

**VV COLLEGE OF ENGINEERING**  
**DEPARTMENT OF MECHANICAL ENGINEERING**  
**TWO MARK QUESTIONS WITH ANSWERS**

**2017 Regulations**

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*Subject Name* : MANUFACTURING TECHNOLOGY-II

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## UNIT – I

### THEORY OF METAL CUTTING

#### 1. Explain the cutting shaping process?

The required shape of metal is obtained by removing the unwanted material from the work piece in the form of chips is called cutting shaping. Example: Turning, Drilling, Milling, Boring etc.

#### 2. Classify the relative motion between work piece and cutting tool.

- (i) Rotation of work against the tool. Example: Turning,
- (ii) Rotation of tool against work piece. Example: Drilling, Milling,
- (iii) linear movement of the work piece against the tool. Example: Planer,
- (iv) Linear movement of the tool against the work. Example: Shaper.

#### 3. What are all the different types of cutting tool?

- (i) Single point cutting tool, (ii) multiply point cutting tool.

#### 4. Classify the various angles in cutting tool?

- 1) Back rake angle 2) Side rake angle 3) End relief angle 4) Side relief angle 5) Side cutting angle
- 6) End cutting angle.

#### 5. What is tool signature?

The various angles of tools are mentioned in a numerical number in particular order. That order is known as tool signature.

#### 6. What is effect of back rake angle and mention the types?

Back rake angle of tool is increases the strength of cutting tool and cutting action. It can be classified into two types. 1. Positive rake angle. 2. Negative rake angle.

#### 7. What is side rake angle and Mention its effects?

The angle between the tool face and the line parallel to the base of the tool. It is used to control chip flow.

#### 8. What is clearance angle and mention the types?

These are the slopes ground downwards from the cutting edges. The clearance angle can be classified into two types. i Side relief angle. Ii. End relief angle. .

#### 9. Explain the nose radius

Joining of side and end cutting edges by means of small radius in order to increase the tool life and better surface finish on the work piece.

#### 10. What are all conditions for using positive rake angle?

- a. To machine the work hardened materials.
- b. to machine low strength ferrous and non-ferrous metals.
- c. To turn the long shaft of small diameters.
- d. To machine the metal below recommended cutting speeds.

**11. When will the negative rake angles be used?**

- a. To machine high strength alloys.
- b. The machine tools are more rigid.
- c. The feed rates are high.
- d. To give heavy and interrupted cuts.

**12. Classify the types of metal cutting process?**

The metal cutting processes are mainly classified into two types.

- a. Orthogonal cutting process (two dimensional cutting),
- b. Oblique cutting process (Three dimensional cutting).

**13. Define orthogonal and oblique cutting?**

Orthogonal cutting :- The cutting edge of tool is perpendicular to the work piece axis.

Oblique cutting :- The cutting edge is inclined at an acute angle with normal to the cutting velocity vector is called oblique cutting process.

**14. What is shear plane?**

The material of work piece is stressed beyond its yield point under the compressive force. This causes the material to deform plastically and shear off. The plastic flow takes place in a localized region is called shear plane.

**15. What is cutting force?**

The sheared material begins to flow along the cutting tool face in the form of small pieces. The compressive force applied to form the chip is called cutting force.

**16. What is chip and mention its different types?**

The sheared material begins to flow along the cutting tool face in the form of small pieces is called chip. The chips are mainly classified into two types.

- a. Continuous chip.
- b. Discontinuous chip.
- c. Continuous chip with built up edge.

**18. When will the continuous chip deformed?**

The following factor favours the formation of continuous chip.

- (i) Ductile material
- (ii) Smaller depth of cut
- (iii) High cutting speed
- (iv) Large rake angle
- (v) Sharp cutting edge.
- (vi) Proper cutting fluid,
- (vii) Low friction between tool face and chips.

**19. What are the favourable factors for discontinuous chip formation?**

a. Machining of brittle material, b. Small rake angle, c. Higher depth of cut, d. Low cutting speeds, e. Excess cutting fluid. f. Cutting ductile material with low speed and small rake angle of the tool.

**20. What are the favorable factors for continuous chip with built up edge?**

- a. Low cutting speed.
- b. Small rake angle.
- c. Coarse feed.
- d. Strong adhesion between chip and tool face.
- e. Insufficient cutting fluid.

**21. What is chip thickness ratio?**

The ratio of chip thickness before cutting, to chip thickness after cutting is called chip thickness ratio.

**22. What is chip reduction co-efficient?**

The reciprocal of chip thickness ratio is called chip reduction co-efficient.

**23. Classify the different types of chip breakers?**

The chip breakers are classified into three types. a. Step type. b. Groove type. c. Clamp type.

**24. What are the cuttings forces acting on the cutting tool?**

During the cutting process, the following three component of cutting forces acting mutually right angles.

- a. Feed force  $F_x$  acts in a horizontal plane, but in the Direction opposite to feed.
- b. Thrust force  $F_y$  acts in a direction perpendicular to the generated surface.
- c. Cutting force  $F_z$  in the direction of the main cutting motion.

**26. What are the assumptions made by merchant circle?**

- a. The chip formation will be continuous without built up edge.
- b. During cutting process cutting velocity remains constant,
- c. The cutting tool has a sharp cutting edge so that it does not make flank contact to the work piece.

**27. What is metal removal rate?**

It is defined as the volume of metal removed in unit time. It is used to calculate time required to remove specified quantity of material from the work piece.

**28. What are the assumptions made in lee and Shaffer's theory?**

- a. The work ahead of the tool behaves as ideal plastic mass
- b. There exists a shear plane which separates the chip and work piece
- c. No hardening in chip occurs.

