



**ST. ANNE'S**  
**COLLEGE OF ENGINEERING AND TECHNOLOGY**  
ANGUCHETTYPLAYAM, PANRUTI – 607 110.  
**QUESTION BANK**  
**EVEN SEMESTER**

**BRANCH: MECH**

**YR/SEM: II/IV**

**SUB CODE/NAME: ME8451 - MANUFACTURING TECHNOLOGY-II**

**UNIT – I**

**THEORY OF METAL CUTTING**

**2 MARKS**

1. What is an orthogonal cutting? Give two examples.
2. List out the difference between orthogonal cutting and oblique cutting.
3. What is the function of chip breakers?
4. Name any two conditions for continuous chip formation while machining.
5. How can built up edge formed during machining be avoided?
6. What are desirable properties of cutting fluids?
7. Define tool wear and mention the types.
8. Define tool life.
9. What are the four important characteristics of materials used for cutting tools?
10. What is meant by tool signature?
11. What are the main functions of cutting fluids?
12. Name the factors that contribute to poor surface finish in cutting.
13. Define machinability of metal.
14. Write Taylor's tool life equation.
15. What is shear plane angle?

**Part-B (13 Marks)**

**Mechanics Of Chip Formation**

1. With reference to orthogonal cutting, explain the following terms: shear stress in shear plane, Shear strain, cutting ratio, Shear angle (7)
2. Prove that in orthogonal cutting, the kinetic coefficient of friction ( $\mu$ ) is given (6)
3. **by**  $\mu = F_c \sin \alpha + F_t \cos \alpha / F_c \cos \alpha - F_t \sin \alpha$  (6)
4. Describe an expression for the determination of shear angle in orthogonal metal cutting. (7)
5. What is meant by orthogonal cutting and oblique cutting? (6)

**Tool Wear**

6. Name the techniques used to measuring tool wear. Describe their advantage and limitations.. (6)
7. Discuss briefly the various types of tool wear with neat sketches. (7)

**Cutting Tool Materials**

8. Mention the desirable properties of a cutting tool material and the improvements caused by coated carbides.
9. Explain the classification of various cutting tool materials. (7)
10. Explain the properties of each of the tool materials. (6)

### **Cutting Fluids**

11. What are the functions of a cutting fluid? Explain in detail the guidelines adopted for the selection of cutting fluid based on material and tool characteristics.

### **Tool Wear**

12. What is a chip breaker? Describe the different types of chips produced during metal machining with neat sketches (13)
13. Show with the help of a sketch, crater wear and flank wear on a cutting tool. (6)
14. Explain the types and applications of different types of cutting tools. (6)

### **Machinability**

15. Is material ductility important for machinability? Explain. (7)
16. What is the measure of metal removing process machinability? What are the factors that affect it? (6)
17. State the parameters that influence the life of tool and discuss. (7)

### **Single Point Cutting Tool**

18. Explain the geometry of a single point cutting tool with suitable sketches. (6)
19. Explain “Merchant force circle” and formulate the expressions along with (13)

### **PART-C**

1. Give your understanding of the basic metal-cutting process, what are the important physical and chemical properties of a cutting tool?
2. What you think the maximum temperature in orthogonal cutting is located at about the middle of the tool-chip interface?
3. Why is it not always advisable to increase cutting speed in order to increase production rate?
4. Describe in detail your thoughts regarding the technical and economic factors involved in tool material selection.

## **UNIT – II**

### **TURNING MACHINES**

#### **PART A**

1. Name any four types of cutting tool used in a lathe.
2. How lathes are specified?
3. What are the requirements for tool material?
4. Give the expression to estimate the power required in machining.
5. Differentiate capstan and turret lathe.
6. What are the functions of feed rod and lead screw?
7. Why were power chucks developed?
8. What are the advantages of automatic lathes?
9. Calculate the power required for a steel rod of diameter at 200 rpm. Assume cutting force of 160 kg.
10. How is the size of a turret lathe specified?
11. Why is hollow spindle used in lathe?
12. What is meant by semi automatic lathe?
13. A shaft of 25 mm diameter is turned at a cutting speed of 50 m/min. Find the rpm of the shaft.
14. What are the applications of offset cutter holder?

