UNIT I
PART A

1. List the various metal removal processes?
2. How chip formation occurs in metal cutting?
3. What is tool wear?
4. Mention the cutting fluids?
5. Draw the nomenclature of cutting tool geometry?
6. Compare orthogonal and oblique cutting?
7. Define tool life.
8. What are the objectives and functions of cutting fluids?
9. Briefly explain the effect of rake angle during cutting?
10. What are the factors responsible for built-up edge in cutting tools?
11. List out the essential characteristics of a cutting fluid.
12. Name the various cutting tool materials.
13. Give two examples of orthogonal cutting.
14. What are the four important characteristics of materials used for cutting tools?
15. What is the function of chip breakers?
16. Name the factors that contribute to poor surface finish in cutting.
17. Express the Taylor's tool life equation.
18. What are all the factors considered for selection of cutting speed?
19. What is chip thickness ratio?
20. What are the assumptions made by merchant circle?
PART B

1. a. Explain the classification of various cutting tool materials?
   b. State the properties of each of the tool materials.

2. a. The Taylor tool life equation for machining C-40 steel with a HSS cutting tool at a feed of 0.2mm/min and a depth of cut of 2mm is given by \( VT^n = C \), Where \( n \) and \( C \) are constants. The following \( V \) and \( T \) observations have been noted
   
   \[
   \begin{array}{c|c|c}
   V \text{, m/min} & 25 & 35 \\
   T \text{, min} & 90 & 20 \\
   \end{array}
   \]
   
   Calculate
   
   (1) \( n \) and \( C \)
   
   (2) Hence recommend the cutting speed for a desired tool life of 60min.
   
   b. In an orthogonal cutting operation on a work piece of width 2.5mm, the uncut chip thickness was 0.25mm and the tool rake angle was zero degree. It was observed that the chip thickness was 1.25mm. The cutting force was measured to be 900N and the thrust force was found to be 810 N
   
   (b) Find the shear angle.
   
   (c) If the coefficient of friction between the chip and the tool, was 0.5, what is the machining constant \( C_m \)

3. What is a chip breaker? Describe the different types of chips produced during metal machining with neat sketches.

4. With the help of a sketch, show crater wear and flank wear on a cutting tool.

5. a. What is machinability? And explain.
   
   b. Mention the functions and properties of cutting fluids

6. Describe an expression for the determination of shear angle in Orthogonal metal cutting.

7. a. Describe the mechanism of metal cutting?
   
   b. What is meant by orthogonal cutting and oblique cutting?

8. Explain “merchant force circle” along with assumptions.

9. What are the standard angles of cutting tool? Illustrate with an example.

10. a. State the parameters that influence the life of tool and discuss?
    
    b. Explain the geometry of a single point cutting tool with suitable sketches?
UNIT II
PART A
1. What are the various operations can be performed on a lathe?
2. What are the principle parts of a lathe?
3. What is the main requisites of a lathe bed?
4. What are the uses of headstock?
5. What is the main difference between live center and dead center?
6. State the various parts mounted on the carriage.
7. What is a compound rest?
8. List any four types of lathes?
9. What is a semi-automatic lathe? What are the advantages semi-automatic lathes?
10. State the various methods for taper turning operation.
11. Define feed. State the various feed mechanisms used for obtaining automatic feed.
12. List any four work holding devices.
13. Mention the use of chucks.
14. What are the various types of chucks?
15. Define filing operation.
16. Define the process "grooving".
17. What is reaming and boring operation?
18. Define the term "Conicity".
19. Write down the formula for calculating taper turning angle by compound rest method.
20. What are the functions of feed rod and lead screw?
PART B

1. Explain the various taper turning methods?
2. a. Discuss about special attachments of lathe.
   b. Mention the specifications of lathe with a neat sketch.
3. a. Describe the turret indexing mechanism.
   b. Discuss about the bar feed mechanism.
4. a. Describe the holding devices in a lathe.
   b. Explain the working principle of apron mechanism with neat sketch.
5. Draw neat sketches of steady and follower rests and brief their applications.
6. Describe the constructional features of Swiss type automatic screw machine.
7. Explain the working principle of a capstan and turret lathe.
8. Name the various lathe accessories. How does a four jaw chuck differ from a three jaw chuck?
9. Explain the features and classification of multi spindle automatics.
10. a. Discuss the features of ram type and saddle type Turret.
    b. What is meant by “Tool layout” of a Turret lathe?
UNIT III
PART A

1. Mention the differences between shaper and planer.
2. What are the differences between drilling and reaming?
3. What are the differences between drilling and reaming?
4. Briefly describe the importance of quill mechanism.
5. List the types of sawing machines.
6. Define the cutting speed, feed and machining time for drilling.
7. What is broaching.
8. What is the difference between up milling and down milling?
9. List four applications of broaching machines.
10. How do you classify milling cutters?
11. What do you know about straight fluted drill and fluted drill?
12. What is meant by up milling and down milling?
13. State the differences between a vertical shaper and slotters.
14. Write the differences between drilling and tapping.
15. What is a shell mill?
16. Mention the operations performed by a planner.
17. Why is sawing a commonly used process.
18. What is vertical milling machine?
19. What are the different operations performed in drilling machine?
20. How are the non-ferrous metals held in magnetic chuck?
PART-B

1. a. Explain various milling cutters with neat sketches?
   b. How will you cut the following types of surfaces on milling machines?
      (i) Flat surfaces   (ii) Slots and splines

2. Discuss various hole making processes.

3. With a neat sketch explain the column and knee type milling machine and name its main parts.

4. a. Explain hacksaw and band saw with neat sketches.
   b. Explain the different types of table drive and feed mechanisms in a planning machine.