**29. Explain the total energy of the cutting process?**

Total energy per unit volume is approximate equal to the sum of following four energies.

- a. Shear energy per unit volume in shear plane, b. Friction energy per unit volume in tool face,
- c. Surface energy per unit volume due to the formation of a new surface area in cutting.
- d. Momentum energy per unit volume, due to the change in momentum associated with the metal it crosses the shear plane.

**30. Define mach inability of metal?**

Mach inability is defined as the ease with which a material can be satisfactorily machined.

**31. What are the factors affecting the machinability?**

- a. Chemical composition of work piece material,
- b. Microstructure of work piece material
- c. Mechanical properties like ductility, toughness etc.
- d. Physical properties of work materials.
- e. Method of production of the work materials.

**32. What are all the tool variables affecting the machinability?**

- a. Tool geometry and tool material.
- b. Nature of engagement of tool with the work.
- c. Rigidity of tool.

**33. What are the machine variables affecting the machinability?**

- a. Rigidity of machine. b. Power and accuracy of the machine tool.

**34. How the machinability can be evaluated?**

The following criteria suggested for evaluating machinability.

- a. Tool life per grind,
- b. Rate of removal per tool grind,
- c. Magnitude of cutting forces and power consumption. Surface finish.
- e. Dimensional stability of finished work.
- f. Heat generated during cutting.
- g. Ease of chip disposal.
- h. Chip hardness, shape and size.

**35. Mention the advantage of high machinability?**

- a. Good surface finish can be produced,
- b. High cutting speed can be used,
- c. Less power consumption,
- d. Metal removal rate is high,
- e. Less tool wear.

**36. What is machinability index?**

It is a comparison of machinability of different material to standard material. US material standard for 100% machinability is SAE 1112 hot rolled steel.

$$\text{Machinability index, } I = \frac{\text{Cutting speed of metal investigated for 20 minutes tool life}}{\text{Cutting speed of standard steel for 20 minutes tool life}}$$

**37. Classify the tool wear?**

The tool wear is generally classified as follows, (i) Flank wear or crater wear (ii) Face wear (iii) Nose wear

**38. How tool life is defined?**

Tool life is defined as time elapsed between two consecutive tool sharpening. During, this period tool serves effectively and efficiently.

**39. What are the ways of representing tool life?**

The following are some of the ways of expressing tool life.

- i. Volume of metal removed per grind,
- ii. Number of work piece machined per grind, iii. Time unit.

**40. What are the factors affecting tool life?**

- i. Cutting speed ii. Feed and depth of cut iii. Tool geometry iv. Tool material v. Cutting fluid
- vi. Work material vii. Rigidity of work, tool and machine.

**41. Express the Taylor's tool life equation.**

Taylor's tool life equation

$$VT^n = C$$

V= Cutting speed in m/min.

T = Tool life in minute

C = Constant

n = Index depends upon tool and work.

**42. What are all the factors considered for selection of cutting speed?**

i. Tool life ii. Properties of material being machined, iii. Rate of feed iv. Depth of cut v. Tool geometry. Vi. Cutting fluid used, vii. Type of machining process viii. Surface finish to be obtained

**43. What are the factors should be considered for selection of tool materials?**

- i. Volume of production
- ii. Tool design
- iii. Type of machining process
- iv. Physical & Chemical properties
- v. Rigidity and condition of machine.

**44. What are the important characteristics?**

- i. Hot hardness
- ii. Wear resistance
- iii. Toughness
- iv. Low friction
- v. Cost of tool
- vi. High thermal conductivity
- vii. Resistance to thermal shock
- viii. Easy to grind and sharpen.

**45. Name any four tools material?**

- i. Carbon tool steel
- ii. High speed steel
- iii. Cemented carbides
- iv. Ceramics
- v. Diamonds

**46. What is the function of cutting fluids?**

- i. It is used to cool the cutting tool and work piece,
- ii. It lubricates the cutting tool and thus reduces the co-efficient of friction between tool and work,
- iii. It improves the surface finish as stated earlier,
- iv. It causes the chips to break up into small parts,
- v. It protects the finished surface from corrosion,
- vi. It washes away the chips from the tool. It prevents the tool from fouling,
- vii. It prevents corrosion of work and machine.

**47. What are the properties of cutting fluid?**

- i. It should have good lubricant properties,
- ii. High heat absorbing capacity,
- iii. It should have a high specific heat, high heat conductivity and high film co-efficient,
- iv. High flash point.
- v. It should be odorless,
- vi. It should be non-corrosive to work and tool,
- vii. It should have low viscosity to permit free flow of the liquid.

**48. What is built up edge?**

During cutting process, the interface temperature and pressure is generated and metal which is already compressed to the tool nose gets welded to the nose of the tool. The extra metal which is welded to the tool nose it is called as build up edge.

**49. Briefly differentiate between orthogonal cutting and Oblique cuttings?**

Orthogonal cutting

- The cutting edge of the tool is perpendicular to the cutting velocity vector.
- The chip flows over the tool face and the direction of chip-flow velocity is normal to the cutting edge.
- The cutting edge clears the width of the work piece on either ends. (i.e. No side flow)
- The maximum chip thickness occurs at its middle.

Oblique cutting

- The cutting edge is inclined at an acute angle with normal to the cutting velocity vector.
- The chip flows on the tool face making an angle with the normal on the cutting edge.
- The cutting edge may or may not clear the width of the work piece.
- The maximum chip thickness may not occur at the middle.

**50. Mention the various parts single point cutting tool?**

- 1) Shank, 2) Face, 3) Flank, 4) Base, 5) Nose, 6) Cutting edge.

