



**SIDDHARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY :: PUTTUR
(AUTONOMOUS)**

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QUESTION BANK

**Subject with Code: MACHINE TOOLS (19ME0312)
Year/ Sem: III-B. Tech & I-Sem**

**Course & Branch: B. Tech – ME
Regulation: R19**

UNIT I

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| 1. (a) Define the following terms a) 'Metal cutting' b) cutting ratio. | L1 CO1 6M |
| (b) Explain briefly orthogonal and oblique cutting with neat sketch. | L2 CO1 6M |
| 2. (a) Explain basic elements in metal cutting with a neat sketch. | L2 CO1 6M |
| (b) Discuss about machining of metals. | L2 CO1 6M |
| 3. Distinguish the cutting processes with neat sketches. | L4 CO1 12M |
| 4. (a) How can you classify cutting tools? | L1 CO1 6M |
| (b) Define the single point cutting tool elements. | L1 CO1 6M |
| 5. Explain the importance and functions of different tool angles associated with the geometry of a single point cutting tool with neat sketch. | L2 CO1 12M |
| 6. Give the short notes on ASA system and ORS system. Show the inter relationship equations between ASA and ORS system. | L2 CO1 12M |
| 7. Explain the formation of chip. Discuss the types of chips with neat sketches. | L2 CO1 12M |
| 8. (a) Derive the equation for chip thickness ratio and shear plane angle. | L3 CO1 6M |
| (b) What factors influence the formation of the built up edge and give the factors to decrease the built up edge? | L2 CO1 6M |
| 9. (a) Explain various types of chip breakers with neat sketches. | L2 CO1 6M |
| (b) In an orthogonal cutting operation on a lathe the cutting tool used had the tool designation of 0-10-8-8-6-70-1mm. Calculate the values of (i) Back rake angle and (ii) side rake angle. | L3 CO1 6M |
| 10. (a) What are the conditions for producing continuous chips? | L1 CO1 6M |
| (b) During orthogonal cutting a bar of 90mm diameter is reduced to 87.6mm. If the mean length of the cut is 88.2mm and rake angle is 15°, calculate: (i) Cutting ratio (ii) Shear angle. | L3 CO1 6M |

UNIT II

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| 1. (a) List the various forces acting on a chip. | L2 CO2 6M |
| (b) Define cutting speed, feed and depth of cut. | L1 CO2 6M |
| 2. Draw a Merchant's circle diagram and derive expressions to show relationships among the different forces acting on the cutting tool and | L2 CO2 12M |

coefficient of friction.

3. (a) Discuss about Merchant theory and derive the equation for minimum cutting force. **L2 CO2 6M**
 (b) In orthogonal turning of a 60 mm diameter MS bar on a lathe, the following data were obtained: Rake angle 10° , cutting speed 120 m/min, feed 0.3mm/rev, cutting force 170 kg, feed force 65kg. Calculate the shear plane angle, coefficient of friction, cutting power, chip flow velocity and shear force, if chip thickness is 0.4mm. **L3 CO2 6M**
4. (a) Explain the stress and strain acting on a chip. **L2 CO2 6M**
 (b) In an orthogonal turning operation, cutting speed is 86Mm/min, cutting force 25kg, feed force 9kg, rake angle 10° , feed 0.3mm/rev and chip thickness 0.3mm. Determine the shear angle and chip thickness ratio. **L3 CO2 6M**
5. (a) Explain work done in metal cutting process. **L2 CO2 6M**
 (b) Define cutting speed, feed, and depth of cut. **L1 CO2 6M**
6. Describe the factors affecting tool life and give Taylor' tool life equation. **L2 CO2 12M**
7. (a) Give the broad classification of cutting fluids and explain them briefly. **L2 CO2 6M**
 (b) The following equation for tool life is given for a turning operation $V T^{0.13} f^{0.77} d^{0.37} = C$. A 60 minute tool life was obtained while cutting at $V=30$ m/min, feed =0.3 mm/rev and depth of cut = 2.5 mm. Determine the change in tool life if the cutting speed, feed and depth of cut an increased by 20% individually and also taken together. **L3 CO2 6M**
8. (a) Define tool life and explain the impact of coolants on tool life. **L2 CO2 6M**
 (b) The Taylor's tool life equation for machining C-40 steel with an 18-4-1 HSS. Cutting tool at a feed of 0.2mm/min and a depth of cut of 2mm is given by $V T^n = C$, when n and c are constants. The following V and T observations have been noted.
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|-------------|----|----|
| V_1 m/min | 25 | 35 |
| T_1 min | 90 | 20 |
- Calculate (i) n and c (ii) hence recommended the cutting speed for a desired tool life of 60 min.
9. Discuss tool failure and wear mechanism in cutting tool. **L2 CO2 12M**
10. (a) What are the characteristics of an ideal cutting tool material? **L1 CO2 6M**
 (b) List out the types of cutting tool material and explain (i) Coronite (ii) Ucon. **L2 CO2 6M**

