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

ANNA UNIVERSITY (UNIVERSITY DEPARTMENTS)

B.E. /B. Tech / B. Arch (Full Time) - END SEMESTER EXAMINATIONS, APRIL / MAY 2024

B.E. MANUFACTURING ENGINEERING
Semester V

MF5501 METROLOGY AND COMPUTER AIDED INSPECTION

(Regulations 2015, 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	Identify the right instrument and method of measurement for surface finish and form measurements
CO4	Describe understand and apply various measurement techniques using laser metrology
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 (10x2=20Marks)
(Answer all Questions)

Q. No.	Questions	Marks	CO	BL
1	Make a comparison between Precision and Accuracy.	**2**	1	3
2	What is meant by a clean room? State its significance in metrology.	**2**	1	3
3	What are the application areas of a comparators in precision measurement?	**2**	2	3
4	Give the limitations of a sine bar.	**2**	2	1
5	Name the various elements of the spur gear which are checked for accuracy of the gear.	**2**	3	1
6	What is meant by straightness measurement?	**2**	3	1
7	State any four alignment tests conducted on machine tools.	**2**	4	1
8	State any four laser sources used in laser interferometry.	**2**	4	1
9	What are the benefits of using a CMM?	**2**	5	2
10	State any four techniques used in Nano metrology.	**2**	5	1

PART- B (5x 13=65Marks)
(Restrict to a maximum of 2 subdivisions)

Q. No.	Questions	Marks	CO	BL
11 (a)	Describe the various types of errors that may arise in engineering measurement using suitable sketches.	**13**	1	4
	OR			
11 (b)	i. Describe the standard procedure of calibrating a metrological instrument.	**8**	1	4
	ii. What are the key do's and don'ts in the maintenance of metrological instruments to ensure their accuracy and longevity?	**5**	1	4
12 (a)	Sketch a Vernier caliper and Micrometer and explain their working. Make a comparison between them.	**13**	2	4
	OR			

12 (b)	Explain the construction and working of an Angle Dekkor. Mention its advantages and limitations.	**13**	2	4
13 (a)	Discuss the measurement of Effective Diameter by using Two-Wire Method with suitable sketch.	**13**	3	1
	OR			
13 (b)	i. With a suitable sketch describe on any one method used to measure roundness. ii. Enumerate on Beam Comparator method Used for Flatness Testing using suitable sketch.	**6** **7**	3 3	1 1
14 (a)	Describe on the principle of production of interference fringes using optical flat. Sketch and give a description on any four interference pattern produced.	**13**	4	4
	OR			
14 (b)	Enumerate on gauge-length interferometer using suitable sketch. Mention its limitations.	**13**	4	4
15 (a)	Enumerate of the constructional feature of a coordinate-measuring machine (CMM).	**13**	5	1
	OR			
15 (b)	Explain the 4 important phases of machine vision with diagrams wherever necessary.	**13**	5	1

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

Q. No.	Questions	Marks	CO	BL
16.	i) How do CNC CMMs enhance measurement capabilities? Justify using suitable examples. ii) Identify the gauge that can be used in paper manufacturing industry to ensure the thickness of the paper being manufactured. Justify your answer. iii) Explain the reason why three wires are used to measure a screw thread with a hand micrometer and two wires are used to measure a floating carriage machine for the same purpose.	**5** **5** 5	5 2 3	5 5 5