**UNIT – II**

**TURNING MACHINES**

**1. What are the various operations can be performed on a lathe?**

- 1) Turning 2) Facing. 3) Forming. 4) Knurling 5) Chamfering 6) Thread cutting. 7) Drilling  
8) Boring 9) Recessing 10) Tapping 11) Grooving etc.

**2. What are the principle parts of a lathe?**

- 1) Bed 2) Headstock 3) Tailstock 4) Carriage 5) Cross-slide 6) Tool post

**3. What are the main requisites of a lathe bed?**

The lathe bed should be very strong to withstand: cutting forces and vibrations during machining.

**4. What are the uses of headstock?**

- 1 Headstock carries a hollow spindle with nose to hold the work piece.
2. To mount the driving and speed changing mechanisms.

**5. What is the main difference between live center and dead center?**

- i. Live center drives and rotates along with the work pieces.
- ii. Dead center is driven by headstock and it just supports support the other end of the work.

**6. State the various parts mounted on the carriage.**

- a. Saddle, b. Compound rest, c. Cross slide, d. Tool post.

**7. What is a compound rest?**

A member or part, which is mounted on the top of the cross slide having a base graduated in degrees.

**8. List any four types of lathes?**

- 1) Engine lathe. 2) Bench lathe. 3) Tool room lathe 4) Semi-automatic lathe. 5) Automatic lathe.

**9. What is a semi-automatic lathe?**

A lathe in which all the machining operations are performed automatically and loading and unloading of work piece, coolant on or off is performed manually.

**10. What are the advantages semi-automatic lathes?**

- 1) Production time is minimized.
- 2) Accuracy will be high.
- 3) Production rate is increased.

**11. What is an automatic lathe?**

In addition to automatic machining operations loading and unloading are also performed automatically.

**12. Define feed.**

Feed is defined as the movement of the tool relative to the work, in the work piece by form tool.

**13. State the various feed mechanisms used for obtaining automatic feed.**

- 1) Tumbler gear mechanism
- 2) Quick change gearbox.
- 3) Tumbler gear-Quick change gearbox.
- 4) Apron mechanism.

**14. List any four work holding devices.**

- 1) Chucks, 2) Centres, 3) Face plate, 4) Angle plate.

**15. Mention the use of chucks.**

Chucks are used to hold the work piece of small length and large diameter.

**16. What are the various types of chucks?**

- 1) Three jaw chuck (or) Self centering chuck.
- 2) Four jaw chuck or Independent chuck. ..
- 3) Magnetic chuck

**17. What is the use of Mandrels?**

Mandrels are used for holding hollow work pieces.

**18. Define steady and follower rest.**

Steady rest:- It is fixed on bed ways of the lathe by clamping the bolts.

Follower rest: - The saddle is mounted on the saddle and moves together with the tool.

**19. What are the different operations performed on a lathe?**

- 1) Centering 3) Rough turning 5) Shoulder turning 7) Chamfering
- 2) Straight turning 4) Finish turning 6) Facing 8) Knurling etc.

**20. Define filing operation.**

Filing is the process of removing burrs, sharp corners and feed marks on a work piece by removing very small amount of metal.

**21. Define the process "grooving".**

Grooving is the process of reducing the diameter of the work piece over a very narrow surface.



22. **Parting off is an operation of \_\_\_\_\_**  
Cutting a work piece after machining.

23. **What is reaming and boring operation ?**

Reaming: - It is the operation of finishing and size a already drilled hole.

Boring: - It is the process of enlarging a already drilled hole.

24. **Define the term "Conicity".**

The ratio of the difference in diameters of the taper to its length.

$$K = \frac{D - d}{l}$$

Where,

D - Bigger diameter

d - Smaller diameter

l - Length of the work piece.

25. **State the various methods for taper turning operation.**

- 1) Form tool method.
- 2) Tailstock set over method.
- 3) Compound rest method.
- 4) Taper turning attachment method.

26. **Write down the formula for calculating taper turning angle by compound rest method.**

$$\tan \alpha = \frac{D - d}{2l}$$

Where,

D - Bigger diameter

d - Smaller diameter

l - Length of the work piece

27. **State the important requites of capstan and turret lathe.**

- 1) Bed 2) Head stock. 3) Turret head 4) Saddle and Cross slide.

28. **What type of mechanism is used for indexing the turret head for the next operation? Geneva or Indexing mechanism.**

29. **Name any four work holding devices.**

- .1) Collets 2) Chucks 3) Fixtures 4) Power chucks

30 **name any four tool holding devices**

- 1) Multiple cutter holder.
- 2) Offset cutter holder.
- 3) Sliding cutter holder.
- 4) Knee tool holder.

## UNIT III

### SHAPER, MILLING AND GEAR CUTTING MACHINES

**1. What is shaper?**

The shaper is a reciprocating type of machine tool intended to produce flat surface. These surfaces may be horizontal, vertical or inclined.

**2. Classify the shaper according to the reciprocating of ram.**

i. Crank type, ii. Hydraulic type, iii. Geared type.

**3. Classify the shaper according to the travel and position of the ram**

a. Horizontal type, b. Vertical type, c. Traveling head type.

**4. Classify the shaper according to the design of table**

a. Standard type, b. Universal type.

**5. Classify the shaper according to the type of cutting stroke**

a. Push type, b. Draw type

**6. List the different types of parts involved in the shaper**

a. Base, b. Column, c. Cross rail, d. Saddle, e. Table, f. Ram, h. Tool head.

