is a machine tool that removes metal as the work is fed against a rotating multipoint cutter. The milling cutter rotates at high speed and it removes metal at a very fast rate with the help of multiple cutting edges.

Milling machine is used for machining flat surfaces, contoured surfaces, surfaces of revolution, external and internal threads, and helical surfaces of various cross sections.

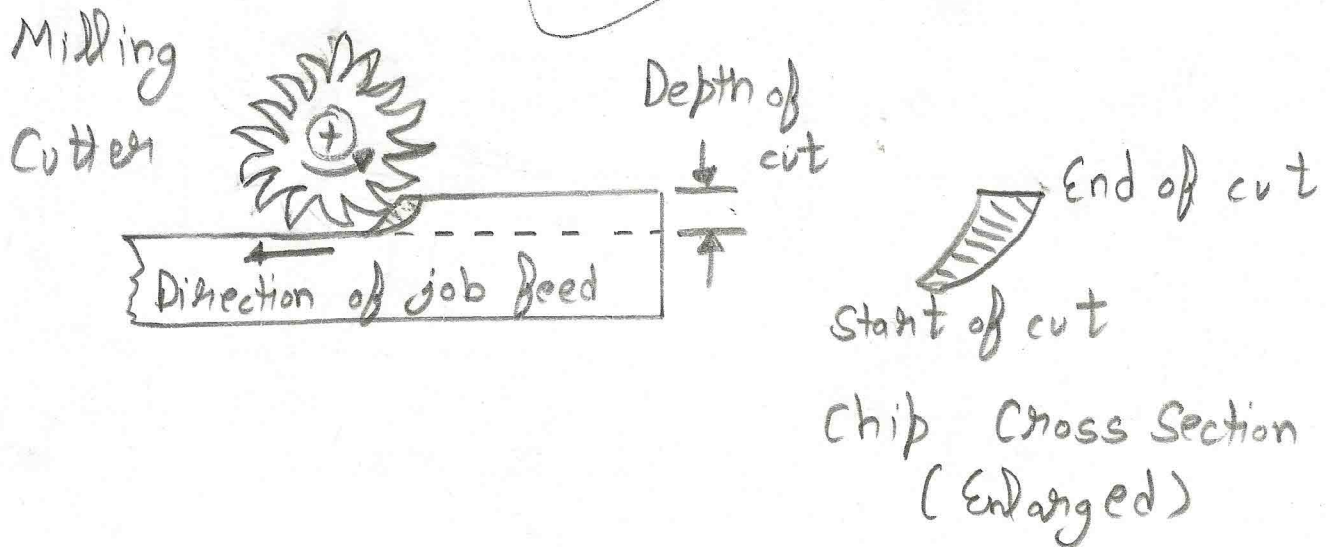
★ Principle of Milling:-

In milling machine, the metal is cut by means of a rotating cutter having multiple cutting edges. For cutting operation, the workpiece is fed against the rotary cutter. As the workpiece moves against the cutting edges of milling cutter, metal is removed in form of chips of trochoid shape. Machined surface is formed in one or more passes of the work. The work to be machined is held in

# Principle of Down-Milling



# Principle of Up-Milling



a vice, a rotary table, a three jaw chuck, an index head, between centres, in a special fixture or bolted to machine table.