UNIT III

1. (a) Define the working principle of lathe. How the lathe is specified? **L1 CO3 6M**
 (b) Name at least five work holding devices. **L2 CO3 6M**
2. Draw the engine lathe and label the parts. Discuss the functions of the lathe parts. **L2 CO3 12M**
3. Name the different types of the lathes? Discuss the importance of the each lathe. **L2 CO3 12M**

4. (a) Name the different types of lathe operations? Explain about facing and knurling with neat sketches. L1 CO3 6M
(b) What are the different types of taper turning methods? Discuss any one method with suitable diagram. L2 CO3 6M
5. Explain lathe machine accessories with neat sketches. L2 CO3 12M
6. Discuss about the lathe attachments with neat sketches. L2 CO3 12M
7. What are the differences between a Turret and a Capstan lathe? L4 CO4 12M
8. (a) Explain the advantages and disadvantages of a turret lathe. L2 CO4 6M
(b) What is meant by tool layout of a turret lathe? L1 CO4 6M
9. Briefly explain the Single spindle and multi spindle automatic lathes. L2 CO4 12M
10. (a) List the common tools and attachments used on Turret and Capstan lathes. L1 CO4 6M
(b) List the Turret lathe operations and explain any one operation with neat sketch. L1 CO4 6M

UNIT IV

1. (a) Define the terms “Drilling” and ‘drill’ L1 CO5 6M
(b) Name the different types of the drilling machines? How the drilling machine specified? L1 CO5 6M
2. Explain with neat sketches any one of the following i) Radial drilling machine ii) Sensitive drilling machine iii) Gang drilling machine. L2 CO5 12M
3. (a) Name the types of cutters, work holding and tool holding devices used in drilling machine. L1 CO5 6M
(b) Explain briefly with sketches any four of the drilling operations. L2 CO5 6M
4. (a) What do you understand by the term “Boring”? How are boring machines classified? L2 CO5 6M
(b) Discuss briefly with neat sketch, a horizontal boring machine. L2 CO5 6M
5. (a) What is a shaper? What is the working principle and specification of a shaper? L1 CO5 6M
(b) How the shapers classified? State the advantages, limitations and applications of shaper. L1 CO5 6M
6. Draw the block diagram of a shaper machine and explain briefly its various parts and operations performed. L2 CO5 12M
7. (a) Give the comparison between planer, shaper and slotter. L4 CO5 6M
(b) What are the advantages of planer? L1 CO5 6M
8. (a) Explain briefly Up-milling process and Down milling process. L2 CO5 6M
(b) How milling machines are broadly classified? L1 CO5 6M
9. Draw the block diagram of a horizontal milling machine and explain its various parts. L2 CO5 12M
10. (a) Write short notes on (i) Face milling (ii) Straddle milling and (iii) End milling. L2 CO5 6M
(b) Explain briefly plain indexing and differential indexing with suitable example. L2 CO5 6M

UNIT V

1. (a) Define the term i) Grinding, ii) rough grinding and iii) precision grinding. **L1 CO6 6M**
(b) How the grinding is classified? **L2 CO6 6M**
2. How grinding machines are classified? Explain plain cylindrical grinding machine with neat sketch. **L2 CO6 12M**
3. With a neat sketch, explain construction and working of tool and cutter grinding machine. **L2 CO6 12M**
4. (a) What is a 'grinding wheel'? What are the grinding wheel parameters that influence the grinding performance? **L1 CO6 6M**
(b) What is a 'bond'? Name and explain principle bonds. **L1 CO6 6M**
5. (a) What is an abrasive? How are abrasive classified? **L1 CO6 6M**
(b) Write short notes on: i) Silicon carbide ii) Aluminium oxide iii) Abrasive size. **L2 CO6 6M**
6. Give the comparison among Grinding, lapping and honing. **L2 CO6 12M**
7. (a) How are broaching machines classified? **L2 CO6 6M**
(b) What are the advantages, limitations and applications of broaching? **L1 CO6 6M**
8. With neat sketch, explain the construction of surface grinding machine. **L2 CO6 12M**
9. Compare the center and center-less grinding machine. **L1 CO6 6M**
10. Explain specification of grinding wheel **L2 CO6 12M**

Prepared by: Dr. B Sreenivasulu