**7. List the parts in tool head .**

a. Swivel base, b. Vertical slide , c. Apron, d. Tool post

**8. List the parts in apron.**

a. Clapper box, b. Clapper block, c. Tool post

**9. What are the different types of mechanism used in shaper?**

a. Crank and slotted Mechanism  
b. Whit worth mechanism  
c. Hydraulic shaper mechanism

**10. List the two block used in the Crank and slotted Mechanism.**

a. Bull gear sliding block, b. Rocker arm sliding block.

**11. What is Crank and slotted Mechanism?**

The rotary motion of the bull gear is transmitted in to reciprocating motion of the ram through the rocker arm.

**12. What are the different types of adjustment made in the Crank and slotted Mechanism?**

a. Adjusting the length of stroke.  
b. Adjusting the position of the stroke.

**13. What is the use of shaper dog in hydraulic shaper mechanism?**

It is used to change the position of the flow to facilitate the reciprocating motion.

**14. What are the advantages of hydraulic shaper mechanism?**

- a. The cutting and return speed are partially constant through out the stroke.
- b. Infinite number of cutting may be obtained from zero to maximum value and control easier.

**15. What are the work holding devices used in shaper.**

1. Clamping the vise
2. Clamping on the table
3. Clamped to the angular plate.

**16. What are the devices used to hold the work in to the table?**

- a. T bolt and clamps
- b. Stop pins
- c. Strip and stop pins

**17. What are the different operations performed by using shaper?**

1. Horizontal surface ,
2. Vertical surface
3. Angular surface ,
4. Cutting slot and key ways
5. Irregular surface

**18. What is planer?**

The planer like a shaper is a machine tool primarily intended to produce plane and flat surfaces by a single point cutting tools. it is used to machining a large work piece which cannot accommodate by shaper table.

**19. What is the difference between shaper and planer?**

The fundamental difference between shaper and planer is that in a planer the work which is supported on the table reciprocate and the cross wise and perpendicular movement of the tool but shaper the tool reciprocate cross wise and vertical movement of the table.

**20. What are the types of planer?**

- a. Double housing planer
- b. Open side planer
- c. Pit planer
- d. Edge or plate planer
- e. Divided table planer

**21. What is open side planer?**

The open side planer is having housing at one side which is used to accommodate large work pieces.

**22. What is the main intention for plate planer?**

It is used to squaring and beveling the edges of steel plates used for different pressure vessels.

**23. What is divided table planer?**

This type of planer has two tables on the bed which may be reciprocated separately or together. It is used to reduce the time for setting the work pieces in the table.

**24. What are the parts involved in the planer?**

- a. Bed
- b. table
- c. Tool head
- d. Cross rail
- e. Housing or column.
- F. Driving and feed mechanism.

**25. What are the parts involved in tool head?**

1. Saddle
2. Swivel base
3. Apron
4. Clapper box
5. Clapper block

**26. List the mechanism involved in the planer.**

1. Table feed
2. Feeding

**27. List the mechanism used to drive the table.**

1. Open and cross belt drive
2. Reversible motor
3. Hydraulic

**28. What is belt shifter lever?**

It is used to shift the cross and open belt from one pulley to other to reverse the direction of the table.

**29. List two general methods to drive the rack in planer.**

1. Through a train of gearing to bull gear engaging the rack.
2. By a worm mounted on the motor spindle which meshes with the rack at an angle

**30. List the advantages of electric drive in planer.**

1. There is very little chance of any accident as the net driving arrangement is eliminated.
2. Large number of cutting speed and return speed are available.
3. Control is quick and accurate.

**31. List the feed mechanism used in planer.**

- a. By friction disc,
- b. By electric drive.

**32. List the feed involved in the planer.**

1. Cross feed, 2. Down feed

**33. What are the factors considered to hold the work piece in planer?**

1. Work should be rigidly fixed to the table so that it may not be shifted out of its position while cutting activity progresses.
2. Proper clamping should be needed all around the work piece.

**34. What are the devices used to clamp the work in planer?**

1. By standard clamping
2. By special fixtures

**35. List the standard clamping devices used in planer.**

1. Heavy duty vice
2. T bolt and clamps
3. Angle plate
4. Stops

**36. What is the use of planer jack?**

It is used to support the overhanging parts.

**37. List the planer operation.**

1. Horizontal surface,
2. Vertical surface
3. Planning curved surfaces,
4. Planning slots and grooves.

**38 What is slotter?**

It falls under the category of reciprocating types of machine tool similar to shaper.

**39 What is the difference between shaper and slotter?**

1. In shaper ram reciprocates about horizontal axis but slotter the ram reciprocates about vertical axis.

**40. What is the difference between vertical shaper and slotter?**

In vertical shaper the holding the tool may also reciprocate at an angle to the horizontal table in addition to the vertical stroke.

**41. What is the use of slotter?**

It is used to cutting groove, keyway, and slots of various shapes.

**42. What are the types of slotter?**

1. Puncher slotter,
2. Precision slotter

**43. What is puncher slotter?**

The puncher slotter is heavy, rigid machine designed for removal of large amount of work pieces. It is driven by a spiral pinion meshing with the rack teeth on the under side of the ram.

**44. What are the parts involved in slotter?**

1. Base
2. Column
3. Saddle
4. Cross slide
5. Rotating table.
6. Ram and tool head.

**45. List the ram driving mechanism used in slotter.**

1. Whith worth quick return mechanism
2. Variable speed reversible motor drive mechanism.
3. Hydraulic drive.

**46. List the feed involved in slotter.**

1. Longitudinal feed
2. Cross feed
3. Circular feed.

**47 List the slotter operation.**

1. Machining flat surfaces
2. Cylindrical surfaces
3. Irregular surfaces.
4. Slot, key ways and grooves.

**48. What is drilling machine?**

It is the one of the machine tools used in workshops. It is used to produce hole on the surface of the work piece and the hole may be drilled quickly and accurately.

