

1. Answer All the Questions.

(2x10)

- (a) State the composition of HSS Tool.
- (b) Define depth of cut.
- (c) List the operations carried out in a Lathe.
- (d) What are the types of grinders?
- (e) Define drilling & boring.
- (f) What is super finishing?
- (g) What is the function of Ram?
- (h) Define Abrasive.
- (i) Define grinding.
- (j) What is broaching?

2. Answer Any Six Questions.

(5x6)

- (a) What are the characteristics of tool material?
- (b) Differentiate between Capstan & Turret Lathe.
- (c) Explain working of slotter.
- (d) Describe the properties of coolant & lubricant.
- (e) Explain the specification of grinding wheel.
- (f) With neat block diagram show different components of shaper m/c.
- (g) Explain cutting action of a Reamer.

3. Draw three views of a single point cutting tool & explain the cutting Angles. (10)

4. Explain the working of an Universal dividing head. (10)

5. Explain the Quick Return mechanism of a shaper machine. (10)

6. Describe the composition, properties & use of various cutting tool material. (10)

7. With neat sketch explain the clamping device of a Planner. (10)

ANSWER ANY FIVE QUESTION INCLUDING Q. NO 1 & 2.

1. ANSWER ALL THE QUESTIONS.

- (2x10)
- Define Abrasive.
 - What is the function of ram in sloter?
 - Name the different type of Milling Machine.
 - What are the composition of Carbon steel?
 - Write four main parts of Lathe.
 - Define the multiple tool holder.
 - Why coolants are used?
 - Write four clamping device of a planer m/c.
 - Differentiate between orthogonal & oblique cutting.
 - Define Indexing.

2. ANSWER ANY SIX QUESTION.

- (5x6)
- Explain the working of Radial drilling machine.
 - Explain the method of Taper-Turning operation.
 - Difference between upmilling & Down milling.
 - Explain cutting Action of a hacksaw blade.
 - Explain the Automatic table Feed mechanism of a shaper m/c.
 - Explain the working of Centreless grinder.
 - Draw the diagram of an Universal milling machine & show it's all part.
3. Show & Explain different parts of Capstan Lathe. (10)
4. Explain single point cutting tool Nomenclature. (10)
5. Explain the Quick Return mechanism of a shaper. (10)
6. Explain the manufacturing process of grinding wheel. (10)
7. How we make a hexagonal Nut & bolt? Explain in detail. (10)

IV SEM - MECH. ENGG.

TH-2: MANUFACTURING TECHNOLOGY

FULL MARK-80

TIME-3 HOURS

ANSWER ANY FIVE QUESTION INCLUDING Q. NO 1 & 2

1. ANSWER ALL THE QUESTIONS. (2x10)
- Name various cutting tool material.
 - State the operations which may performed on a Lathe.
 - Why chucks are used?
 - Name different types of drilling machine?
 - Define coolant.
 - What is centreless grinding?
 - Define Depth of cut.
 - State the specification of shaper.
 - What do you mean by surface finishing?
 - Necessity of broaching.
2. ANSWER ANY SIX QUESTION. (5x6)
- List various hand tools & discuss their cutting action.
 - Explain different methods of taper turning.
 - Draw the sketch of capstan & turret lathe with Nomenclature.
 - Describe the main parts of a slotting machine (Any three).
 - Explain the specification of grinding wheels.
 - Draw a simple dividing head & explain it's working.
 - State the properties & uses of any one cutting tool material.
3. Explain with a neat sketch the geometry of a Turning tool. (10)
4. Describe the desirable properties of Coolant & Lubricant. (10)
5. With a neat sketch explain Quick return mechanism of a shaper. (10)
6. Explain cutting Action of a Reamer & chisel. (10)
7. Difference between Shaper & Planner machine. (10).

Drilling Machine

(i) Drilling is an operation through which holes are produce in solid metals.

(ii) The process of making hole is done by the help of a tool which is known as drill tool.

(iii) In drilling operation it is not possible to produce a perfectly true hole with accurate dimensions and surface finish. So, it can be considered as roughing operations.

Q-1 classify drilling machines.

