



Subject Name: METROLOGY AND MACHINE TOOLS

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Year and Sem, Department: III/I, Mechanical Engineering.

Unit-I: METAL CUTTING AND LATHE.

Important points / Definitions: (Minimum 15 to 20 points covering complete topics in that unit)

1. Metal cutting
2. elements of cutting process
3. Geometry of single point tools.
4. Chip formation and types of chips.
5. Engine lathe – Principle of working
6. types of lathe, specifications.
7. Taper turning – Lathe attachments.
8. Capstan and Turret lathe
9. Single spindle and multi-spindle.
Automatic lathes
10. Tool layouts

Short Questions (minimum 10 previous JNTUH Questions)

1. Define machining, give its importance.(2015)
2. What are the different types of machining processes?(2016)
3. How are cutting process classified? (2015)
4. Classify cutting tools. (2017)
5. What is orthogonal cutting tool? (2016)
6. What is the main function of lathe? (2017)
7. Which types of lathes are generally used? (2018)
8. State the specifications required to specify the size of lathe. (2017)
9. What are the functions of a headstock? (2017)
10. What are the functions of a tailstock(2018)

Long Questions (minimum 10 previous JNTUH Questions – Year to be mentioned)

1. Explain the elements of machining with neat sketch. (2017)
2. Explain with neat sketch the different methods of machining. (2015)
3. Give comparisons between orthogonal and oblique cutting. (2016)
4. Give classifications of cutting tools. (2017)
5. Explain the important terms and angles (nomenclature) of the single point cutting tools. (2016)
6. Explain the working principle of Lathe with neat sketch. (2015)
7. What are different types of Lathe? Explain. (2017)
8. Explain specifications of lathe machines. (2018)



9. Draw the block diagram of a lathe machine and explain the functions of its various parts. (2018)
10. State the various methods of taper turning. Explain any three with neat sketch. (2018)

Fill in the Blanks / Choose the Best: (Minimum 10 to 15 with Answers)

1. Angle between the rake face and plane perpendicular to rake face is known as-----
2. Angle between the rake face flank of tool and perpendicular line drawn from cutting point to base of tool is known as:-----
3. With an increase in lip angle keeping side rake angle constant, strength of tool-----
4. For large positive back rake angle, tool will be-----
5. _____ improves toughness, wear resistance, and high temperature strength.
6. In surface finishing operation one should use a sharp tool with a _____ feed and _____ Speed of rotation of the job.
7. End of the work piece can be supported by using-----
8. . Distance measured normal to the axis of part, between crest and root of thread is known as---

9. Turret head in turret lathe is generally mounted on-----
10. The cutting fluid mostly used for machining alloy steels is -----

Unit-II: DRILLING, BORING AND SHAPING MACHINES.

Important points / Definitions:

1. Drilling machine
2. Boring Machines
3. Principles of working, specifications of drilling and boring machines
4. Types, operations performed; twist drill.
5. Types of Boring machines and applications.
6. Shaping machines
7. Slotting machines
8. Planning machines
9. Principles of working of machines
10. machining time calculations.

Short Questions (minimum 10 previous JNTUH Questions

1. Explain drilling operation?
2. Explain the difference between reaming and boring. (2015)
3. Where are the different types of drilling machines? (2017)
4. Where are portable drilling machines used? (2016)
5. What is sensitive drilling machine? (2015)
6. What is shaping machine? (2018)
7. How are shapers classified? (2017)
8. Which are the methods of obtaining quick return mechanism? (2016)
9. State any 2 advantages of hydraulic mechanism. (2017)
10. Mention few work holding devices. (2018)

Long Questions (minimum 10 previous JNTUH Questions – Year to be mentioned)

1. What is drilling? Explain the working principle of drilling machine. (2017)
2. Explain the construction of drilling machine. (2016)



