Reg. No.																

Question Paper Code	14490

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

Fourth Semester

Mechanical Engineering

20MEPC402 – METROLOGY, MEASUREMENTS AND COMPUTER AIDED INSPECTION

Regulations - 2020

Duration: 3 Hours | Max. Marks: 100

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

		Marks	*K – Level*	*CO*
1.	Define metrology. a) Study of heat transfer b) Science of measurement c) Study of machines d) Science of casting	*1*	*K1*	*CO1*
2.	The standard used as the highest reference in measurement is a) Working standard b) Secondary standard c) Primary standard d) Temporary standard	*1*	*K1*	*CO1*
3.	Interpret the purpose of feeler gauges. a) Measure pressure b) Measure small gap thickness c) Measure temperature d) Measure speed	*1*	*K2*	*CO1*
4.	Identify the gauge used to check hole dimensions. a) Snap gauge b) Ring gauge c) Plug gauge d) Feeler gauge	*1*	*K1*	*CO2*
5.	Compare GO gauge and NO GO gauge based on checking limits. a) GO gauge checks maximum material condition b) NO GO gauge checks maximum material condition c) Both check same condition d) Neither checks limits	*1*	*K2*	*CO2*
6.	Select the instrument suitable for measuring minute angular deviations. a) Clinometer b) Autocollimator c) Surface plate d) Steel rule	*1*	*K2*	*CO2*
7.	Identify the instrument commonly used for thread pitch measurement. a) Feeler gauge b) Dial gauge c) Screw pitch gauge d) Surface plate	*1*	*K1*	*CO3*
8.	Recognize the type of proximity sensor using magnetic field. a) Capacitive sensor b) Inductive sensor c) Optical sensor d) Thermal sensor	*1*	*K2*	*CO3*
9.	Which of following is the force measurement device operating mechanically a) Spring balance b) Thermocouple c) Optical pyrometer d) RTD	*1*	*K1*	*CO3*
10.	Select the CMM component responsible for detecting workpiece coordinates. a) Probe b) Chuck c) Coolant system d) Spindle	*1*	*K2*	*CO4*

11.	Identify the measurement technique based on wavelength comparison.		*1*	*K1*	*CO4*
	a) Interferometry	b) Extrusion			
	c) Forging	d) Welding			
12.	Which one of the following interferometer used for machine tool alignment.		*1*	*K1*	*CO4*
	a) Optical pyrometer	b) Michelson interferometer			
	c) Thermistor	d) Slip gauge			
13.	Define image processing.		*1*	*K1*	*CO5*
	a) Method of grinding	b) Method of welding			
	c) Manipulation and analysis of digital images	d) Heat transfer process			
14.	Interpret the role of software in machine vision systems.		*1*	*K2*	*CO5*
	a) Increase machine size	b) Process and analyze images			
	c) Increase vibration	d) Reduce lighting			
15.	The application used for automatic object identification is		*1*	*K1*	*CO6*
	a) Pattern recognition	b) Heat treatment			
	c) Surface grinding	d) Welding			
16.	The purpose of robot guidance systems is		*1*	*K1*	*CO6*
	a) Manual robot control	b) Direct robots accurately during operation			
	c) Reduce productivity	d) Increase machine weight			

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

17.	Classify different types of measurement errors.	*3*	*K2*	*CO1*
18.	Examine the factors affecting surface finish quality.	*3*	*K3*	*CO2*
19.	Discuss the working principle of LVDT.	*3*	*K3*	*CO3*
20.	Explain the role of CMM software in measurement and inspection.	*3*	*K2*	*CO4*
21.	Summarize the advantages and limitations of laser vision systems.	*3*	*K2*	*CO5*
22.	Describe the importance of machine vision in safety monitoring.	*3*	*K3*	*CO6*

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

23.	a)	Discuss the static characteristics of measuring instruments with a suitable example.	*11*	*K3*	*CO1*
		OR			
	b)	Categorize the various types of comparators and Illustrate the working principle of mechanical comparator with a neat sketch.	*11*	*K3*	*CO1*
24.	a)	Describe the working principle of a bevel protractor and sine bar.	*11*	*K3*	*CO2*
		OR			
	b) (i)	Discuss the advantages and disadvantages of selective assembly in manufacture.	*6*	*K3*	*CO2*
	(ii)	Illustrate the need and relevance of interchangeability in mass production industry.	*5*	*K3*	*CO2*

25.	a)	Classify the types of position sensors and discus in detail about any two with a suitable diagram.	*11*	*K3*	*CO3*
		OR			
	b)	Discuss in detail about RTD and thermistor in temperature measurement systems.	*11*	*K3*	*CO3*
26.	a)	Illustrate how probe selection affects measurement accuracy in CMM and explain their types.	*11*	*K3*	*CO4*
		OR			
	b)	Describe the working principle of Michelson interferometer with a suitable diagram.	*11*	*K3*	*CO4*
27.	a)	Illustrate the different types of cameras used in machine vision and explain.	*11*	*K3*	*CO5*
		OR			
	b)	Develop the steps involved in designing a machine vision system.	*11*	*K3*	*CO5*
28.	a)	Discuss how the machine vision techniques used for identification of flaws and defects.	*11*	*K3*	*CO6*
		OR			
	b)	Examine the effectiveness of machine vision in sorting and counting operations.	*11*	*K3*	*CO6*