15. What is meant by tool signature?

**Part-B (13 Marks)**

16. State the need for tumbler gear mechanism. What are the different types of machining operations that can be performed on a lathe? And explain any six in detail. **13**
17. Explain the construction and working principle of a lathe with a neat sketch. **13**
18. Describe the difference between a steady rest and a follow rest. Give an application of each.
19. Explain the various types of Chucks explain any two in detail **6**
20. Explain taper turning operation in a lathe by taper turning attachment method. **7**
21. Why can boring on a lathe be a difficult operation? **6**
22. Explain the following methods of taper turning in lathe by i. Swivelling the compound rest, ii. Form tool method. **13**
23. Explain the thread cutting operation in a lathe with a neat sketch. Also make a note on knurling, grooving and forming operations in a lathe. **7**
24. Enumerate the purpose of various attachments used on a centre lathe **6**
25. Calculate the gears for cutting metric threads of following pitch. i) 4mm pitch, ii) 5.25 mm pitch. The lead screw of lathe contains 6 TPI. The lathe is supplied with 20 to 120 teeth in step of 5 and an additional gear wheel of having 127 teeth **7**
26. Calculate the time required for one complete cut on a piece of work having 250 mm long and 40 mm diameter. The cutting speed is 32 m/min and feed is 0.4 mm/rev. **6**
27. Explain with neat sketch Geneva mechanism of turret lathe. **13**
28. Why is there more than one turret in turret lathe. **5**
29. Discuss the features of Ram type and Saddle type turret with neat sketches. **8**
30. Explain the tooling layout for the producing of a Hexagonal bolt in a Capstan lathe. **7**
31. Discuss the tooling layout for production of a hexagonal nut in Turret lathe **6**
32. Classify transfer machines. Sketch and explain the working of Swiss type automatic screw machine. What are the advantages of automatic machines? **13**
33. Briefly explain the principle of working of sliding head type single spindle automatic machine. **7**
34. Differentiate between parallel action and progressive action multi spindle automatics. **6**
35. Explain the working principle of turret lathe and capstan lathe with neat sketch. **13**
36. Describe the working principle of multi spindle automatics. Give its advantages and applications **13**

**PART-C**

1. A badly oxidized and uneven round bar is being turned on a lathe. Would you recommend a small or in large depth of cut? Explain.
2. Describe the problems, if any, that may be encountered in clamping a work piece made of a soft metal in a three-jaw chuck.
3. We have seen that cutting speed, feed, and depth of cut are the main parameters in a turning operation. In relative terms, at what values should these parameters be set for a (a) roughing operation and (b) finishing operation?
4. Explain the economic justification for purchasing a turret lathe instead of a conventional lathe.

**UNIT 3**  
**SHAPER, MILLING AND GEAR CUTTING MACHINES**  
**PART A**

1. Under what conditions planning operation would be preferred over other machining processes
2. What are the common work holding devices used on milling machines?
3. Mention the operations performed by a shaper.
4. Mention the operations performed by a planer.
5. Mention the difference between shaper and planer.
6. List out the situation where the reaming operation is required.
7. Compare drilling and boring operation.
8. What is the difference between face milling and end milling?
9. What are types of driving mechanisms used in slotter for driving the ram?
10. How is a broaching machine specified?
11. What do you mean by progressive broaching?
12. Why is sawing a commonly used process?
13. Compare hydraulic shaper and mechanical shaper.
14. What is meant by up milling and down milling?
15. What is broaching?
16. List any two types of planning machine.
17. What is meant by vertical shaper?
18. What is pit planer?