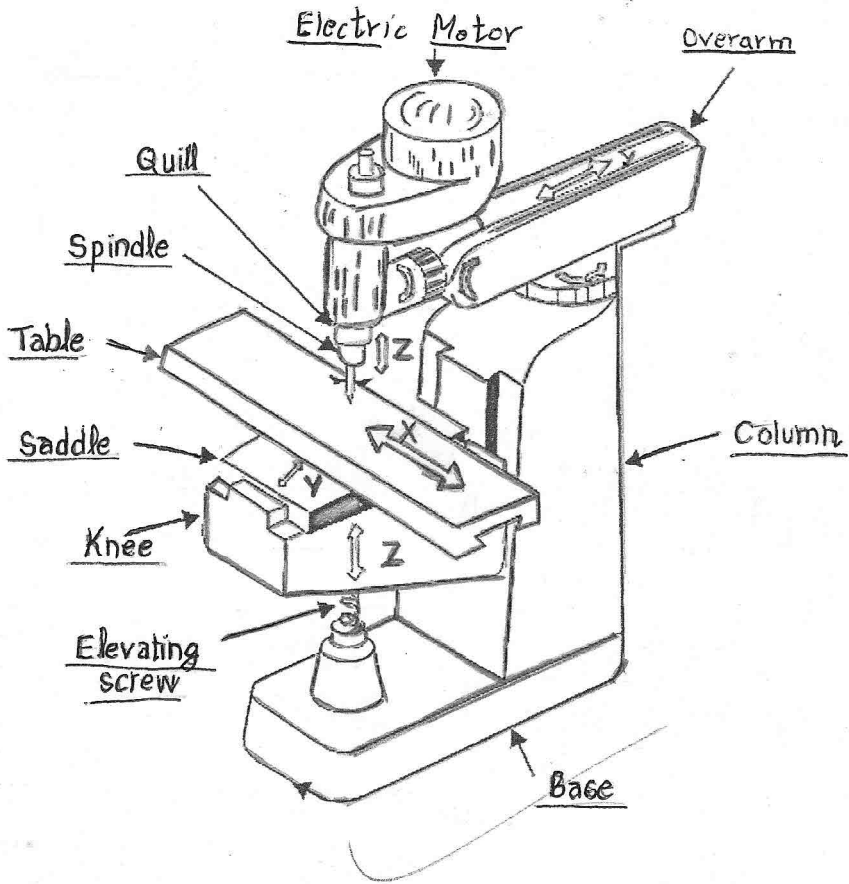
## ★ MILLING METHODS:

There are two distinct methods of milling classified as follows:-

- 1- Up-milling or conventional milling → In the up-milling, the metal is removed in form of small chips by a cutter rotating against the direction of travel of the workpiece. In this type of milling, the chip thickness is minimum at the start of the cut and maximum at the end of cut. As a result, the cutting force also varies from zero to the maximum value per tooth movement of the milling cutter. The major disadvantages of up-milling process are the tendency of cutting force to lift the work from the fixtures and poor surface finish obtained.

## 2- Down Milling or Climb Milling:-

In this method, the metal is removed by a cutter rotating in the same direction of feed of the workpiece. The effect of this is that the teeth cut downward instead of upwards. Chip thickness is maximum at the start



