



P.E.S. College of Engineering, Mandya - 571 401
 (An Autonomous Institution affiliated to VTU, Belagavi)
Fifth Semester, B.E. - Industrial and Production Engineering
Semester End Examination; Feb. - 2021
Theory of Metal Cutting

Time: 3 hrs

Max. Marks: 100

Course Outcomes

The Students will be able to:

CO1: Recognize the geometry of cutting tools based on the materials used for machining.

CO2: Elaborate on mechanics of machining in metal cutting, and to demonstrate the measurement of cutting forces for various machining operations.

CO3: Identify the tool life based on different cutting speed, feed and depth of cut and understand the importance of economy in machining.

CO4: Govern cutting tool temperature and appreciate the importance of cutting fluids.

CO5: Explain the characteristics and properties of different tool material.

Note: I) PART - A is compulsory. Two marks for each question.II) PART - B: Answer any **Two** sub questions (from a, b, c) for Maximum of **18 marks** from each unit.

Q. No.	Questions	Marks	BLs	COs	POs
I : PART - A		10			
I a.	Explain Metal cutting process.	2	L1	CO1	PO1
b.	Mention the requirements of dynamometer.	2	L1	CO2	PO1
c.	Mention the factor which affects tool life.	2	L1	CO3	PO1
d.	Write a neat sketch of temperature distribution in metal cutting.	2	L1	CO4	PO1
e.	Explain cemented carbide tools.	2	L1	CO5	PO1
II : PART - B		90			
UNIT - I		18			
1 a.	Differentiate between the different types of metal cutting process.	9	L1	CO1	PO1
b.	With a neat sketch, explain the principle of chip breaking.	9	L1	CO1	PO1
c.	With a neat sketch, explain the multi point cutting tool nomenclature.	9	L1	CO1	PO1
UNIT - II		18			
2 a.	Derive the relation between the different forces and coefficient of friction in metal cutting process.	12	L3	CO2	PO3
b.	A mild steel bar is turned on a lathe with a cutting tool having rake angle 10° and with a cutting speed of 200 mpm. If the width of cut is 3 mm and uncut thickness is 0.3 mm. Determine the shear angle, cutting force and thrust force.	6	L3	CO2	PO3
c.	With a neat sketch, explain milling dynamometer.	6	L1	CO2	PO2
UNIT - III		18			
3 a.	Explain the effect of cutting parameters on tool life.	9	L1	CO3	PO1
b.	The total life for a HSS tool is expressed by the relation $VT_1/7 = C_1$ and for tungsten carbide $VT_1/5 = C_2$. If the tool life for a cutting speed of 24 m/min is 128 mm. Compare the life of the two tools at a speed of 30 m/min.	9	L3	CO3	PO3
c.	Explain the different cost involved in manufacturing a component.	9	L1	CO3	PO1

UNIT - IV**18**

- 4 a. Explain the different types of cutting fluids. 9 L1 CO4 PO1
- b. Explain the different factors which affect heat generation in cutting zone. 9 L1 CO4 PO1
- c. With a neat sketch, explain any one techniques used for the measurement of temperature in metal cutting. 9 L1 CO4 PO1

UNIT - V**18**

- 5 a. Explain the different properties of cutting tool materials and mention the different types of cutting tool materials. 9 L1 CO5 PO1
- b. Write a note on diamonds and multi-coated cemented carbide inserts. 9 L1 CO5 PO1
- c. Briefly explain;
- i) Sialon tools 9 L1 CO5 PO1
 - ii) Whiskered ceramics
 - iii) CBN

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