

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY GURAJADA VIZIANAGARAM**  
**III B. Tech I Semester Regular/Supplementary Examinations, April/May -2025**  
**MACHINING, MACHINE TOOLS & METROLOGY**  
**(MECHANICAL ENGINEERING)**

Time: 3 hours

Max. Marks: 70

Answer any **FIVE** Questions **ONE** Question from **Each unit**

All Questions Carry Equal Marks

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		<b><u>UNIT-I</u></b>	
1.	a)	Explain the mechanism of chip formation and classify different types of chips formed during metal cutting.	[7M]
	b)	Describe the Merchant's force diagram and derive the expression for cutting forces in orthogonal cutting.	[7M]
		(OR)	
2.	a)	Discuss the tool wear mechanisms and the factors affecting tool life. Derive Taylor's tool life equation.	[7M]
	b)	Define machinability. What are the factors affecting machinability and how it is evaluated?	[7M]
		<b><u>UNIT-II</u></b>	
3.	a)	Explain the construction and working principle of an engine lathe. List its major components and specifications.	[7M]
	b)	Describe various taper turning methods used in lathe machines with neat sketches.	[7M]
		(OR)	
4.	a)	Explain the working principle of a slotting machine and its difference from shaping and planning machines.	[7M]
	b)	With neat sketches, explain the slider crank mechanism used in shaping machines. How the machining time is calculated?	[7M]
		<b><u>UNIT-III</u></b>	
5.	a)	Describe the construction and working of a radial drilling machine. List its applications.	[7M]
	b)	Explain the geometry of a twist drill. How does it affect the drilling performance?	[7M]
		(OR)	
6.	a)	Classify milling machines and explain the column and knee-type milling machine with a neat sketch.	[7M]
	b)	Describe various methods of indexing in milling machines. Derive the formula for simple indexing.	[7M]
		<b><u>UNIT-IV</u></b>	
7.	a)	Explain the theory of grinding. Classify grinding machines and describe cylindrical grinding.	[7M]
	b)	Compare lapping, honing, and broaching operations. When are they preferred over grinding?	[7M]
		(OR)	
8.	a)	Explain the hole and shaft basis systems. How do they influence	[7M]

		the limits and fits in assemblies?	
	b)	Describe Taylor's principle for gauge design. Explain the working and applications of plug and snap gauges.	[7M]
		<b><u>UNIT-V</u></b>	
9.	a)	Distinguish between surface roughness and waviness. Explain their significance in machining.	[7M]
	b)	Explain the construction and working of a Talysurf instrument for surface roughness measurement.	[7M]
		(OR)	
10.	a)	Describe the working principle and uses of a Tool Maker's Microscope and Optical Flats.	[7M]
	b)	What is an optical comparator? Explain its construction, working, advantages, and limitations.	[7M]

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