Ans classification of drilling machine:-

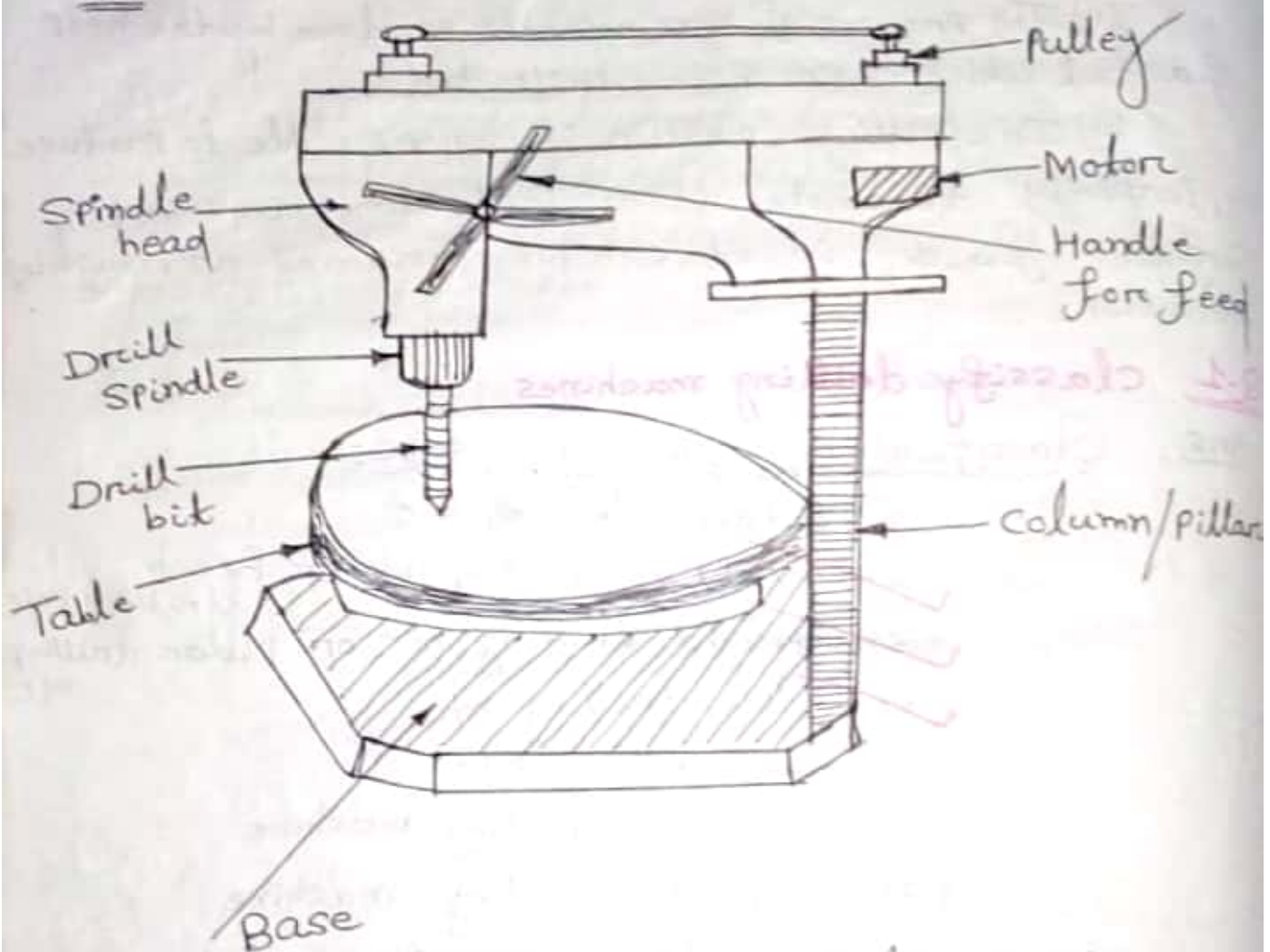
- (1) Portable drilling m/c
- (2) Sensitive drilling m/c or Bench drilling m/c
- (3) Upright drilling m/c or pillar drilling m/c
- (4) Radial drilling m/c
- (5) Gang drilling m/c
- (6) Automatic drilling machine
- (7) Deep hole drilling machine
- (8) Multiple spindle drilling m/c

Note In our syllabus, there are only 3 type of drilling machine is to be studied.

