

CBCS SCHEME

BME402

USN

Fourth Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026 Machining Science and Metrology

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.	Explain the different types of chips produced during metal cutting with neat sketches.	7	L1	CO1
	b.	Explain the difference between orthogonal cutting and oblique cutting with atleast two examples for each.	7	L1	CO1
	c.	Derive an expression for shear plane angle in terms of rake angle and chip thickness ratio.	6	L3	CO1
OR					
Q.2	a.	With a neat sketch, explain the various parts of a lathe machine.	6	L2	CO1
	b.	Explain how does a capstan lathe differ from turret lathe.	6	L1	CO1
	c.	Explain any four operations performed on a lathe machine.	8	L2	CO1
Module – 2					
Q.3	a.	Explain with a sketch the constructional features of column and knee type milling machine.	6	L2	CO2
	b.	Explain any four operations performed on milling machine.	8	L2	CO2
	c.	Index 87 divisions by compound indexing method having a index plate with circle of holes – 21, 23, 27, 29, 31, 33	6	L3	CO2
OR					
Q.4	a.	With a neat sketch, explain the construction and operation of bench drilling machine.	7	L2	CO2
	b.	Briefly explain the differences between shaper and planer machine.	6	L1	CO2
	c.	With a neat sketch, explain grinding process and the components of a grinding wheel.	7	L2	CO2
Module – 3					
Q.5	a.	Explain the different types of tool wear with relevant sketches.	7	L2	CO3
	b.	A cast iron bar stock was turned at 50 m/min, for which the tool life was 3 hours. For the same material, at 40m/min, the tool life was 5 hours. Find the value of constant 'C' and 'n' in the Taylor's tool life equation.	6	L3	CO3
	c.	What is tool life? Explain the factors which affect the tool life.	7	L2	CO3

OR

Q.6	a.	Briefly explain the desirable properties of cutting tool materials.	6	L2	CO3
	b.	Explain Taylors tool life equation.	6	L2	CO3
	c.	Explain the salient features of HSS and coated carbides.	8	L2	CO3

Module – 4

Q.7	a.	Define Metrology. Explain the objectives of metrology.	7	L2	CO4
	b.	Explain with neat sketches wringing phenomenon of step gauges.	7	L2	CO4
	c.	Four length bars A, B, C and D each having a basic length 125 mm are to be calibrated using a calibrated length bar of 500 mm basic length. The 500 mm bar has an actual length of 499.999/mm. Also, $L_B = L_A + 0.0001$ mm, $L_C = L_A + 0.0005$ mm, $L_D = L_A - 0.0002$ mm and $L_A + L_B + L_C + L_D = L + 0.0003$ mm. Determine L_A , L_B , L_C and L_D .	6	L3	CO4

OR

Q.8	a.	Explain the following terms: i) Tolerance ii) Interchangeability iii) Selective assembly	6	L2	CO4
	b.	Define fit. Explain the different types of fit with neat sketches.	7	L2	CO4
	c.	Determine the tolerances on the hole and the shaft for a precision running fit designated by 50 H7/96. Given : i) 50 mm lies between 30-50 mm ii) $i = 0.45\sqrt[3]{D} + 0.001D$ microns iii) Fundamental deviation for 'H' hole = 0 iv) Fundamental deviation for 'g' shaft = $-2.5D^{0.3}$ v) IT7 = 16i vi) IT6 = 10i State the actual maximum and minimum sizes of the hole and shaft, and maximum and minimum clearances.	7	L3	CO4

Module – 5

Q.9	a.	What are gauges? How are they classified?	6	L3	CO5
	b.	Explain with neat sketches, any two types of gauges.	7	L2	CO5
	c.	With a neat sketch, explain reed type mechanical comparator.	7	L2	CO5

OR

Q.10	a.	With neat sketch, explain working of LVDT.	7	L2	CO5
	b.	With neat sketch, explain the principle of sine bar.	7	L2	CO5
	c.	Select the sizes of angle gauges required to built the following angles, also show the arrangement of gauges: i) $57^\circ 34' 9''$ ii) $102^\circ 8' 42''$	6	L3	CO5
