Reg. No.															

Question Paper Code	14422

B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2026

Fourth Semester

Mechanical Engineering

24MEPC402 - METROLOGY AND MEASUREMENTS

Regulations - 2024

Duration: 3 Hours | Max. Marks: 100

PART – A (i) (MCQ)
(16 × 1 = 16 Marks)
Answer ALL Questions

		Marks	K – Level	CO
1.	What is bilateral tolerance? a) Total tolerance is in 1 direction only b) Total tolerance is in both the directions c) May or may not be in one direction d) Tolerance provided all over the component body	1	K1	CO1
2.	Which environmental factor affects measurement most? a) Temperature b) Color c) Shape d) Weight	1	K2	CO1
3.	Which type of error is caused by calibration defects? a) Random error b) Gross error c) Systematic error d) Human error	1	K1	CO1
4.	What is the range of bevel protractor? a) 0-90° b) 0-180° c) 0-360° d) 90-270°	1	K1	CO2
5.	Which of the following is not used in making of sine bars? a) High carbon b) High chromium c) Corrosion resistant steel d) Aluminium	1	K1	CO2
6.	The instrument used to measure the angle of a V-groove is: a) Sine bar b) Autocollimator c) Bevel Protractor d) Angle dekkor	1	K1	CO2
7.	What is the name of screw thread which is formed on a cone? a) Parallel screw thread b) Straight screw thread c) Tapered screw thread d) Cylindrical screw thread	1	K1	CO3
8.	For checking the flatness, which of the following is used to mark the surface? a) Scriber b) Prussian blue c) Alcohol d) Ruler	1	K2	CO3
9.	What is the tolerance of parallelism of straight lines? a) 0.015 on 300 mm b) 0.15 on 300 mm c) 0.015 on 600 mm d) 0.15 on 600 mm	1	K1	CO3
10.	What is the full form of LASER? a) Light Amplification by Spontaneous Emission of Radiation b) Light Amplification by Stimulated Emission of Radiation c) Light Absorption by Stimulated Emission of Radiation d) Light Analysis by Stimulated Energy Radiation	1	K1	CO4

11.	A laser interferometer is primarily used to measure: a) Temperature b) Force c) Displacement d) Pressure	*1*	*K2*	*CO4*
12.	Straightness measurement using lasers helps in checking: a) Surface hardness b) Deviation from a straight path c) Material composition d) Temperature variation	*1*	*K2*	*CO4*
13.	Which of the following is used as indication instrument in a liquid expansion system? a) Bellows b) Bourdon tube c) Ammeter d) Thermometer	*1*	*K2*	*CO5*
14.	Which of the following is true for bimetallic type thermometer? a) Two metals have same temperature coefficients b) Two metals have different temperature coefficient c) One metal is cooled always d) None of the mentioned	*1*	*K1*	*CO5*
15.	What precise movement does CMM have? a) Precise movement in x coordinate b) Precise movement in x and y coordinates c) Precise movement in y and z coordinates d) Precise movement in x, y and z coordinates	*1*	*K2*	*CO6*
16.	What is the use of a laser beam in image formation? a) Triangulation system for measuring system b) Reduce glare of image c) Controls contrast of image d) Controls brightness of image	*1*	*K1*	*CO6*

PART – A (ii) (Short Answer Questions)
(6 × 3 = 18 Marks)
Answer ALL Questions

17.	Compare systematic error and random error.	*3*	*K2*	*CO1*
18.	Illustrate briefly about wringing of slip gauges.	*3*	*K3*	*CO2*
19.	Illustrate why is the three-wire method preferred over the two-wire method?	*3*	*K3*	*CO3*
20.	Why is laser preferred in engineering metrology?	*3*	*K2*	*CO4*
21.	Discuss the seeback effect.	*3*	*K2*	*CO5*
22.	Illustrate briefly about alignment test on machine tools.	*3*	*K3*	*CO6*

PART - B (Descriptive Answer Questions)
(6 × 11 = 66 Marks)
Answer ALL Questions

23.	a)	What are the various elements of metrology? With examples, explain how these elements influence the accuracy of measurements.	*11*	*K3*	*CO1*
		OR			
	b)	What are the different types of limit gauges used in metrology? Discuss in detail about any five with a suitable diagram.	*11*	*K3*	*CO1*
24.	a)	Describe working principle of angle Dekkor with the neat sketch and also write its application.	*11*	*K3*	*CO2*
		OR			
	b)	Select a suitable autocollimator for checking angular indexing and for small linear displacements and illustrate its working with a schematic diagram.	*11*	*K3*	*CO2*
25.	a)	Illustrate explain an accurate method of measuring effective diameter of screw threads.	*11*	*K3*	*CO3*

OR

	b)	Discuss about Tomlinson surface meter with a suitable diagram.	*11*	*K3*	*CO3*
26.	a)	Discuss the working principle of DC Laser interferometer with neat diagram.	*11*	*K3*	*CO4*
		OR			
	b)	Describe the working principle of a dual frequency laser interferometer with a neat sketch.	*11*	*K3*	*CO4*
27.	a)	Illustrate the construction and working of a venturimeter & orifice meter with neat sketch.	*11*	*K3*	*CO5*
		OR			
	b)	Describe the construction and working of an electrical resistance thermometer (RTD) & bimetallic strips. Mention its advantages and limitations.	*11*	*K3*	*CO5*
28.	a)	A Machine Vision system recovers useful information about a scene from its two dimensional digitized image. Explain the stages in machine vision process.	*11*	*K3*	*CO6*
		OR			
	b)	What are the different configurations of CMM? Discuss in detail with a suitable diagram.	*11*	*K3*	*CO6*