5. a. Discuss push and pull type broaching machines with neat sketches.
   b. Write short notes on expanding hand reamers and adjustable machine reamers.

6. a. Sketch and explain the hydraulic drive of a horizontal shaper.
   b. Describe the working of a crank and slotted link mechanism.

7. a. Discuss the principle of operation of a shaper with a neat sketch.
   b. Make a note on different types of work holding devices used in a slotting machine.

8. a. What are the operations performed on a drilling machine?
9. b. Explain different types of drilling machines with their special features?
10. a. List out the differences between shaper and planner.
    b. Explain with a sketch “Fast and loose pulleys” quick return mechanism of a planer table.
UNIT - IV
PART A

1. What are the specifications of grinding wheel?
2. What is honing?
3. Narrate the working principle of abrasive jet machining.
4. What is gear hobbing?
5. Define hardness of the grinding wheel.
6. Define lapping.
7. What is meant by “grade” and “structure” of a grinding wheel?
8. What are all the parameters that would affect the MRR in abrasive jet machining?
9. Mention four important factors that influence the selection of grinding wheel.
10. What is roller burnishing process?
11. What is the need of truing and dressing operations in a grinding wheel?
12. List the advantages of honing?
13. State the abrasives used in manufacture of grinding wheels.
14. What are the different types of external grinders?
15. What are the operations done in centre less grinders?
16. What are the work holding and supporting devices used in grinders?
17. Why is the centre less grinders called specialized machine for Cylindrical parts?
18. What are the different types of fine finishing process?
19. What are the various methods of shaping the gear blank?
20. What is broaching?
PART- B

1. Explain the working mechanism of cylindrical and surface grinding.
2. a. Describe gear cutting by forming and shaping.
   b. Give the specification of grinding wheel.
3. Explain the working principle and various methods of centreless grinding with a neat sketch.
4. Sketch and explain the three methods of external cylindrical centreless grinding.
5. What is meant dressing and truing of grinding wheel?
6. Explain the abrasive jet grinding with diagram.
7. How do you classify cylindrical grinders? What is the difference between “Plain and universal “cylindrical grinder?”
8. a. Write short notes on gear shaping.
   b. List the advantages and disadvantages of gear shaping process.
9. a. Describe Honing process.
   b. Explain gear hobbing process over other gear generation processes.
10. a. Briefly discuss about the different types of abrasives used in a grinding wheel.
    b. Describe the use of cutting fluids in grinding.
UNIT - V
PART - A

1. List the differences between NC and CNC.
2. What are linear bearings?
3. Mention the type of ball screws.
4. What are feed drives?
5. What are the types of motion control system used in NC machines?
6. What is meant by APT language?
7. Compare a closed loop NC system with open loop system.
8. What is a preparatory function? How is it important in CNC programming?
9. State the limitations of CNC machine tools.
10. What is a canned cycle?
11. Define NC. Name the major elements of NC machines.
12. What are the classifications of NC machines?
13. What is the difference between incremental and absolute system.
14. What is the role of computer for NC machine tool?
15. What is point –to – point (PTP) system?
16. What are G-Codes and M-Codes? Give examples.
17. List the commonly used coordinate systems of CNC machine tools.
18. Write down the types of statements in APT language.
19. Write the various types of tape readers.
20. Write the disadvantages of manual part programming.
PART -B

1. Define CNC and DNC. With a help of a diagram explain the working of NC machine tool.
2. a. Narrate the design considerations of CNC machines.
   b. Discuss about slide ways used in CNC machine tools.
3. a. List the difference between manual and computer assisted part programming.
   b. Describe the drive systems used in CNC.
4. Explain the following in CNC machining.
   a. Linear Interpolation
   b. Circular Interpolation
   c. Cubic interpolation
5. a. Explain the main difference between point to point and continuous path of numerically controlled machine tools.
   b. Under what conditions of production the numerically controlled machine tools are employed.
6. a. With a neat sketch, explain the working of ATC?
   b. Write short notes on APT language.
7. Explain the various elements of NC machine with closed loop control system.
8. Describe the spindle and feed drives. State the requirement of the drives of CNC machine tools.
9. a. List any five motions and control statements of computer assisted NC programming and explain.
   b. Under what conditions of production the numerically controlled machine tools are employed.
10. a. Write the part program for the part shown below.
    b. Write the part program for drilling holes in the part shown below. The plate thickness is 20mm.