- (a) Sensitive or Bench drilling m/c
- (b) upright or pillar drilling m/c
- (c) Radial drilling machine

Q-2 Explain the construction & working of Bench drilling m/c.

Ans



* It is a light, simple bench type machine used for light duty working.

* The machine can hold drills up to 12.5 mm. diameter.

The major components of bench type drilling m/c are

- (1) Base
- (2) Column
- (3) Table
- (4) Drill spindle
- (5) Drill bit.

Construction Parts

Base:- The base provided support and rigidity to the entire structure of the machine. It is made of cast iron & having a fixed table over it.

Column:-

- (i) The column or pillar is a supporting structure for the table, spindle head and other part of the machine.
- (ii) The column carries a swivelling table.
- (iii) At the top of the column is provided with a motor which act as a drive mechanism for the system.

Table:-

- (i) The table of the drilling m/c supports the workpiece and other clamping devices like drill jigs.
- (ii) By loosening the table clamping handle the table can be adjusted up & down on the column with respect to the drill.

Drill Spindle:-

- (i) The various mechanism of the spindle head powered by the help of motor through belt & pulleys.
- (ii) The top of the column is provided with V-belt running over two pulleys.
- (iii) one of these pulleys mounted over the motor shaft & other is mounted on the spindle head.
- (iv) No gears are used in this drive arrangement.
- (v) Vertical movement of the spindle is given through the feed handle by rack & pinion arrangement.

Drill bit:-

- (i) Various types of drill bit can be used for drilling purpose according to the requirement.
- (ii) Generally Twist drill are used for drilling operation. It made from HSS & High carbon Steel.

Working Principle

(i) When the switch is on of motor, the motor shaft starts revolving.

(ii) Then the power is transmitted through the V-belt which is mounted on the pulley to the other pulley which is mounted on the spindle head.

(iii) Thus the spindle starts rotating & the drill tool also rotates. by the help of the handle we can give feed.

(iv) The handle is mounted on the ^{Pinion} shaft which is connected to a rack which moves longitudinally.

(v) Different spindle speeds can be obtained by shifting the V-belt to the different pairs of driving & driven pulleys.

(vi) While the motor rotates on the same speed.

(vii) There is no arrangement of automatic feed in this machine.

Q-3 With a neat sketch explain the function of pillar drilling machine.