3. What are the types of drilling machines? Explain upright drilling machine with a neat sketch. (2016)
4. Distinguish between round section and box section column drilling machine. (2015)
5. Explain with suitable sketch, radial drilling machine. State its advantages. (2015)
6. Explain the working principle of shaping machine? (2017)
7. With neat sketch explain the principle parts of shaper. (2017)
8. Explain cutting speed, feed and depth of cut of shaper. (2017)
9. What is machining time for shaper? (2018)
10. Explain the working principle of planer machine. (2018)

Fill in the Blanks / Choose the Best: (Minimum 10 to 15 with Answers)

1. Cutting of material during shaping operation takes place in-----
2. -----part of shaper provides straight line motion of tool.
3. ----- part of shaper machine carries tool head.
4. -----part of shaper machine hold and supports the work piece.
5. Time of return stroke is _____ the time of forward stroke in crank and slotted link mechanism.
6. Producing circular hole in a solid metal by means of revolving tool is known as-----
7. Operation of finishing previously drilled hole in order to bring it to accurate size and have good surface finish is known as-----
8. Process of enlarging the hole size and enhancing its surface finish is known as-----
9. Operation used to form internal threads is known as-----
10. Helical grooves on a body of reamers are known as-----

Unit-III: MILLING AND GRINDING MACHINES

Important points / Definitions:

1. Milling machines-principles of working
2. Types of milling machines
3. Geometry of milling machines
4. Methods of indexing
5. Grinding-theory of grinding
6. Classification of grinding machines
7. Types of abrasives bonds
8. Selection of a grinding wheel
9. Lapping
10. Honing and broaching machines
11. Comparison and constructional features
12. Machining time calculations

Short Questions (minimum 10 previous JNTUH Questions – Year to be mentioned)

1. What is milling? (2018)
2. State different types of milling machines? (2016)
3. How are milling cutters classified? (2015)
4. What is meant by up milling? (2016)
5. Mention any four milling machine operations? (2017)
6. What is a shell milling? (2017)
7. What do you mean by differential indexing? (2015)
8. What are the different types of end mills used in milling? (2018)



9. What is the difference between face milling and end milling? (2018)
10. What is meant by down milling? (2016)

Long Questions (minimum 10 previous JNTUH Questions – Year to be mentioned)

1. With a neat sketch explain the working principle of milling machine? (2016)
2. Give detailed classification of milling machines? (2017)
3. Explain milling cutter geometry with a neat sketch? (2015)
4. Give comparison between up milling and down milling with neat sketch? (2017)
5. Write a short note on dividing or indexing head? (2016)
6. Write a short note on simple or plain indexing? (2015)
7. What is differential indexing? Explain? (2018)
8. Explain in detail compound indexing? (2017)
9. What are different types of grinding machines? (2018)
10. What are cylindrical grinders? Explain plain cylindrical grinder with neat sketch? (2018)

Fill in the Blanks / Choose the Best: (Minimum 10 to 15 with Answers)

1. . Knee of milling machine is attached and slides up and down on-----
2. Motor drive in milling machine is generally attached to-----
3. ----- part of milling machine can be used for reservoir for coolant.
4. ----- capable of sliding up and down in milling machines.
5. -----part movement of milling machines helps in adjustment of table height.
6. -----part of the milling machine is used to support work piece.
7. Table of milling machine is generally made up of-----
8. Removing dull grains in order to make grinding wheel sharp is known as-----
9. Grinding wheel specified as “C 8 K 5 R 17” in ISO designation. What is the type of bond present in grinding wheel-----
10. Friability of grinding wheel is associated to-----

Unit-IV-LIMIT GAUGES

Important points / Definitions:

1. Limits
2. Fits and Tolerances
3. Unilateral and Bi-lateral tolerances system
4. Hole and Shaft basis system
5. Full Interchangeability
6. Selective assembly

Short Questions (minimum 10 previous JNTUH Questions – Year to be mentioned)

