PVP 23

Code: 23ME3501

III B.Tech - I Semester - Regular Examinations - NOVEMBER 2025

MACHINE TOOLS AND METROLOGY
(MECHANICAL ENGINEERING)

Duration: 3 hours Max. Marks: 70

Note: 1. This question paper contains two Parts A and B.
2. Part-A contains 10 short answer questions. Each Question carries 2 Marks.
3. Part-B contains 5 essay questions with an internal choice from each unit. Each Question carries 10 marks.
4. All parts of Question paper must be answered in one place.

BL – Blooms Level CO – Course Outcome

PART – A

		BL	CO
1.a)	What is metal cutting?	L2	CO1
1.b)	List the properties of coolants.	L2	CO1
1.c)	Define ‘taper’.	L2	CO2
1.d)	What are the operations that can be performed on a shaper?	L2	CO2
1.e)	Name different types of drilling machines.	L2	CO3
1.f)	What are the various methods of indexing?	L2	CO3
1.g)	Name any two instruments used to measure surface roughness.	L2	CO4
1.h)	Define ‘tolerance’.	L2	CO4
1.i)	What is wringing of slip gauges?	L2	CO5
1.j)	Name the various instruments used for measuring angles.	L2	CO5

PART – B

			BL	CO	Max. Marks
UNIT-I					
2	a)	Explain with the help of neat sketch the complete geometry of a single point cutting tool.	L3	CO1	5M
	b)	Distinguish between orthogonal cutting and oblique cutting.	L2	CO1	5M
OR					
3	a)	State the general form of Taylor's equation for tool life, and discuss the parameters involved in it.	L2	CO1	5M
	b)	Sketch Merchant's force diagram and explain the different quantities involved.	L3	CO1	5M
UNIT-II					
4	a)	Discuss in brief an engine lathe.	L3	CO2	5M
	b)	Distinguish between capstan and turret lathe.	L2	CO2	5M
OR					
5	a)	Name different parts of a shaper. Describe them in brief pinpointing their functions.	L3	CO2	5M
	b)	Describe various slotting tools and slotting operations.	L3	CO2	5M

UNIT-III					
6	a)	Sketch and describe in brief of a radial drilling machine.	L3	CO3	5M
	b)	What are the different horizontal boring machines? List them and specify their suitability.	L2	CO3	5M
OR					
7	a)	Classify milling machines and list them accordingly. How milling differs from lathe?	L2	CO3	5M
	b)	Determine the cutting time in cutting 125 mm long keyway using HSS end mill of 20 mm diameter, having four cutting teeth. The depth of keyway is to be 4.5 mm. Feed per tooth is 0.1 mm and cutting speed is 90 m/min.	L3	CO3	5M
UNIT-IV					
8	a)	Describe the various types and kind of abrasives.	L2	CO4	5M
	b)	Briefly explain the process of lapping.	L2	CO4	5M
OR					
9	a)	Define “Interchangeability” and discuss its importance.	L2	CO4	5M
	b)	A 75 mm shaft rotates in a bearing. The tolerance for both shaft and bearing is 0.075 mm and the required allowance is 0.10 mm. Determine the dimensions of the shaft, and the bearing bore with the basic hole standard.	L3	CO4	5M

UNIT-V					
10	a)	Why the slip gauges are termed as “End standard”? Explain.	L2	CO5	5M
	b)	State the principle of micrometer. Sketch an outside micrometer and name its various parts.	L3	CO5	5M
OR					
11	a)	Explain the use of sine bar for measuring angle of a taper plug gauge with the help of a neat sketch.	L3	CO5	5M
	b)	Describe the working principle of an optical projector.	L3	CO5	5M