Ans

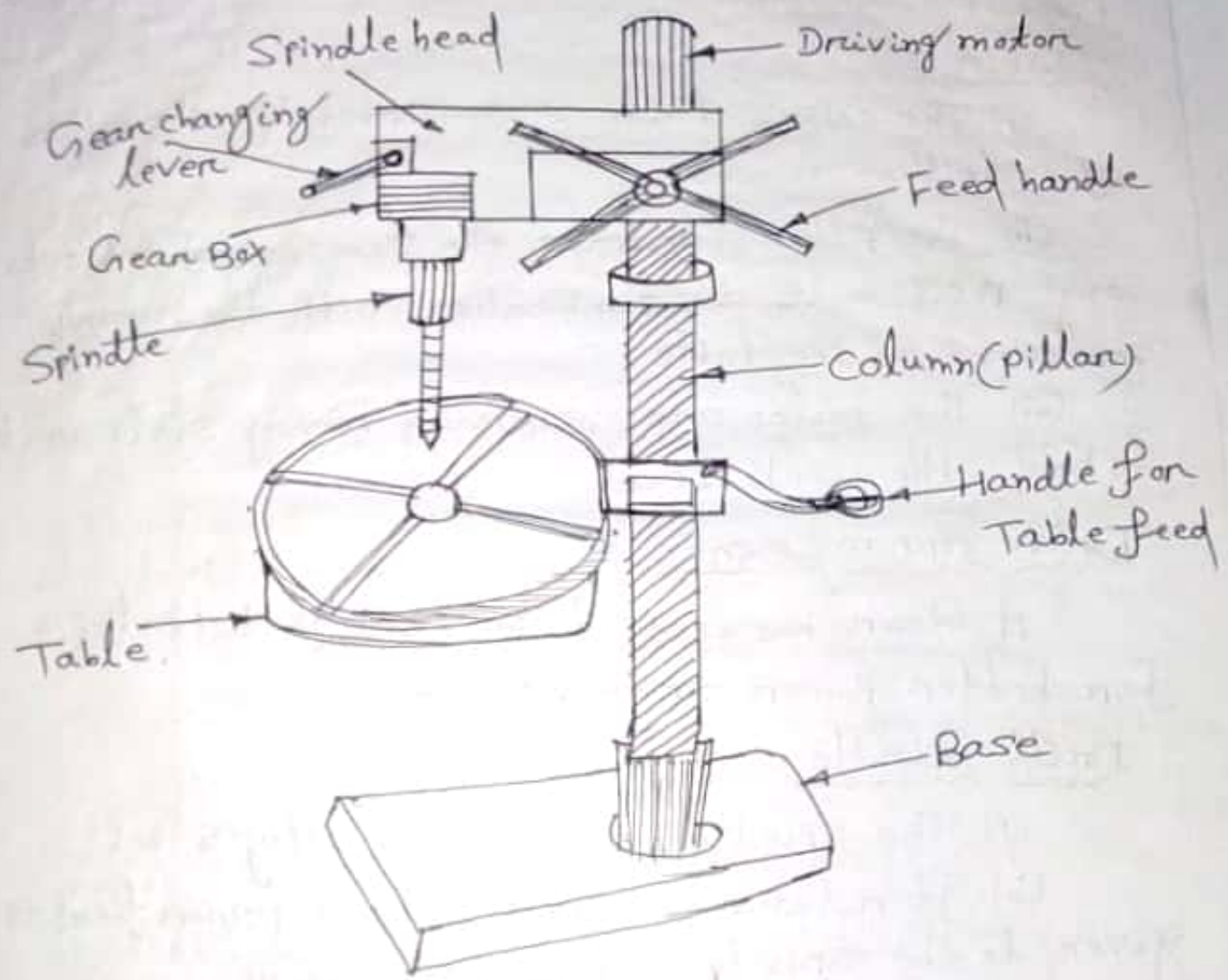
(i) The pillar drilling m/c is used for heavy work and has back gearing arrangement as lathe.

(ii) It is coming under up-right drilling machine.

(iii) It especially differs from a sensitive drilling machine in its weight, rigidity, power feed and wide range of spindle speed.

(iv) It can give speed ranging from 75 to 3500 r.p.m. So, obtain this speed range here

gear box is used instead of belt arrangement.



It consist of following parts.

- (1) Base
- (2) Pillar
- (3) Table
- (4) Spindle
- (5) Drill bit
- (6) Drive Arrangement.

Base:- The base of pillar drilling machine is made of heavy casting supports the pillar & spindle head.

Pillar/column:- The pillar is a hollow pipe of casting made of cast iron. ~~The~~ It rest from the base & supports the spindle head & table. Here rack & pinion gear present. So, that the table

Can be raise or lower depending upon the work piece requirement.

Table:-

- (i) The work table is supported by the pillar of a drilling machine.
- (ii) The pillar facilitates the swinging of table to any position & in combination with the rotary movement of the table.
- (iii) The tables are generally having slots on it to hold the work piece.