1. What is standardization? (2017)
2. What is interchangeability? (2017)
3. Write a short note on selective assembly? (2015)
4. What are limits, fits and tolerances? (2016)
5. What is the need of tolerances? (2015)
6. What are the types of fits? (2016)
7. What is a transition fit? (2015)
8. Explain hole basis? (2018)
9. Explain advantages of limit gauges? (2018)
10. Write limitations of limit gauges? (2015)



Long Questions (minimum 10 previous JNTUH Questions – Year to be mentioned)

1. Define Taylor's principle? (2016)
2. Write a note on sine gauging? (2016)
3. Explain the procedure of design of GO and NOGO gauges? (2015)
4. Explain auto collimator in details? (2015)
5. Explain with diagram the working of sine bar and sine centre? (2017)
6. Explain with diagram the working of angle dekkor? (2015)
7. Explain why sine bar is used for lesser values of angles? (2017)
8. Explain bevel protractor with neat sketch? (2018)
9. What is surface plate? Explain flatness measurement by using surface plate? (2015)
10. Explain flatness testing by using optical flat with neat sketch? (2018)

Fill in the Blanks / Choose the Best: (Minimum 10 to 15 with Answers)

1. ----- is bilateral tolerance.
2. ----- '50' represents in 50H8/g7.
3. ----- is the condition for a positive upper deviation.
4. ----- ES represent in terminology as per IS: 919.
5. ----- principle is related to Gauge design.
6. ----- is the shape of the tool maker's flats.
7. ----- sensitivity of spirit level is expressed.
8. ----- is used for checking the perpendicular distance from the graduated face of a beam to the graduated face of vernier.
9. How many grades or classes of slip gauges are present-----
10. ----- is the main use of contour gauge.

Unit-V-MEASUREMENT

Important points / Definitions:

1. Surface roughness measurement: Roughness
2. Waviness
3. CLA
4. RMS
5. Rz values
6. Methods of measurement of surface finish
7. Talysurf
8. Screw thread measurement
9. Gear measurement: Machine
10. Tool alignment test on lathe
11. Milling and drilling operations
12. Coordinate measuring machines
13. Types of applications of CMM

Short Questions (minimum 10 previous JNTUH Questions – Year to be mentioned)

1. Define surface texture and surface roughness? (2017)
2. What are the different methods for surface finish measurement? (2016)
3. Explain RMS value? (2015)
4. Explain Rz value? (2016)
5. Explain Taylor-Hobson instrument? (2017)
6. Explain types of pitch error? (2018)



7. Write a short note on gear tooth vernier? (2015)
8. Explain gear rolling? (2018)
9. Explain constant chord method? (2018)
10. Short note on Parkinson's tester? (2015)

Long Questions (minimum 10 previous JNTUH Questions – Year to be mentioned)

1. Explain the various errors in screw threads and their effect on accuracy? (2016)
2. Explain the methods of measuring effective diameter using three wires with neat sketch? (2017)
3. Explain gear rolling in detail? (2015)
4. Determine the setting for spur gear having 50 teeth of module 5 mm? (2015)
5. What are the common geometrical tests performed on an engine lathe? What purpose they are performed? (2016)
6. What are the different alignment test on drilling machine? Explain in detail? (2015)
7. What is CMM? What are its types? (2018)

Fill in the Blanks / Choose the Best: (Minimum 10 to 15 with Answers)

1. ----- is the method to find low and high spots.
2. ----- is the nature of the surface if curve bands around the line of contact when the surface is tested under surface contour test.
3. ----- is used to make optical flats.
4. ----- is the tolerance of the straightness of a line.
5. For testing straightness with the help of spirit level,----- is the length of each surface section.
6. ----- is most convenient to measure the cylindrical ring gauges.
7. ----- is used to check change in ocular lines position due to column rotation in universal micrometer.
8. ----- is generally used to check the hardness of the gauging surface of screw ring gauges.
9. ----- is best gauge/machine to inspect the parallel screw ring gauges.
10. ----- is the least count of vernier bevel protractor.