U.S.N.										

B. M. S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

July 2024 Semester End Main Examinations

Programme: B.E. **Semester: V**
Branch: Mechanical Engineering **Duration: 3 hrs.**
Course Code: 22ME5PCMMM **Max Marks: 100**
Course: Mechanical Measurements and Metrology

Instructions:1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

		UNIT - I	CO	PO	Marks
1	a)	Define Metrology. State its objectives.	CO1	PO1	**08**
	b)	Compare and contrast Hole basis system and Shaft basis system. Illustrate.	CO1	PO1	**06**
	c)	Build up the dimension 73.975mm and 34.468mm using M87 and M45 slip gauge sets respectively.	CO2	PO1 PO2	**06**
		OR			
2	a)	Explain the concept of: i. Unilateral and Bilateral Tolerances ii. Compound tolerances Show illustrations.	CO2	PO1 PO2	**08**
	b)	Describe Wavelength standard. State its advantages.	CO1	PO1	**04**
	c)	A length bar of size 1000mm after calibration is found to be lesser by 0.0001mm. If the same length bar is used for calibrating four bars and the following were found: • Bar A is shorter by 0.0002 mm as compared to Bar B • Bar C is longer than bar B by 0.0003mm • Bar D is longer than Bar B by 0.0001 mm. • If all bars (bar A,B,C,D) are assembled on one another and compared with the length bar it is found that this combination of all four bars is lesser than length bar by 0.0004mm. What is the assumed length of length bar, what is the actual calibrated length of length bar, what are the actual lengths of Bar A, Bar B, Bar C, Bar D. • Sketch the analysis.	CO2	PO1 PO2	**08**
		UNIT - II			
3	a)	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	CO2	PO1 PO2	**12**

			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 (microns) = $0.45\sqrt[3]{D}$ + 0.001D and IT7 = 16i and IT8 = 25i. Illustrate.			
		b)	Explain Zeiss ultra – optimeter with a neat sketch.	*CO2*	*PO1*	**08**
			UNIT - III			
	4	a)	"Most pressure measuring devices use elastic members to sense the pressure". Justify it by explaining the various types with illustration.	*CO3*	*PO1*	**10**
		b)	Explain Cathode ray Oscilloscope with a neat sketch. State its applications.	*CO3*	*PO1*	**10**
			UNIT - IV			
	5	a)	Elaborate the working of Servo-controlled dynamometer with a neat sketch.	*CO4*	*PO1*	**10**
		b)	Write a note on the measurement of temperature using a infrared thermometers. Illustrate.	*CO4*	*PO1*	**10**
			OR			
	6	a)	Classify pressure measuring devices for measurement of pressure.	*CO3*	*PO1*	**07**
		b)	Point out the most popular metals used in the manufacture of strain gauges.	*CO3*	*PO1*	**05**
		c)	Schematically explain the strain gauge arrangement for the force measurement using load cell.	*CO3*	*PO1*	**08**
			UNIT - V			
	7	a)	Explain the working principle of autocollimator with a neat sketch. State its advantages and disadvantages.	*CO4*	*PO1*	**10**
		b)	Explain the working of a Scanning electron microscopy with a neat sketch.	*CO4*	*PO1*	**10**

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