Drive Arrangement:-

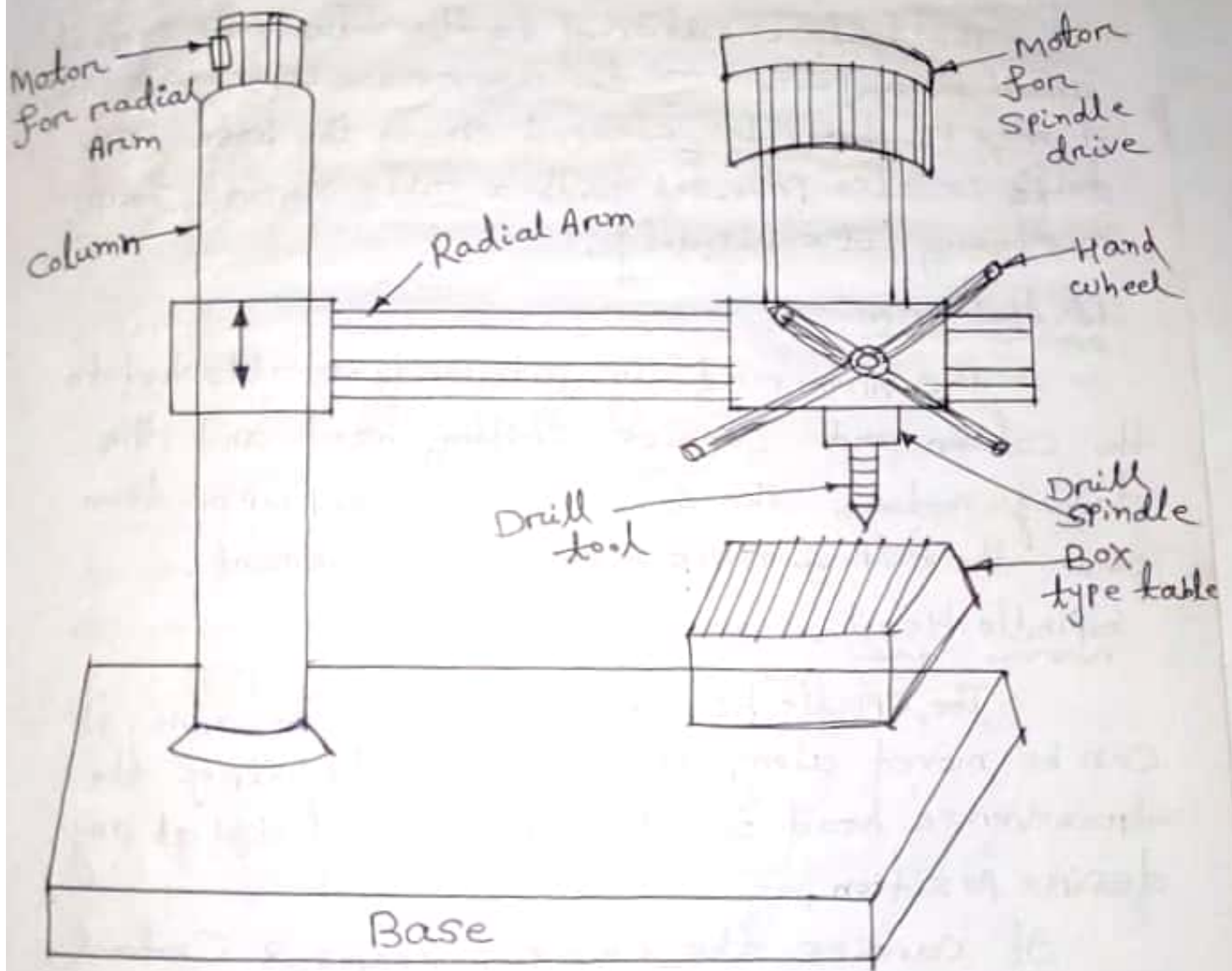
A Gear box is used instead of belt drive for better power transmission.

Drill Spindle:-

- (i) The spindle is made of alloy steel.
- (ii) It rotates the drill & here power feed is given to the spindle for heavier work.
- (iii) It has driven mechanism for changing speeds & feeds and thus a large no. of drill spindles are available to drill different kinds of job.

Q-4 With block diagram explain the construction & working of a radial drilling machine.

Ans The radial drilling machine is used for too large and heavy drill hole.



Base:-

- (i) The base is made box type of cast iron or
- (ii) The base carries the column & it may be bolted on bench with the base.
- (iii) The base must be strong enough to give sufficient rigidity & support to the whole structure & other parts.

Column:-

The column is cylindrical & used to support the radial arm. It is made highly rigid and perfectly round in cross-section.

Table:-

The table is attached to the column to support small work piece. If the work piece is very large, it may be directly clamped on to the base. The table is also provided with a table support for increasing it's rigidity.

Radial Arm:-

The Arm radially outward is attached to the column and carries drilling head and the driving motor. The Arm can be moved up or down with the help of rack & pinion arrangement.

