

MF 5104 Metal Cutting Theory and Practice

Important 13 Mark Questions

Unit I

1. Discuss schematically the theory of Lee and Shaffer.
2. Discuss about the mechanism of chip formation with a neat sketch.
3. Explain the need for rational approach to the problem of cutting materials.
4. Schematically show the Merchant force circle in orthogonal cutting. Derive the equations for shear and friction forces in terms of material properties and cutting parameters.
5. Turning is performed on a work material with shear strength of 250 MPa. The following conditions are used: $v=3.0$ m/s, $f=0.20$ mm/rev, $d=3.0$ mm, and rake angle $=7^\circ$ in the direction of chip flow. The resulting chip ratio $=0.5$. Using the orthogonal model as an approximation of turning. Determine:
 - (i) The shear plane angle;
 - (ii) The shear force;
 - (iii) Cutting force and feed force.

Unit II

1. Sketch and explain the complete nomenclature of a multipoint tool like drill.
2. Sketch and explain the differences between single point and multi point cutting.
3. What is meant by milling process? Explain the various types of milling process.
4. During the machining of a mild steel work piece a triple carbide turning tool of $(-7^\circ)-12^\circ-8^\circ-8^\circ-10^\circ-75^\circ-1$ mm (ORS) geometry was used. Sketch the tool showing above geometry.
5. Sketch the plain milling cutter and label its nomenclature.

Unit III

1. Discuss briefly any two various methods of measuring cutting temperature in metal cutting.
2. Summarize on lubricants and its classification. Explain its purposes.
3. Explain the strain gauge type dynamometer for turning.
4. Discuss the methods of measurements of temperature with a neat sketch.
5. Explain the various parameters influences on temperature during machining process.

Unit IV

1. Differentiate between conventional and accelerated tool life tests.
2. Discuss the parameters that influence the life of the tool with an example.
3. Discuss briefly about any four materials along with their properties that can be used for making the tools.
4. Derive the relationship for minimum cost cutting speed and tool life in a single-point turning of cylindrical parts. State the assumptions made.

5. The durability of a cutting tool is 40 min at a cutting speed of 140 m/min and 100 min at a cutting speed of 60 m/min. Calculate
- Taylor constants
 - The tool life for $V=1$ m/min,
 - The cutting speed for a tool life $T=1$ min,
 - The tool life for $V=70$ m/min,
 - The cutting speed for durability of 120 min.

Unit V

- Explain the parameters that control the tool life of a single-point cutting tool.
- Show by neat sketch the various forms of wear in cutting tools.
- Discuss the major types of vibrations occurring in machining and also explain the various chattering suppression techniques.
- Discuss any three important tool materials with respect to composition and applications.
- Derive the Expression tool life for maximum production rate.