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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; February / March - 2022
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.	Mention the importance of Economical cutting speed.	2	L1	CO1	PO1
b.	Explain what is Dynamometry?	2	L1	CO2	PO1
c.	Explain how tool failure occurs.	2	L1	CO3	PO1
d.	Mention the effect of cutting fluid.	2	L1	CO4	PO1
e.	Mention the conditions for the effective use of ceramic tools.	2	L1	CO5	PO1
	II : PART - B	**90**			
	UNIT - I	**18**			
1 a.	With a neat sketch, explain the nomenclature of single point cutting tool.	9	L1	CO1	PO1
b.	What is metal cutting principle? With a neat sketch, explain the different types of metal cutting process.	9	L1	CO1	PO1
c.	With a neat sketch, explain the different types of chip formed during metal cutting process.	9	L1	CO1	PO1
	UNIT - II	**18**			
2 a.	Derive an expression for shear plane angle.	6	L3	CO2	PO3
b.	Derive an expression between the different force acting in cutting process with assumptions.	12	L3	CO2	PO3
c.	Explain the requirements of the cutting force dynamometers.	6	L1	CO2	PO2

UNIT - III	**18**			
3 a. Define machinability. Explain the various criteria of machinability.	9	L1	CO3	PO1
b. Explain tool failure and the various wear mechanisms of cutting tools.	9	L1	CO3	PO1
c. With a neat sketch, explain the different types of tool wear.	9	L1	CO3	PO1
UNIT - IV	**18**			
4 a. With a neat sketch, explain the different zones of heat generated during metal cutting process.	9	L1	CO4	PO1
b. With a neat sketch, explain tool work thermocouple technique used to measured tool chip interface temperature.	9	L1	CO4	PO1
c. Briefly explain the different types of cutting fluids.	9	L1	CO4	PO1
UNIT - V	**18**			
5 a. Explain the requirements of cutting tool materials.	9	L1	CO5	PO1
b. Mention the chemical composition and application of different grades of High speed steels.	9	L1	CO5	PO1
c. Write a note on cast cutting and cemented carbides.	9	L1	CO5	PO1

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