**Part-B (13 Marks)**

1. Explain with neat sketches the procedure for carrying out the following operations on a shaper. Horizontal cutting, Vertical cutting, concave surface and keyway cutting. **13**
2. With a simple sketch explain working of crank and slotted link quick return motion mechanism used in shaper. **7**
3. How the stroke length and position of a ram is adjusted? **6**
4. Discuss various hole making processes. **7**
5. Write short notes on the following tools, i. Reaming tool and ii. Tapping tool **6**
6. Sketch and explain the hydraulic drive of a horizontal shaper. **13**
7. Explain various milling cutters with neat sketches
8. Describe the working mechanism of a universal dividing head with a neat diagram **6**
9. Explain the different types of milling operations with neat sketches
10. Discuss the common work holding devices used in shaper and drilling machines. **6**
11. Explain up milling and down milling with a neat sketch and state which one is suitable for machining a flat surface. **7**
12. With a neat sketch explain the principle parts and angles of plain milling cutter. Explain them. **6**

13. Compare Plain and Universal milling machine.
14. Differentiate between gear forming and gear generation. 6
15. Enumerate with a neat sketch gear shaping. 7
16. List the advantages and disadvantages of gear shaping process. 6
17. List out the gear finishing processes. Explain any two with neat sketches. 13
18. Explain the principle of gear hobbing operation. What are the advantages and disadvantages of gear hobbing process? 13

#### **PART-C**

1. In milling operations with horizontal and vertical spindle machines, which one is likely to hold dimensional accuracy better? Why?
2. How would you recommend machining dovetails onto air compressor blades?
3. Why do machined gears have to be subjected to finishing operations? Which of the finishing processes are not suitable for hardened gear teeth? Why?
4. If expanded honeycomb panels were to be machined in a form milling operation, what would you do to keep the sheet metal from buckling? Think up as many solutions as you can and write down any two.

### **UNIT 4**

#### **ABRASIVE PROCESS AND BROACHING**

##### **PART A**

1. What do you mean by loading of grinding wheels?
2. State the abrasives used in the manufacture of grinding wheels.
3. What are the uses of lapping process?
4. What is meant by dressing and truing of grinding wheels?
5. List any four common abrasives used in a grinding wheel.
6. What are the types of surfaces that could be produced using plain cylindrical grinders?
7. What are the advantages of honing process?
8. Explain buffing process.
9. Name any two gear finishing methods.
10. What is meant by differential indexing?
11. What is the significance of grit in a grinding wheel?
12. What is glazing? How will you rectify this?
13. Compare and contrast the gear generation process with gear forming process.
14. A grinding wheel is specified as A 24 K 7 V. What does each letter indicates?
15. What is the difference between spur gear and helical gear?
16. What do you mean by balancing of grinding wheels?

##### **Part-B (13 Marks)**

1. Explain the working mechanism of cylindrical and surface grinding. 7
2. Discuss the various bonding materials used for making grinding wheels. 6
3. What are the consequences of allowing the temperature to rise during grinding? 7

4. The performance of a grinding wheel depends upon the type of abrasive, grain size, grade, structure and bonding material. Discuss the effect of each. **6**
5. What do you understand by grinding as an abrasive process? Explain with a neat sketch. **7**
6. What precaution should you take when grinding high precision? **6**
7. What is Surface grinding? What are the different types of surface grinding machines? **7**
8. Explain why there are so many different types and sizes of grinding wheels? **6**
9. Explain the working principle and various methods of centreless grinding with a neat sketch. **7**
10. Sketch and explain the three methods of external cylindrical centre less grinding. **7**
11. Why speeds so much higher in grinding than in cutting? **6**
12. Explain dressing and truing of grinding wheel. **7**
13. What factors could contribute to chatter in grinding? **6**
14. Explain the factors to be considered to select a grinding wheel and recommended parameters. **7**
15. What are the effects of wear flat on the grinding process? **6**
16. How do you classify cylindrical grinders? What is the difference between "Plain and universal "cylindrical grinder? **7**
17. Describe the use of cutting fluids in grinding **6**
18. Briefly discuss about the different types of abrasives used in a grinding wheel. **7**
19. Discuss with neat sketch vertical broaching machines. **6**
20. Describe the factors that contribute to broaching force and explain why they do so. **7**
21. Describe the conditions under which broaching would be the preferred method of machining. **6**
22. Describe the concept of surface integrity. **7**
23. Explain the generalised classification of broaching machines. **6**
24. Explain Surface and continuous broaching. Give the advantages and disadvantages of surface and continuous broaching. **13**
25. Explain the construction of a Push type and pull type broaching machine. **13**

