

Fourth Semester B.E./B.Tech. Degree Examination, June/July 2025 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.	Distinguish between orthogonal cutting and oblique cutting with neat sketches. Also justify which type of cutting method is preferred, why?		06	L2	CO1
	b.	With a neat sketch, explain single point cutting tool nomenclature.		06	L2	CO1
	c.	The following data are obtained during a turning operation on a Lathe, cutting Force = 120 kg, Feed force = 30 kg, Rake angle = 15°, Feed rate = 0.2 mm/rev, chip thickness = 0.3 mm, cutting speed = 100 m/min, work piece diameter = 120 mm, Depth of cut = 0.4 mm. calculate, a) Chip thickness ratio b) Shear angle c) Co-efficient of friction d) Friction angle e) Shear stress		08	L3	CO1
OR						
Q.2	a.	Mention the assumption of merchant circle model, draw the neat sketch of merchant circle with all the notation.		06	L2	CO1
	b.	Derive the relation between Rake angle, shear angle and Frictional angle.		08	L2	CO1
	c.	With a neat sketch explain the principle of Lathe machine. Also distinguish between Turret Lathe and Capstan Lathe.		06	L2	CO1
Module - 2						
Q.3	a.	Explain the constructional feature of column and knee type milling machine with a neat sketch.		06	L2	CO2
	b.	What is Indexing? Mention the different method, also write the steps for Indexing 69 divisions.		08	L3	CO2
	c.	Distinguish between Up milling and Down milling with sketches.		06	L2	CO2
OR						
Q.4	a.	Explain the constructional feature of radial drilling machine with a neat sketch.		06	L2	CO2
	b.	A 12 mm hole is to be drilled through a 20 mm thick plate. The cutting speed is 12 m/min and the feed rate is 0.12 mm/rev. Estimate the machining time. Take the over travel plus the clearance of the tool as 5 mm.		08	L3	CO2
	c.	Distinguish between shaping and planing machine.		06	L2	CO2
Module - 3						
Q.5	a.	With a neat sketch Explain the different temperature zones during metal cutting process.		06	L2	CO3
	b.	Determine the percentage change in the cutting speed required to give 60% reduction in tool life. The speed /life of the tool relationship is given by $VT^n = G$. Take $n = 0.2$.		08	L3	CO3
	c.	What are the functions of coolants in metal cutting process. Mention some of the coolants used during metal cutting.		06	L2	CO3

OR

Q.6	a.	What do you mean by tool life? Mention the tool life equation with usual notation, also mention the parameters on which tool life is depending.	06	L2	CO1
	b.	Explain with a neat sketch, Flank and creator wear.	06	L2	CO3
	c.	A lathe turning at a particular speed is cutting a mild steel work piece with H.S.S tool. The speed – life relationship for the tool is given by $VT^{0.4} = 400$. Determine the percentage increase in the tool life of the cutting speed is reduced by 20%	08	L3	CO3

Module – 4

Q.7	a.	What are the difference between line standards and end standards. Also mention the characteristics of Line standards.	08	L2	CO1
	b.	Explain the wringing phenomenon with a neat sketch.	06	L2	CO1
	c.	List the slips to be wrung together to produce on overall dimension of 92.357 mm using two protection slips of 2.500 mm size. Show the slip gauge combination.	06	L3	CO4

OR

Q.8	a.	Define Fit. Explain the types of fit and their designation. With sketches. (any 2)	06	L2	CO4
	b.	With a neat sketch, Explain Hole basis system and shaft basis system.	06	L2	CO4
	c.	Determine the dimension of the shaft and hole for a fit $30 H_8/d_{10}$ and sketch the fit for the following. i) Diameter 30 falls in the dia range 18-30, upper deviation for “d” shaft is $-16 D^{0.44}$ ii) $i=0.45 D^{1/3} + 0.001 D$, Tolerance for IT 8 = 25i, Tolerance for IT10 = 64i	08	L3	CO4

Module – 5

Q.9	a.	Explain the following with neat sketches. i) Plug gauges ii) Ring gauges iii) Snap gauge iv) Concept of limits of size and Tolerance	12	L2	CO5
	b.	Determine the type of fit after deciding the fundamental deviation and tolerance in the following. Also sketch the fit : i) Fit $\phi 70 H_9 e_7$ Diameter step (50-80) ii) Fundamental deviation for e shaft = $-11 D^{0.41}$ Take, IT7 = 16i and IT9 = 40i, $i=0.45\sqrt[3]{D} + 0.001D$	08	L3	CO5

OR

Q.10	a.	Describe with a neat sketch, the construction and working of L.V.D.T.	10	L2	CO5
	b.	Explain the principle of sine – bar with sketch. Also build the angle $37^\circ 9' 18''$ using angle gauges with sketch.	10	L3	CO5