Spindle Head:-

The Spindle Head is mounted on the arm. It can be moved along the arm with the help of the transverse head wheel and can be locked at any desire position.

It carries the changes gears & Control for spindle speed & feed.

Working operation

(i) A separate motor is provided for elevating lowering the radial arm and can also be swing round the column to any desire angle.

(ii) clamping levers are provided for locking the arm at desire height. The spindle head is mounted on the arm which can slide horizontal

on the radial arm.

(iii) These adjustment of the arm & drilling head permit the operator to locate the drill quickly any point of the work.

(iv) Powerful drives are geared directly into the head of the machine and a wide range of power feed are available.

Q-5 Write the basic principle of Boring.

Ans It is the process of enlarging a hole that has already been drilled.

* Boring is used to achieve greater accuracy of the diameter of a hole.

Example This process is to used in large & heavy parts such as engine frames, steam engine cylinder etc.

Q-6 Difference between Boring and drilling.

Ans Boring:-

(i) It is the process of enlarging a hole that is already ~~is~~ in the material. This hole made by drilling.

(ii) Boring concerns the internal diameter and the surface of a hole rather than the depth of the hole.

(iii) Boring is done using a boring bar; which is a heavy metal bar with the tool fixed at the end.

Drilling

(i) Drilling is the cutting process of a material using a specially designed rotating cutting tool called a drill bit.

(ii) The holes are produced by the drilling are always cylindrical in drilling process is simple.

(iii) The drill bit is rotated by a drill and pressed against the material, where the tip of the drill bits cuts away the layers of material. By continually pressing against the material, a hole of a desired length can be created.

BROACHING

Q-1 Define Broaching.

Ans It is a method of removing metal by pushing or pulling a cutting tool called a broach which cuts in fixed path.

- * The tool may be pulled or pushed through the surfaces to be finished.

- * Surface finished by broaching may be flat or contoured and may be either internal or external.

- * A broach is a multiple edges cutting tool that has successively higher cutting edges along the length of the tool.

Q-2 Write down types of Broaching.

Ans Types of Broaching

It may be classified in various ways according to :-

1. Type of operation → Internal & external
2. Method of operation → Push & Pull
3. Type of Construction → Solid, overlapping tooth, rotor cut, inserted tooth.

According to our Syllabus Push & Pull broaching Study.