**49. List the types of drilling machines.**

1. Portable drilling machine
2. Sensitive drilling machine
3. Upright drilling machine
4. Radial drilling machine
5. Gang drilling machine

6. Multiple spindle drilling machine
7. Automatic drilling machine
8. Deep hole drilling machine

**50. List the types of Sensitive drilling machine.**

1. Bench mounting 2. Flour mounting.

**51. List the types of Upright drilling machine**

1. Round column 2. Box column

**52. List the types of Radial drilling machine.**

1. Plain 2. Semiuniversal 3. Universal.

**53. List the types of Deep hole drilling machine.**

1. Vertical. 2. Horizontal

**54. What is sensitive drilling machine?**

It is a small machine designed for drilling a small holes at high speed in light jobs. The feed should be manual .It is used to produce the up to 1.5 to 15mm.

**55. What are the different adjustments made in Round column drilling machine?**

1. Arm and table moves up and down to accommodate the work piece.
2. Arm and table may be moved in an arc up to 180 around the column
3. The table may be rotated 360 about its own axis.

**56. What is the use of deep hole drilling machines?**

It is used to produce deep holes in rifle barrels, cranks shaft, long shafts.

**57. List the part involved in the up right drilling machine.**

1. Base 2. Column 3. Table 4. Head 5. Spindle, quill and drill head assembly.

**58. List the part involved in the radial drilling machine.**

1. Base 2. Column 3. Radial arm 4. Drill head

**59 What are the work holding devices used in drilling machine?**

1. T bolt and clamp , 2. Step block, 3. Angle plate, 4. Drill jig.

**60. What are the different operations performed in drilling machine?**

1. Driling 2. Reaming 3. Boring 4. Counter boring 5. Counter sinking 6. Spot facing 7. Tapping 8. Lapping 9. Grinding.

**61. What is reaming?**

It is the secondary operation after the drilling operation has been performed to produce the accurate hole or finish the hole.

**61. What is boring?**

It is used to enlarge the hole by means of adjustable cutting tool with only one cutting edge.

**62. What is counter boringg?**

It is used to enlarge the end of the hole cylindrically and the enlarge hole forms the square shoulders with original hole.

**63. What is tapping?**

It is the operation to produce internal threads by using tap tool.

**64. List the types of drill.**

1. Flat or spade drill, 2. Straight fluted drill, 3. Two lip twist drill, 4. Centre drill.

**65. What is heel?**

The edge is formed by the intersection of the flute surface and body clearance.

**66. What is lip?**

The edge formed by the intersection of the flank and face.

**67. What is face in drill bit?**

The portion of the flute surface adjacent to the lip on which chip impinges as it cut from the work.

**68. What is chisel edge angle?**

The angle included between the chisel edge and the lip as viewed from the end of the drill.

**69. What is rake or helix angle?**

The angle is held between leading edge of the land to the drill axis.

**70. What is circular land?**

The cylindrically ground surface adjacent to the cutting edge, on the leading edge of the land.

**71. What is the advantage of flute?**

The flute is the helical groove. It is used to remove the chip through the helical groove and the cutting fluid will enter through the flute surface.

**72. What is primary clearance?**

The portion of the land removed to provide clearance immediately behind the cutting edge.

**73. What is secondary clearance?**

The portion of the land removed to provide clearance behind the primary clearance or circular land.

**74. What is the type of milling machines?**

1. Column and knee type milling machine, 2. Manufacturing of fixed table type.  
3. Planer type, 4. Special type.

**75. What are the special attachments made in the universal milling machine?**

1. Dividing head 2. Vertical milling attachments, 3. Rotary attachment

4. Twist drill 5. Reamer

**76. What is vertical milling machine?**

In vertical milling machine the spindle is mounted vertical or perpendicular to the table.

**77. What are the parts used in the column and knee type milling machine?**

1. Base 2. Column 3. Knee 4. Table 5. Over hanging arm 6. Front brace 7. Arbour

**UNIT – 4**

**ABRASIVE PROCESSES AND BROACHING**

**L. What is meant by Grinding?**

Grinding is a metal removal process or operation performed by means of rotating abrasive wheel that acts as a cutting tool against the work piece.

**2. Why is grinding called finishing process?**

Grinding is called finishing process, because the grinding process removes metal usually in the order of 0.25 to 0.50 mm. Which produces very high quality surface finish.

**3. What is the approximate thickness of metal removed in grinding operation ?**

The approximate thickness of metal removed in grinding operation is 0.01 to 0.03 mm.

**4. What are the main types of grinding?**

The two main types of grinding are:

a) Rough or Non-precision grinding, b) Precision grinding.

**5. What are the different types of rough grinders?**

a) Floor stand and bench type grinders b) Portable and flexible shaft grinders c) Swing frame grinders d) Abrasive belt grinders.

**6. What are the types of precision grinders?**

a) Cylindrical grinders b) Internal grinders c) Surface grinders d) Tool and cutter grinders e) Special grinding machines

**7. What is surface grinding?**

Surface grinding is the process of producing and finishing flat surfaces by means of a grinding machine using a revolving abrasive wheel.

**8. What are the types of surface grindings?**

The different types of surface grindings are:

1. Reciprocating table surface grindings - a. Horizontal type b. Vertical type.
2. Rotating table. - a. Horizontal spindle b. Vertical spindle.