Horizontal      Milling      Machine

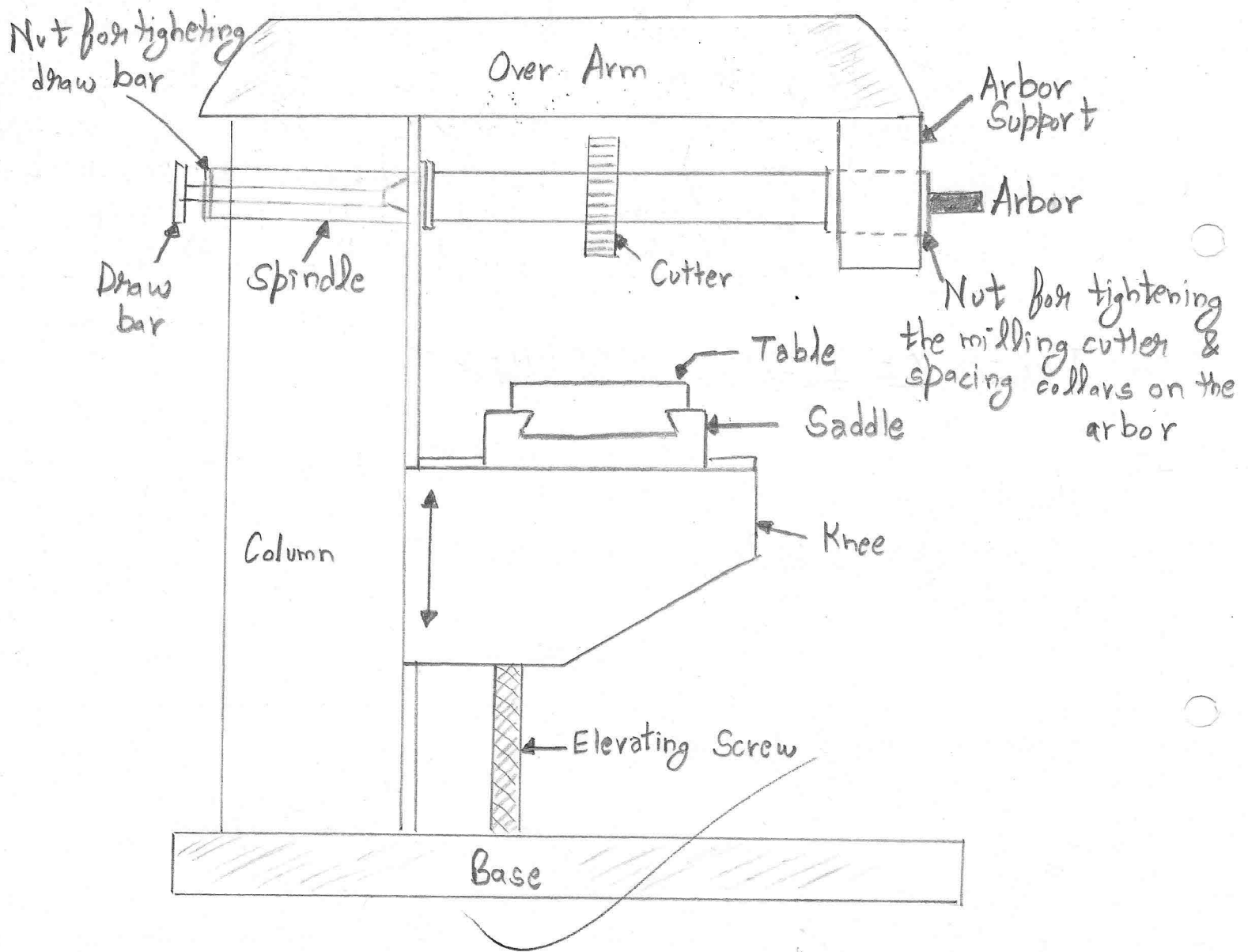


of the cut and minimum in the end. Climb milling can be used advantageously on many kinds of work to increase the number of pieces per sharpening and to produce a better finish. With climb milling, same cut long thin slots more satisfactorily than with standard milling. Another advantage is that slightly lower power consumption is obtainable by climb milling, since there is no need to drive the table against the cutter.

## \* TYPES OF MILLING MACHINES:-

- \* 1. Column and knee type milling machines
  - a) Hand milling machine
  - b) Horizontal milling machine
  - c) Universal milling machine
  - d) Vertical milling machine

