Roll No. | | | | | | | | | | |

ANNA UNIVERSITY (UNIVERSITY DEPARTMENTS)

B.E. (Full Time) - END SEMESTER EXAMINATIONS, Nov/Dec 2024

Manufacturing

V Semester

MF5501 Metrology and Computer Aided Inspection

(Regulation 2019)

Time:3 hrs

Max. Marks: 100

CO1	Recognize the basics of metrology, understand the measurement concepts and perform measurement tasks accurately.
CO2	Understand the design principle working and construction of various instruments for measuring various elements of a component
CO3	To be familiarized with the right instrument and method of measurement for surface finish and form measurements
CO4	Identify the right instrument and method of measurement for surface finish and form measurements
CO5	Learn to adapt computer aided inspection and advances in metrology in industries and organizations

BL – Bloom's Taxonomy Levels

(L1-Remembering, L2-Understanding, L3-Applying, L4-Analysing, L5-Evaluating, L6-Creating)

PART- A (10 x 2 = 20 Marks)

(Answer all Questions)

Q. No.	Questions	Marks	CO	BL
1	State at least two important differences between accuracy and repeatability.	2	CO 1	L2
2	How Null method of measurement is more accurate?	2	CO 1	L4
3	What is the fundamental difference between Comparators and Limit gauges?	2	CO 2	L2
4	State any three important applications of Alignment telescope.	2	CO 2	L3
5	Define the terms Straightness and Flatness.	2	CO 3	L1
6	What is meant by 'best wire size'?	2	CO 3	L2
7	What are the uses of lasers in metrology?	2	CO 4	L1
8	How the limitations of optical flat can be overcome by an interferometer?	2	CO 4	L4
9	What is the difference between Laser trackers and Measurement arms?	2	CO 5	L2
10	List any four important Nano metrology instruments.	2	CO 5	L1

PART- B (5 x 13 = 65 Marks)

Q. No.	Questions	Marks	CO	BL
11 (a)	What are standards of measurements? Explain the classification of various standards and relate them with calibration of instruments.	13	CO1	L2
	OR			
11 (b)	What is an error? With a neat sketch explain the effect of poor contact, improper alignment, elastic deformation, expansion of workpiece on accuracies of measurement.	13	CO1	L2
12 (a)	Explain the working principle and applications of a pneumatic back pressure gauge. Discuss the relevance of the characteristic curve in measurement.	13	CO2	L3
	OR			
12 (b)	With a neat diagram, explain the working of Micro-optic autocollimator and its applications in engineering measurements.	13	CO2	L3
13 (a)	What is meant by single flank and double flank testing of Gears? Using a neat sketch explain the construction and working of Parkinson gear roll tester.	13	CO3	L4
	OR			
13 (b)	What is roundness? How it is measured using roundness testers? Explain the pros and cons of the two type roundness testers.	13	CO3	L4
14 a)	Explain the formation of interference fringes when light falls on an optical flat resting on a lapped surface. What is the effect of using a monochromatic beam, instead of white light?	13	CO4	L4
	OR			
14 (b)	Using a neat sketch explain the working principle of laser interferometer and how it is applied to measure angular variation in rotary axis of a rotary table?	13	CO4	L4
15 (a)	How part dimensions and geometry are measured using coordinates generated from CMM? Explain the constructional features of CMM and their role in achieving accurate measurements.	13	CO5	L3
	OR			
15 (b)	What is machine vision system? Using a neat schematic, explain the basic steps involved in the measurement of components by machine vision system.	13	CO5	L3

PART- C (1 x 15 = 15 Marks)
(Q. No. 16 is compulsory)

Q. No.	Questions	Marks	CO	BL
16.	(i) The accuracy of base tangent method is better than that of gear tooth caliper. Justify this statement with suitable illustration.	8	CO3	L5
	(ii) Compare the following roughness parameters with an example surface profile (a) R_z value, (b) RMS value, and (c) R_a value.	7	CO3	L5