

CBCS SCHEME



BME402

Fourth Semester B.E./B.Tech. Degree Supplementary Examination, June/July 2024

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.	What is meant by tool signature? Explain each term of a tool designated as 10-9-6-5-8-7-2.	06	L2	CO1
	b.	Derive an expression for shear angle in terms of chip thickness ratio and back rake angle.	07	L3	CO1
	c.	Explain the mechanism and types of chip formed during metal cutting.	07	L2	CO1
OR					
Q.2	a.	Draw a neat sketch of Lathe and name the parts.	07	L2	CO2
	b.	Explain the following lathe operations: (i) Facing (ii) Knurling (iii) Turning	06	L2	CO1
	c.	Differentiate between Capstain Lathe and Turret lathe.	07	L2	CO1
Module – 2					
Q.3	a.	With a neat sketch, explain column and knee type milling machine.	07	L2	CO2
	b.	Differentiate between Up milling and Down milling.	07	L2	CO1
	c.	With neat sketches, explain : (i) Form milling (ii) Gang milling (iii) Face milling	06	L2	CO2
OR					
Q.4	a.	Explain Crank and Slotted Link Quick Return Mechanism of Shaper.	07	L2	CO2
	b.	Explain the following drilling operations: (i) Reaming (ii) Boring (iii) Tapping	06	L3	CO2
	c.	With a neat sketch, explain centerless grinding process.	07	L2	CO2
Module – 3					
Q.5	a.	With the aid of neat sketch, explain tool-work thermocouple technique to measure tool tip temperature.	06	L2	CO3
	b.	With a neat sketch, explain various heat generation zones during metal cutting along with temperature distribution curve.	07	L2	CO3
	c.	Explain the different forms of tool wear with neat sketches.	07	L2	CO3

OR

Q.6	a.	Explain the desirable properties of cutting tool materials.	07	L2	CO3
	b.	Explain the salient features of cutting tool materials listed below: (i) CBN (ii) HSS (iii) Diamond	06	L2	CO3
	c.	What are the properties of a good cutting fluid? Explain.	07	L2	CO3

Module – 4

Q.7	a.	Define metrology. What are the objectives of metrology?	06	L2	CO4
	b.	With a neat sketch, explain the imperial standard yard.	07	L2	CO4
	c.	A calibrated metre end bar has an actual length of 1000.0003 mm. It is to be used in the calibration of two bars A and B, each having basic length of 500 mm. When compared with the metre bar $L_A + L_B$ was found to be shorter by 0.0002 mm. On comparing A with B it was found that A was 0.0004 mm longer than B. Find the actual length of A and B.	07	L3	CO4

OR

Q.8	a.	What is Line and End standard? Explain the wringing phenomena of slip gauges.	07	L2	CO4
	b.	Build the dimension 35.4875 mm using M12 set of gauges. Use two protector slips of 2.5 mm each.	06	L3	CO4
	c.	Differentiate between interchangeability and selective assembly.	07	L2	CO4

Module – 5

Q.9	a.	State and explain Taylor's principle of gauge design.	06	L2	CO5
	b.	With a neat sketch, explain a snap gauge.	06	L2	CO5
	c.	Calculate the dimensions of plug and ring gauges to control the production of 50 mm shaft and hole pair of H_7d_8 as per IS specification. The following assumptions may be made: 50 mm lies in diameter step of 30 and 50 mm and the upper deviation for "d" shaft is given by $-16D^{0.44}$ and lower deviation for hole H is zero. Tolerance unit $i(\text{microns}) = 0.45\sqrt[3]{D} + 0.001D$ and $IT6 = 10i$ and above. IT6 grade the tolerance magnitude is multiplied by 10 at each fifth step.	08	L3	CO5

OR

Q.10	a.	Sketch and explain the working of Sigma Comparator.	07	L2	CO5
	b.	Select the sizes of angle gauges required to build: (i) $37^\circ 9' 18''$ (ii) $33^\circ 16' 42''$	06	L3	CO5
	c.	With a neat sketch, explain sine bar. List the limitations of sine bar.	07	L2	CO5