**9. What types of work can be ground by a surface grinder?**

Surface grinder can be used for flat surface, irregular surface, curved surface, tapered surface, convex surface and concave surface.

**10. What are the types of internal grinders?**

The different types of internal grinders are:



1. Chucking grinders
  - a) Plain
  - b) Universal
2. Planetary grinders
3. Centreless grinders

### **11. What is the use of internal grinders?**

Internal grinders are used to finish straight, tapered, or formed holes to correct size, shape and finishing.

### **12. What are the different types of external grinders?**

External grinders are divided into

- a) Plain cylindrical grinders
- b) Universal grinders
- c) Special grinders such as the centre less grinders.

### **13. What are the uses of external grinders?**

External grinders are used for grinding cylindrical surfaces and to produce external cams eccentrics and special form on the outside diameter of the work.

### **14. List out the surfaces ground by the plain cylindrical grinder?**

External cylinders, tapers, fillets, undercuts and shoulders are some

- a) The head stock spindle may be used alive or dead.
- b) The headstock can be swiveled at an angle in horizontal plane.
- c) The wheel head and slide can be swiveled and traversed at any angle.

### **15. Explain briefly; the meaning of centre less grinding?**

Grinding the diameter of the work piece without mounting on centres is known as centre less grinding.

### **16. What are the operations done in centre less grinders?**

The various operations are:

- a) Through feed grinding
- b) In feed grinding
- c) End feed grinding

### **17. What are the main disadvantages in centre less grinding?**

The main disadvantages are:

- a) The hollow work cannot be grinded
- b) The work having multiple diameters is not easily handled.

### **18. How does the centre less grinding operate ?**

The centre less grinding operates with two wheels as the cutting or grinding wheel, to remove excess stock and a regulating wheel is used to control the speed of rotation of work and rate of feed.

### **19. Why is the centre less grinders called specialized machine for Cylindrical parts?**

Centre less grinders are called specialized machine for cylindrical parts because it was developed form the rapid production of cylindrical, external taper, or external profile work.

**20. What are the advantages of centre less grinding?**

The advantages of centre less grinding are:

- a) The work piece is suppressed through the operations.
- b) No tendency for chatter or deflection of work
- c) Easy control of the size of the work
- d) No need of chucking or mounting.

**21. What are the types of wheel that are mounted on way grinders?**

Cup, Ring or segmented wheels are the wheels that are mounted on vertical spindle of a way grinders.

**22. What are the work holding and supporting devices used in grinders?**

Work holding and supporting devices include:

- a) Steady rest for cylindrical grinders.
- b) Chucks and fixtures for other grinders,
- c) Magnetic chucks used particularly on surface grinders.

**23. What are the two types of magnetic chucks?**

- a) Electromagnetic chuck
- b) Permanent magnetic chuck.

**24. What is the use of magnetic chuck in surface grinding?**

The magnetic chuck helps in firmly holding the workplace without any distortion due to pressure of the jaws, which is undesirable. Magnetic chuck is used for holding a very thin work piece, made of magnetic material. Moreover more number of similar work piece can be conveniently located on the surface for simultaneous grinding.

**25. How are the non-ferrous metals held in magnetic chuck?**

Non-ferrous metals may be held on a magnetic chuck by clamping them in suitable fixtures made of iron or steel by exhausting air from a vacuum chuck.

**26. What are the attachments used in grinding machines?**

The different attachments are:

- a) Equipments for contour grinding
- b) Attachments to improve grinding results
- c) Measuring and sizing device

**27. What is meant by measuring and sizing devices?**

The measuring and sizing devices range from simple measuring devices to continuous reading gauge, which actually control the feeding of the machine.

**28. What are the attachments used to improve grinding results?**

The attachments include wheel reciprocating attachments for better finish, ultrasonic cleaning devices and electrolytic attachments to aid in grinding extremely hard materials.

**29. What is meant by dressing of grinding wheels?**

Dressing of the grinding wheels refer to conditioning the face of the wheel for the operations to be performed ,like opening the face for free cutting, smoothing the face for finishing and removing and load from the free face.

**30. What are the different types of fine finishing process?**

Milling, super finishing, polishing, buffing, metal spraying,galvanising and electroplating are the fine finishing process.

**31. What is honing?**

Honing is a machining process similar to grinding, used to finish a fine before surface.

**32. How does honing differ from grinding?**

Grinding machines run at high speeds and pressure, which results in high temperatures. But, Honing requires slow speed and low-Pressure, which keeps surface temperature relatively low.

**33. What are the materials normally be worked by the Honing process?**

Steels of all varieties, Cast iron, aluminum, magnesium, brass, bronze, glass, ceramics, hard rubbers, graphite etc., are few examples honing.

**34. Give the product applications of lapping?**

Lapping is done as precision tools, gauges, valves and on othersimilar places, where resistance to wear of moving parts, better sealing characteristics and longer life of cutting edges are preminent factors.

**35. What is meant by polishing?**

Polishing is the surface finishing operation performed by a polishing wheel, for the purpose of removing appreciable metal to take out scratches, hole marks, pits and other defects from rough surfaces.

**36. How is the polishing wheel made?**

Polishing wheel is made of leather, papers, canvas, wool, the-abrasive grains are set up with the glue or thermosetting, buffing resins on the face of the wheel.

**37. What is meant by Buffing?**

Buffing is used to give a much higher, lustrous, reflective finish, that cannot be obtained by polishing. The buffing process consists of applying a very fine abrasive with a rotating wheel.

**38. What are the abrasives and binders used in binding?**

Iron oxide, chromium oxide, emery, wax mixed with grease, paraffin's and kerosene are the abrasives and binders used in buffing.

