

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY :: PUTTUR

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QUESTION BANK

Subject with Code: MACHINE TOOLS (16ME316)
Year/ Sem: III-B. Tech & I-Sem

Course & Branch: B. Tech – ME
Regulation: R16

UNIT I

1. a How the shaping process of metals is classified? Give examples. 6M
- b What are the basic objectives of the economical and efficient machining practice? 6M
2. a Explain basic elements in metal cutting with a neat sketch. 6M
- b Discuss about machining of metals. 6M
3. Distinguish the cutting process with neat sketches. 12M
4. a How can you classify cutting tools? 6M
- b Define the single point cutting tool elements. 6M
5. Explain the importance and functions of different tool angles associated with the geometry of a single point cutting tool with neat sketch. 12M
6. Give the short notes on ASA system and ORS system. Show the inter relationship equations between ASA and ORS system. 12M
7. Explain the formation of chip. Discuss the types of chips with neat sketches. 12M
8. a Derive the equation for chip thickness ratio and shear plane angel. 6M
- b What factors influence the formation of the built up edge and give the factors to decrease the built up edge? 6M
9. a Explain various types of chip breakers with neat sketches. 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. 6M
10. a What are the conditions for producing continuous chips? 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. 6M

UNIT II

1. a Explain various forces acting on a chip. 6M
- b Derive an equation for shear strain from velocity relations. 6M
2. Draw a Merchant's circle diagram and derive expressions to show relationships among the different forces acting on the cutting tool and coefficient of friction. 12M
3. a Discuss about Merchant theory and derive the equation for minimum cutting force. 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, 6M

cutting power, chip flow velocity and shear force, if chip thickness is 0.4mm.

4. a Explain the stress and strain acting on a chip. 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, workdone in shear and shear strain. 6M
5. a Explain work done in metal cutting process. 6M
 b Explain cutting speed, feed, and depth of cut. 6M
6. Describe the factors affecting tool life and give Taylor' tool life equation. 12M
7. a Give the broad classification of cutting fluids and explain them briefly. 6M
 b The following equation for tool life is given for a turning operation $VT^{0.13} f^{0.77} d^{0.37} = C$. 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 are increased by 20% individually and also taken together. 6M
8. a State the advantages and disadvantages of chemical fluids. 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 $VT^n = C$, when n and c are constants. The following V and T observations have been noted.

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. 12M
10. a What are the characteristics of an ideal cutting tool material? 6M
 b List out the types of cutting tool material and explain (i) Coranite (ii) Ucon. 6M

UNIT III

1. a Define the working principle of lathe. How can you specify a lathe? 6M
 b Show the lathe set up for thread cutting operation and explain thread cutting. 6M
2. Draw the engine lathe and label the parts. Discuss the functions of the lathe parts. 12M
3. Name the different types of the lathes? Discuss the importance of the each lathe. 12M
4. a Name the different types of lathe operations? Explain about facing and knurling with neat sketches. 6M
 b What are the different types of taper turning methods? Discuss any one method with suitable diagram. 6M
5. Explain lathe machine accessories with neat sketches. 12M
6. Discuss about the lathe attachments with neat sketches. 12M
7. What are the differences between a Turret and a Capstan lathe? 12M
8. a Explain the advantages and disadvantages of a turret lathe. 6M
 b What is meant by tool layout of a turret lathe? 6M

9. Briefly explain the Single spindle and multi spindle automatic lathes. 12M
10. a List the common tools and attachments used on Turret and Capstan lathes. 6M
- b List the Turret lathe operations and with neat sketch explain any one operation. 6M

UNIT IV

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

UNIT V

1. a Define the terms: i) Grinding ii) Rough Grinding iii) Precision Grinding 6M
- b How is “grinding” classified? 6M
2. How grinding machines are classified? Explain plain cylindrical grinding machine with neat sketch. 12M
3. With a neat sketch, explain construction and working of tool and cutter grinding machine. 12M
4. a What is a ‘grinding wheel’? What are the grinding wheel parameters that influence the grinding performance? 6M
- b What is a ‘bond’? Name and explain principal bonds. 6M
5. a What is an abrasive? How are abrasive classified? 6M
- b Write short notes on: i) Silicon carbide ii) Aluminium oxide iii) Abrasive size. 6M

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| 6. | Give the comparison among Grinding, lapping and honing. | 12M |
| 7. | a How are broaching machines classified? | 6M |
| | b What are the advantages, limitations and applications of broaching? | 6M |
| 8. | Explain with the help of neat sketch 3-2-1 principle of location. | 12M |
| 9. | a Define and explain the terms i) Jig and ii) Fixture with its uses. | 6M |
| | b Describe briefly “Principles of jig and fixture design”. | 6M |
| 10. | Explain briefly the principles of jig and fixture design. | 6M |

