

Code: 20ME3502

**III B.Tech - I Semester – Regular / Supplementary Examinations
NOVEMBER 2024**

**METAL CUTTING AND MACHINE TOOLS
(MECHANICAL ENGINEERING)**

Duration: 3 hours

Max. Marks: 70

Note: 1. This paper contains questions from 5 units of Syllabus. Each unit carries 14 marks and have an internal choice of Questions.

2. All parts of Question must be answered in one place.

BL – Blooms Level

CO – Course Outcome

			BL	CO	Max. Marks
UNIT-I					
1	a)	Describe the single-point cutting tool signature in the ASA and ORS system.	L2	CO1	7 M
	b)	Explain the orthogonal cutting model and describe the forces acting on the chip and tool with a neat diagram.	L2	CO1	7 M
OR					
2	a)	Explain the types of chip formation during metal cutting in detail with neat schematics.	L2	CO1	7 M
	b)	The rake angle in an orthogonal cutting operation is 12° . The chip thickness before the cut = 0.30 mm and the resulting chip thickness after the cut = 0.70 mm. Calculate (i) the shear plane angle and (ii) the shear strain for the operation.	L2	CO2	7 M

UNIT-II					
3	a)	Explain the three possible modes by which the cutting tool can fail in machining.	L2	CO1	7 M
	b)	Describe the important properties required in a tool material and list the types of tool materials.	L2	CO2	7 M
OR					
4	a)	Why cutting fluids is essential in machining? Discuss the application methods of cutting fluids in detail.	L2	CO2	7 M
	b)	Machine shops are considering dry machining because of certain problems inherent in the use of cutting fluids. What are the problems associated with the use of cutting fluids?	L2	CO1	7 M
UNIT-III					
5	a)	Classify the types of Lathe and explain the construction of Lathe with a neat sketch.	L2	CO3	7 M
	b)	Discuss the various Lathe operations.	L2	CO3	7 M
OR					
6	a)	Describe the crank and slotted link mechanism in shaper with a neat diagram.	L2	CO3	7 M
	b)	An engine lathe is used to turn a cylindrical work part 150 mm in diameter by 500 mm long. Cutting speed = 2.50 m/s, feed = 0.30 mm/rev and depth of cut = 3.0 mm. Determine (i) cutting time and (ii) metal removal rate.	L2	CO3	7 M

UNIT-IV					
7	a)	Explain the various drilling operations in detail.	L2	CO4	7 M
	b)	Write the difference between up milling and down milling operations.	L2	CO4	7 M
OR					
8	a)	Describe the process of manufacturing spur gear using the milling machine.	L2	CO4	7 M
	b)	Determine the indexing crank movement for milling hexagonal bolt by simple indexing.	L2	CO4	7 M
UNIT-V					
9	a)	Explain the working principle of the surface grinding machine in detail.	L2	CO5	7 M
	b)	List the types of grinding wheels and explain their purposes.	L2	CO5	7 M
OR					
10	a)	Explain the working principle of cylindrical grinding operation in detail.	L2	CO5	7 M
	b)	Explain Lapping and Honing process with neat sketches.	L2	CO5	7 M