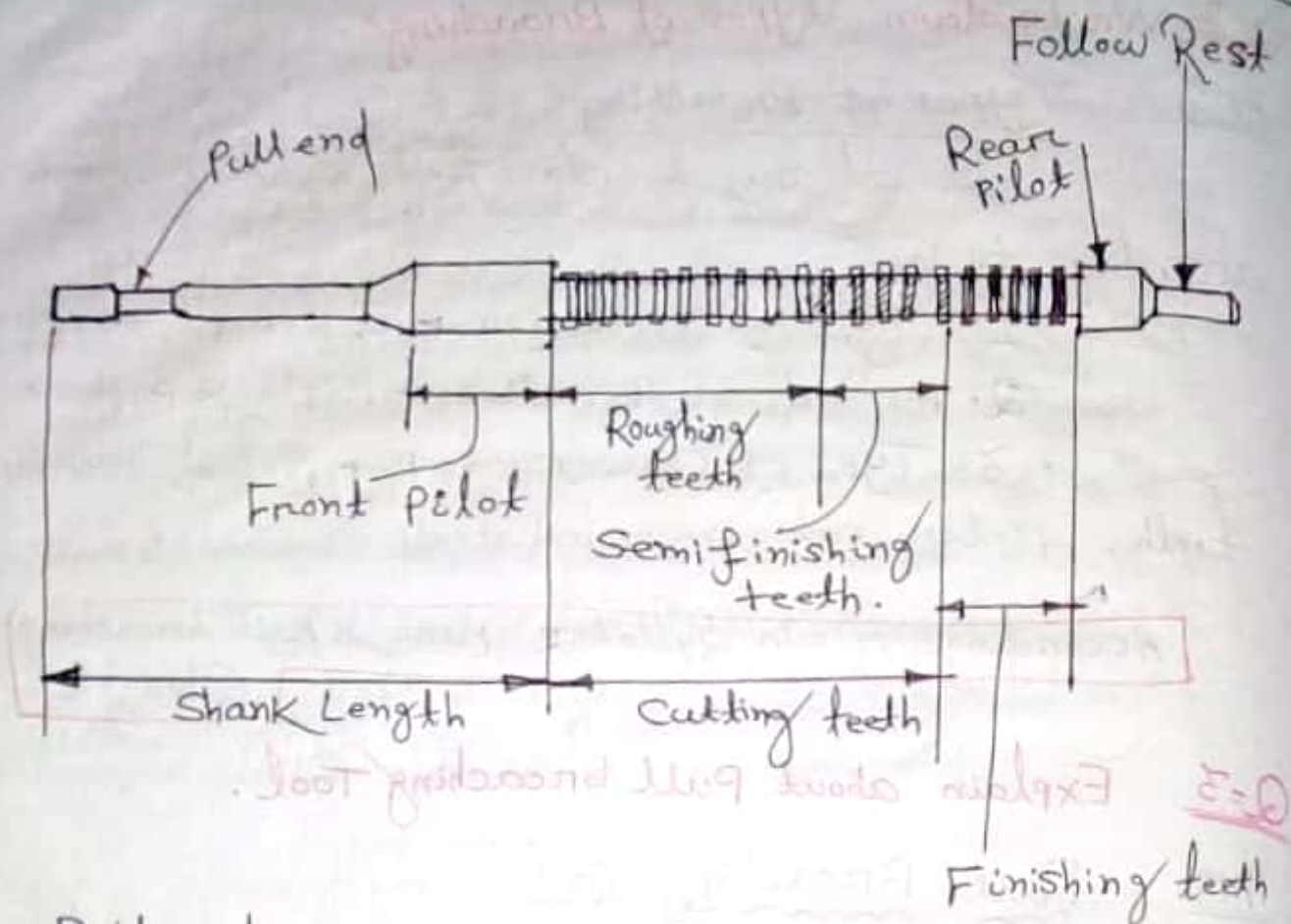
Q-3 Explain about Pull broaching Tool.

Ans Pull Broaching Tool

(i) In Pull broach; the tool is entirely in tension & long slender broaches are possible, having a large no. of teeth.

(ii) In pull broaching methods; the work is held stationary and the broach is pulled through the work. Broaches are held in a special head. Pull broaching is used mostly for internal broaching but it can do some surface broaching.

(iii) Ordinary cut broaches for machining previously drilled or bored holes consist of different elements, which are discussed below.



Pull end:-

This is designed to permit engagement of the broach with the broaching machine through the use of a puller ~~and~~ head.

Front pilot

This centres the broach in the hole before the teeth begins to cut.

Roughing & Semi-finished teeth

They Remove most of the stock in the hole.

Finishing Teeth:-

They are for sizing the hole and must have the shape required the finished hole.

Rear Pilot & Follow Rest

They support the broach after the last tooth leaves the hole.

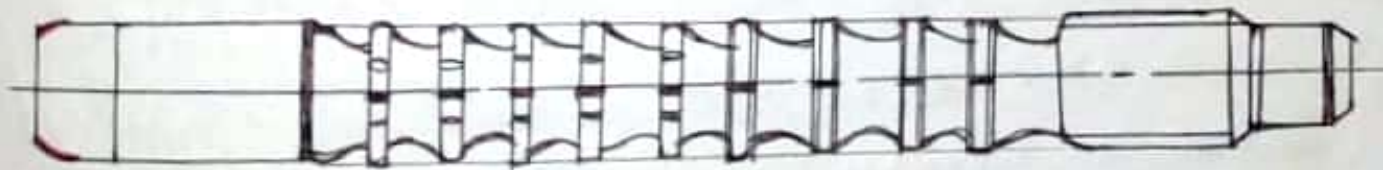
* Push Broaching:-

(i) A push broach is one that is designed to be pushed through the workpiece by special press or push broaching machining. Because of the tendency to bend under compressive loads, the push broach must be short which means, less material can be removed for each pass of the tool.

(ii) In this broaching, the work is held stationary and the broach is pushed through the work.