**39. Write any four advantages of milting gears?**

The advantages of milling gears are:

1. All types of gears i.e. spur, helical, worm, bevel are possible and easy to cut.
2. Both roughening and finishing operations can be easily done and fine surface finish can be obtained.

3. It is useful for any tooth form
4. Initial cost is low

**40. Where is the form of relieved convex involute gear used?**

Involute gear cutter is used in forming of gear in milling machine.

**41. State the principle involved in gear shaping?**

The principle involved in gear shaping is that an involutes gear will roll with any other involutes gear of the same base pitch

**42. What are the various methods of shaping the gear blank?**

There are two methods involved in shaping the gear blank. They are:

- 1) Shaping with single point tool formed to the tooth space of the gear.
- 2) Generating with pinion type cutter.

**43. What do you understand by gear generating?**

Gear generating process is based on the fact that any two motives gear of the some module will mesh exactly. In this process one of the gears act as cutter. Due to relative rolling motion of the cutter and blank, gear teeth are generated.

**44. Distinguish between the forming and generating methods?**

Single point Tool (Forming): Here the tool is a single point tool. The job should be indexed for every tooth; The tool is fixed.

Pinion type cutter (Generating): Here the tool is also a gear made of hard steels, (Used as cutter). The job is not indexed for every tooth. The cutter as well as the blank rotates simultaneously meshing with each other.

**45. What are the factors affecting geometrical accuracy of the circular component . in shape?**

Geometrical accuracy of the circular component depends upon: a) The trueness of the work piece rotation, b) Parallelism of the tool movement with the work spindle axis, c) The effect of the tool wear.

**46. Write the advantages of gear shaping (Generating)?**

The advantages of Gear shaping are: a) with a particular module of DP cutter, gears having the same module of DP but different number of teeth can be cut accurately, b) Quicker and economical, c) Only one cutter is used for cutting all spur gears of same pitch, d) Both internal and external gears can be cut

**47. What is the main disadvantage of gear shaping?**

The main disadvantage of gear shaping is that Worm and worm wheels cannot be generated on a gear shaper.

**48. When do you prefer shaping process for generating a gear?**

Gear shaping is preferred for operations like cutting gear segments, cutting, spur gear, herring-bone gears, splines and sprockets etc., of gear shaping over other diameter.

**49. What are the advantages of gear shaping over the other methods?**

The advantages are:

- a) The finished gear has a generated profile
- b) It is suitable for cutting internal gears
- c) Only one cutter is used for cutting all spur gears of the same pitch.

**50. What are the specific types of gears that could be formed specifically by gear shaping process?**

Shaping process can operate on classes of gearing outside the capacity of other methods. Example: a) Internal gears with or without back shroud, b) Cluster gears.

51.

**Distinguish between gear shaping and gear planning?**

Gear shaping:

- a) The job is indexed and tool reciprocates
- b) Gear can be generated by using form tool as well as pinion cutter.

Gear planning:

- a) Job is indexed and reciprocated but the tool is fixed.
- b) Gear can be produced by means of form tool and Rack cutters.

**52. What is the basic condition to use 'Bobbing' in gears?**

Hobbing can be done only if the gear blank to be generated is of the same modules

53. Write the formula for calculating index change gears in gear bobbing? For Index change gear:  
Driving Teeth - Indexing constant x Number of teeth of hob Driven Teeth Number of teeth to be cut.

**54. Name the different types of bobbing?**

Different types of bobbing are classified under the direction of feed of hob are:

- a) Axial hobbing
- b) Radial hobbing
- c) Tangential hobbing.

**55. Explain axial hobbing process?**

- a) Gear blank is brought towards the hob for required depth.
- b) Table slide is then clamped.

**56. What are the advantages of gear hobbing?**

The advantages of gear hobbing are:

- a) The method is versatile and can generate spur, helical, worm and worm wheels.
- b) It is rapid, economical and highly productive.

**57. Give any three differences between gear hobbing and gear milling?**

Gear Hobbing:

- a) Hob operates on several teeth at a time.
- b) It is not necessary to disengage cutter and work before indexing.
- c) Gear hobbing is faster process than gear milling.

Gear Milling:

- a) Milling machine can cut only one tooth at a time.
- b) It requires cutter and work to get disengaged before indexing can occur.
- c) It is slower process compared to gear hobbing process.

**58. What is Sawing?**

Sawing is one of basic machining process, it removes a very small amount of material which consumes less power and at same time cuts large sections

**59. Classify Sawing machines.**

- i) Hack saw manual Power
- i) Band Saw
- a) Vertical      b) Horizontal    c) Circular saw

**60. Define Kerf?**

The tooth set makes the saw cut termed as kerf.

**61. What is broaching?**

Broaching is a process of removing metal from a work piece by a cutting tool called broach. Broach is a tool having multiple cutting edge arranged along its length. The tool may be pulled (or) pushed over a surface on the work piece.

As the height of the tooth is gradually increasing the metal removed progressively by each tooth. The work will be machined in a single pass of the broach.

**62. Give some applications of broaching.**

By internal broaching, splined holes, key ways internal gear seration, square and hexagonal holes and holes with different c are broached. By surface broaching, flat surface and surface different contour, external splines.

**63. What are the advantages of broaching?**

1. The rate of production is very high
2. High accuracy and very good surface finish are obtained
3. Less skilled operator is sufficient
4. Cutting fluid can be effectively applied
5. Both internal and external surfaces can be broached.

**64. What are the limitations of broaching?**

1. Cost of the broach is very high
2. Not suitable for producing small number of work piece.
3. Very large surface cannot be broached.