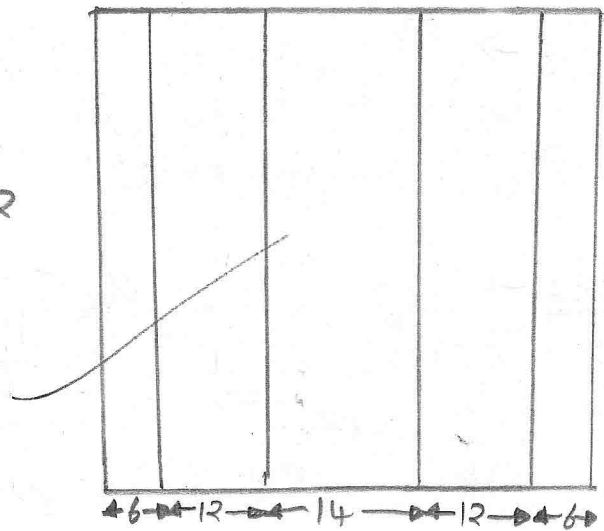
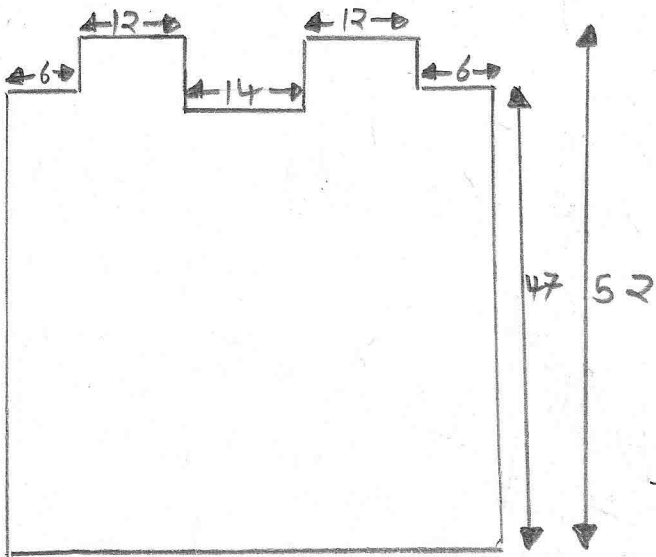
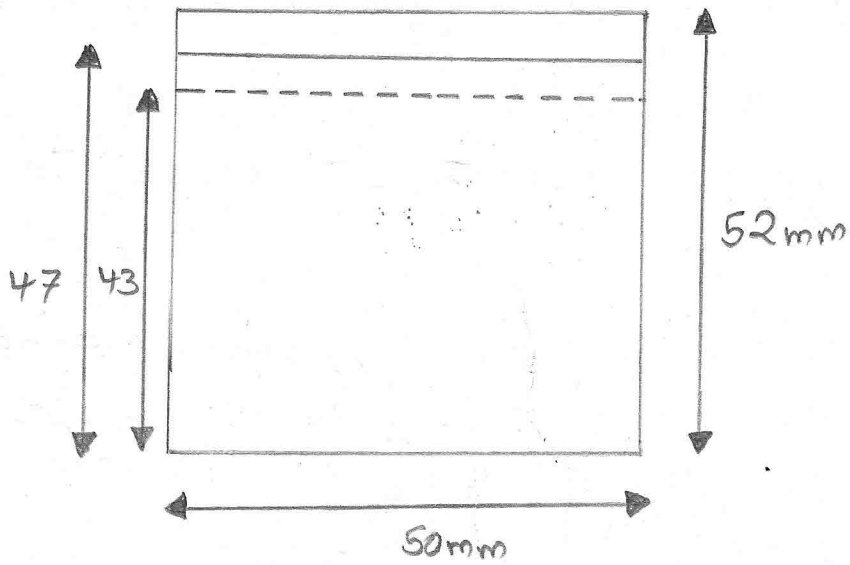
(See Figure)
- 2. Planer milling machine.
- 3. Fixed-bed type milling machine
  - a) Simplex
  - b) Duplex
  - c) Triplex
- 4. Machining centre machines
- 5. Special types of milling machines.
  - a) Rotary table
  - b) Planetary
  - c) Profiling
  - d) Duplicating
  - e) Pantograph
  - f) Continuous
  - g) Drum
  - h) Profiling & tracer controlled



Column and Knee Type Milling Machine

## ★ Parts of Column & Knee Type Milling Machine

- Base → It is the foundation member for all the other parts, which rest upon it. It carries the column at its one end.
- Column → It is the main supporting member mounted vertically on the base. It is box shaped, heavily ribbed inside and houses all the driving mechanism for the spindle and table feed.
- Knee → The knee is a rigid grey iron casting which slides up and down on the vertical ways of the column face. The knee houses the feed mechanism of the table, and different controls to operate it.
- Saddle → The saddle is placed on the top of the knee and it slides on guideways set exactly at  $90^\circ$  to the column face.
- Table → The table rests on ways on the saddle and travels longitudinally. A lead screw under the table engages a nut on the saddle to move the table horizontally by hand or power.
- Overhanging arm → It is mounted on the top of the column, which extends beyond the column face and serves as a bearing support for the other end of



All Dimensions are in mm.

the arbor.

- Spindle → It is situated in the upper part of the column and receives power from the motor through belts, gears and clutches and transmit it to the arbor.

- Arbor → It is like an extension of the machine spindle on which milling cutters are securely mounted and rotated. The arbor assembly consists of -

1. Arbor
2. Spindle
3. Spacing collars
4. Cutter
5. Bearing brush
6. Draw bolt
7. Lock nut
8. Key block
9. Set screw

#### \* Precautions :-

1. Do not change spindle speed when the machine is operating.
2. Do not touch moving parts of machine.
3. Put on shoes & apron while working.
4. Apparatus should be carefully handled.

#### \* References

- B.S Raghuvanshi Vol.-2