(iii) Hand & hydraulic arbor presses are popular for push broaching. This method is used mostly for sizing holes and cutting keyways.

Broaching Application



(Figure of push Broach)

Q-4 What are the advantages of Broaching?

Ans Advantages

(1) Rate of Production is very high. With properly applied broaches, fixtures and machined, more pieces can be turned out per hour by broaching than by any other means.

(2) Little skill is required to perform a broaching operation.

(3) High Accuracy and a high class of Surface finish is possible.

(4) Both roughing and finishing cuts are completed in one pass of the tool.

(5) The process can be used for either internal or external Surface finishing.

(6) Any form that can be reproduced on a broaching can be machined.

Broaching Application

Broaches are used for high production and for finishing high surfaces.



Q-1 Define Surface Finishing.

Ans Super finishing is the proper function and service life of a machine part depending upon the quality of its surface that is its surface finish.

⇒ Various basic operations like turning, boring, drilling, milling, shaping etc. are used to produce various parts.

⇒ These parts are accurate in size but they don't carry a very high degree of surface finish for which the service life of the parts decreases.

⇒ So, to obtain highly finish surface various operations are performed as:- Lapping, Honing, Super finish, Grinding operation etc.

Q-2 Define Superfinishing.

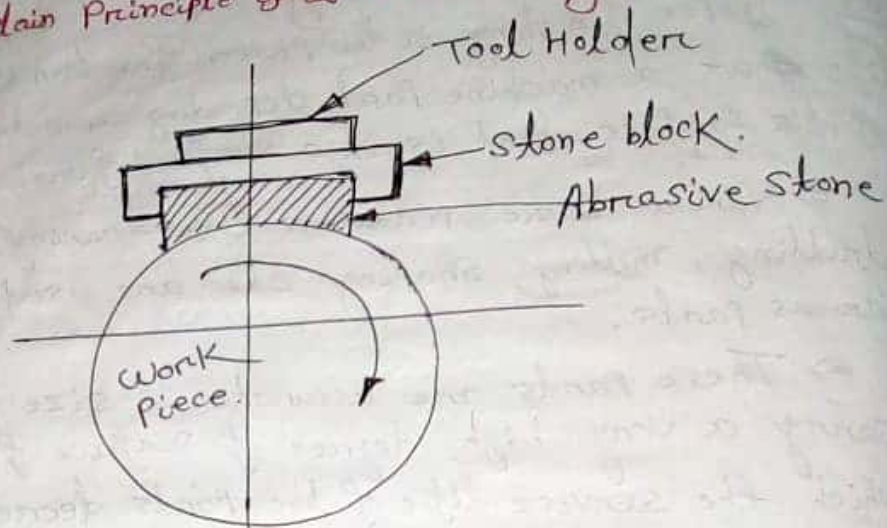
Ans (i) It is a process generally used for achieving high degree surface finish on the components. Removing the scratches or various marks from the work piece.

(ii) It is a not primarily dimension changing process but mainly used for high quality surface finish on the work piece.

(iii) In this process very less amount of metal is removed which ranges from 0.0025 mm to 0.005 mm.

Q-3 Explain Principle of Superfinishing.

Ans



- (i) The principle of Superfinishing is shown in fig. Here the face of abrasive stone is given the shape of the work piece to be super finished.
- (ii) The Abrasive stone block is held in a suitable tool holder & the whole arrangement is placed on the work surface.
- (iii) The work piece is rotated at very slow speed. As the work rotated, the abrasive stone block reciprocates forward & backward at a rapid rate with rubbing of the stone. As a result super finishing surface is obtained.

Q-4 Description about Lapping.

Ans

(i) Lapping is a process employed for improving the surface finish by reducing roughness, waviness and other irregularities on the surface.

(ii) It should be used only where geometrical accuracy is vital with surface finish.

(iii) The material to be selected for making lapping tools are soft cast iron, copper, brass, lead etc.

(iv) Sometimes abrasive particles are also used. These particles are natural and artificial abrasive particles.

(v) Aluminium oxide (Al_2O_3), Silicon Carbide & diamonds are used for lapping materials.

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7. With neat sketch explain the clamping device of a Planner. (10)

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