**65. What are the types of broaching machines?**

The types of broaching machine are

1. Horizontal broaching machine
2. Vertical broaching machine
3. Continuous broaching machine

**66. How broaches are classified?**

Broaches are classified as

1. According to the type of surface broached
  - i) Internal broaches ii) External broaches
2. According to the method of operation
  - i) Push broach ii) Pullbroach
3. According to the operations performed on the work piece
  - i) Surface broach ii) Key way broach iii) Round hole broach iv) Spline broach

**67. What is meant by push broach?**

A push broach is pushed through the work during cutting. During broaching the broach comes under compressive load. To avoid bending, the push broach is made short. Because of this, only less amount of material is removed by the broach.

**68. What is meant by pull broach?**

A pull broach cuts the material while it is pulled through the work piece. During pulling the broach comes under tensile load. So it is not bend during machining. So the broach can be made longer. So more amount of material can be easily removed by the broach.

<b>69.</b>	<b>Name</b>
<b>some broaching operations.</b>	

The broaching operations are

1. Surface broaching, 2. Hole broaching, 3. Key way broaching, 4. Spline broaching

**70. List the various parts of pull type broach.**

The various parts of pull type broach are

- 1) Pull end 2) Front pilot 3) Roughing and semi finishing teeth 4) Finishing teeth 5) Rear pilot 6) Land 7) Clearance angle 8) Rake (or) face angle 9) Pitch

**71. Why broaching process is long and laborious?**

Broaching process is long and laborious because

1. The shape of the broach is complicated
2. Each tooth of the broach has different dimensions.

**UNIT – 5**  
**CNC MACHINING**

**1. Define numerical control machine.**

Numerical control can be defined as a form of programmable automation in which the process is controlled by numbers, letters and symbols.

**2. List out any 3 Basic component of NC system**

1. Program of instruction
2. Controller unit
3. Machine tool

**3. Classify NC Motion Control System**

1. Point to point
2. straight Cut
3. Contouring

**4. Mention any 3 Application of Numerical control**

1. Milling
2. Drilling
3. Boring

**5. What is NC part programming**

NC part programming is the procedure of by which the sequence of processing steps to be performed on the NC machine is planned and documented

**6. What is tape reader?**

The tape reader feed the data from the tape to the buffer in blocks.

**7. What are the responsibility in computer assisted part programming**

1. Defining the work part geometry,
2. Specifying the operation sequence and tool path.

**8. What is APT language?**

APT is not only a NC language it is also the computer program that performs the calculations to generate cutter positions based on APT statement.

**9. Classify statements in APT**

1. Geometry statement
2. Motion statement
3. Post processor statement
4. Auxiliary Statement

**10. Define Check surface.**

This is the surface that stops the movement of the tool in its current direction. In a sense, the forward movement of the tool.

**11. Write general form of Motion Statement**

motion command/descriptive data example: GOTO/P1

**12. Mention any 4 Post processor statement in APT**  
COOLNT, END, FEDRAT, MACHIN,  
RAPID

**13. Write any 3 Contouring Motion words**

GOLFT GOFWD GOUP GORGT GOBACK

**14. What are the merits of CAD/CAM IN NC programming?**

- Savings in geometry definition
- Immediate visual verification



- Use of automatic programming routine

**15. What is CNC?**

CNC is an NC system that utilizes a dedicated, stored program computer to perform some or all of the basic numerical control functions

**16. What are functions of CNC?**

1. Machine tool Control
2. In Process compensation
3. Improved Programming and operating features

**17. List out any 3 merits of CNC.**

1. Part program tape and tape reader are used only once
2. Tape editing at machine site
3. Greater flexibility

**18. What is FTP NC?**

The objective of machine tool control system to move the cutting tool to a predefined location.

**19. What do you mean by machining centre ?**

The machining centre in a control machines is an automatic tool changing arrangement that is designed to perform a variety of machining operations, with large number of cutting tools and provided with a continuous path CNC system.

**20. Where is the common path contouring used?**

Common path contouring is used in grinding machine and routes.

**21. What is a part program ?**

Part program is a high level language program containing the instructions for -machining a part on sheets with respect to various standard words / codes and symbols.

**22. What is post processing?**

Post processing is a computer program that takes a generalized part program output and adopts it to a particular machine control unit/machine tool combination. It is the basic intelligence required to change the program into computer language.

**23. Name the language used in CNC programming.**

The language used in CNC programming is APT(Automatically Programmed Tool).

**24. Write the various types of tape readers.** The various types of tape readers are:

- a) Electromagnetic tape reader.
- b) Magnetic tape reader.
- c) Photo electrical tape reader.
- d) Pneumatic tape reader.

**25. Write the order of the instructions in a part program.**

The order of the part program is

1. Preparatory function,
2. Feed function,
3. Tool function,
4. End of block

**26. What is meant by manual part programming?**

Manual part programming is a process of writing programs which consist of a set of instructions to carry out the machining of the work.

**27. Write the disadvantages of manual part**

**programming.** The disadvantages of manual part programming are:

- a) It is difficult to perform several co-ordinate calculation for complex shapes.
- b) Setting of the tool can be done to an approximate dimension and the difference is adjust by suitable external switches set.

**28. What is preparatory function/?**

It is word address format represented by the letter G ,followed by a numerical code for the operation of the control unit to instruct the machine tool.

**29. What is tool length offset?**

When tools with different length are used, then the difference in their lengths with respect to a datum is known as offset of each tool.

**30. Give a brief note on Canned Cycle.**

The canned cycle simplifies and shortens the programming in such way whenever any one of the above operation is required.

