CBCS SCHEME

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BME402

Fourth Semester B.E./B.Tech. Degree Examination, June/July 2026
Machining Science and Metrology

ACHARYA INSTITUTE OF TECHNOLOGY LIBRARY BANGALORE

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Define Metal Cutting. With a suitable sketch explain the mechanics of metal cutting.	06	L2	CO1
	b.	With a neat sketch, explain Merchant's circle diagram, add the advantages and limitations of it.	06	L3	CO1
	c.	Distinguish between Orthogonal and Oblique Cutting.	08	L2	CO1
		OR			
Q.2	a.	What is a Lathe? With a line diagram explain the lathe specifications.	04	L1	CO2
	b.	With a neat diagram explain any 'five' lathe operations.	10	L1	CO2
	c.	State the differences between Capstan and Turret Lathes.	06	L1	CO2
		Module – 2			
Q.3	a.	Explain with neat sketch Up milling and Down milling operation.	06	L1	CO2
	b.	Explain any 'four' milling machine operations.	08	L1	CO2
	c.	With a neat sketch explain vertical milling machine.	06	L1	CO2
		OR			
Q.4	a.	With a neat sketch explain Quick Return Mechanism used in shaper.	06	L2	CO2
	b.	With a neat sketch explain the nomenclature of single point cutting tool.	06	L2	CO2
	c.	Explain with sketch any 4 drilling machine operations.	08	L1	CO2
		Module – 3			
Q.5	a.	Discuss the factors that influence the amount of heat generated during the metal cutting.	06	L2	CO3
	b.	What are the primary forms of tool wear in metal cutting? Explain Crater wear and Flank wear in detail.	08	L2	CO3
	c.	A carbide cutting tool lasted for 150 min while machining mild steel at 35 m/min. If a similar tool is used at 30% higher speed to machine mild steel, calculate the tool life. Also calculate the value of cutting speed if the tool is to machine for 2 hours. Assume n = 0.3 in Taylor's tool life equation $VT^n = C$.	06	L3	CO3

		OR			
Q.6	**a.**	Discuss the relationship between the work material properties and its machinability.	**06**	**L1**	**CO3**
	b.	Write short notes on the following tool materials : (i) HSS (i) Cemented carbide (iii) Ceramics (iv) Cubic boron nitride.	**08**	**L1**	**CO3**
	c.	Explain the criterion for selecting an appropriate cutting fluid.	**06**	**L1**	**CO3**
		Module – 4			
Q.7	**a.**	Define Metrology. State and explain the objectives of metrology.	**05**	**L1**	**CO4**
	b.	What do you mean by Standard? Explain line and end standard. Also comment on wringing of slip gauges.	**08**	**L1**	**CO4**
	c.	What do you mean by Interchangeability? Explain taking any suitable example.	**07**	**L2**	**CO4**
		OR			
Q.8	**a.**	Define the following terms: (i) Limits (ii) Fits (iii) Tolerance (iv) Fundamental deviation	**08**	**L1**	**CO4**
	b.	Discuss the different types of fits and their designation with neat sketches.	**06**	**L1**	**CO4**
	c.	Write short notes on : (i) Compound Tolerance (ii) Cost v/s Tolerance	**06**	**L1**	**CO4**
		Module – 5			
Q.9	**a.**	What are 'GO' and 'NOGO' gauges? Explain how Taylor's principle is used in designing them.	**06**	**L1**	**CO4**
	b.	Sketch and explain any two types of plug and ring gauges.	**08**	**L1**	**CO4**
	c.	Explain briefly the Gauge Tolerances.	**06**	**L1**	**CO4**
		OR			
Q.10	**a.**	Define Comparator. Explain mechanical comparator. Add sketch.	**07**	**L1**	**CO5**
	b.	With a neat sketch explain LVDT.	**06**	**L1**	**CO5**
	c.	What do you mean by Angular Measurement? Explain any one method adding suitable sketch.	**07**	**L1**	**CO5**

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