#### **PART-C (15 Marks)**

1. Describe as many parameters as you can that could affect the final surface finish in grinding. Include process parameters as well as setup and equipment. **15**
2. Jewellery applications required the grinding of diamonds into desired shapes. How is this done, since diamond is the hardest material known? **15**
3. Would you encounter any difficulties in grinding thermoplastics? Thermosets? If so, what precautions would you take? **15**
4. Would you recommend broaching a keyway on gear blank before or after machining the teeth? Why? **15**

**UNIT 5**  
**CNC MACHINING**

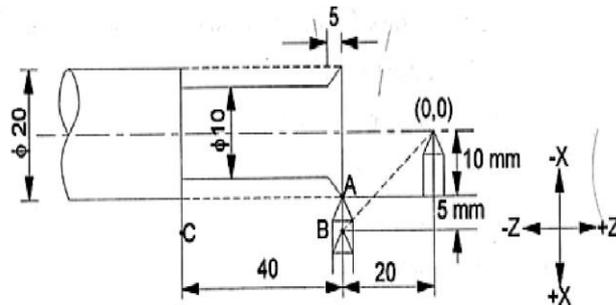
**PART A**

1. List the commonly used coordinate systems of CNC machine tools.
2. What is the difference between absolute and incremental system?
3. What is the role of computer for CNC machine tool?
4. Compare closed loop and open loop NC system.
5. What is a preparatory function? How is it important in CNC programming?
6. Differentiate NC and CNC machine tool.
7. Differentiate NC and conventional machine tool.
8. What is point-to-point system?
9. What are G-codes and M-codes? Give examples.
10. Differentiate between fixed zero and floating zero in CNC terminology.
11. Define a part program.
12. List out the applications of CNC system.
13. Define contouring motion.
14. What are the types of CNC system?
15. What are the functions of slide ways?
16. What are the functions of ball screws?

**Part-B (13 Marks)**

1. Define CNC and DNC. With a help of a diagram explain the working of NC machine tool. **7**
2. Discuss the major elements of CNC machine tools **6**
3. Discuss the design considerations of CNC machines. **7**
4. Discuss about slide ways used in CNC machine tools. **6**
5. List the difference between manual and computer assisted part programming. **7**
6. Explain the various elements of NC machine with closed loop control system. **6**
7. Explain the following in CNC machining. **13**
  - ✓ Linear Interpolation
  - ✓ Circular Interpolation
  - ✓ Cubic interpolation
8. Explain the main difference between point to point and continuous path of numerically controlled machine tools. **7**
9. Under what conditions of production the numerically controlled machine tools are employed. **6**
10. Explain the various statements used in APT language, with suitable examples. **13**
11. Describe the principle of numerical control of machines. What factors need for and development of numerical control? Name typical applications. **13**
12. Describe the spindle and feed drives. State the requirement of the drives of CNC machine tools. **7**
13. Describe in brief the basic components of a tape operated NC machine tools **6**

14. List any five motions and control statements of computer assisted NC programming and explain. 9
15. State a few typical applications where the use of NC would be justified. 4
16. List and explain G-code and M-code for turning and milling operations. 7
17. Is drilling and punching the only application for point to point system? Explain.
18. Develop the part program for the part shown below.



19. List and explain factors that contribute to poor surface finish in micromachining process. 13
20. What do you understand by micromachining? Explain the various steps involved in micromachining. Also mention its applications 13

### PART-C

1. How would you describe the principle of computer aided manufacturing to an older worker in a manufacturing facility who is not familiar with computers?
2. Are Deburring operations necessary for parts made by micro matching process. Explain and give any two examples.
3. Micro machining is an advanced machining process. Justify with examples.
4. Do you think you should be possible to produce spur gear by micromachining process, starting with a round blank? Explain