CM5251 ADVANCES IN METROLOGY AND INSPECTION

DETAILED SYLLABUS

UNIT I CONCEPTS OF METROLOGY

Terminologies – Standards of measurement – Errors in measurement – Interchangeability and Selective assembly – Accuracy and Precision – Calibration of instruments – Basics of Dimensional metrology and Form metrology

UNIT II MEASUREMENT OF SURFACE ROUGHNESS

Definitions – Types of Surface Texture: Surface Roughness Measurement Methods-Comparison, Contact and Non Contact type roughness measuring devices, 3D Surface Roughness Measurement, Nano Level Surface Roughness Measurement – Instruments.

UNIT III INTERFEROMETRY

Introduction, Principles of light interference – Interferometers – Measurement and Calibration – Laser Interferometry.

UNIT IV MEASURING MACHINES AND LASER METROLOGY

Tool Makers Microscope – Microhite – Coordinate Measuring Machines – Applications – Laser Micrometer, Laser Scanning gauge, Computer Aided Inspection techniques - In-process inspection, Machine Vision system- Applications.

UNIT V IMAGE PROCESSING FOR METROLOGY

Overview, Computer imaging systems, Image Analysis, Preprocessing, Human vision system, Image model, Image enhancement, gray scale models, histogram models, Image Transforms - Examples.

REFERENCES

1. “ASTE Handbook of Industries Metrology”, Prentice Hall of India Ltd., 1992.

2. Bewoor, A.K. and Kulkarni,V.A.,”Metrology and Measurement”, Tata Mc Graw-Hill, 2009.

3. Galyer, F.W. and Shotbolt, C.R., “Metrology for engineers”, ELBS, 1990.

4. Gupta, I.C., “A Text Book of engineering metrology”, Dhanpat Rai and Sons, 1996.

5. Jain ,R.K.,“Engineering Metrology”, Khqanna Publishers, 2008.

6. Rajput,R.K., “Engineering Metrology and Instrumentations”, Kataria & Sons Publishers, 2001.

7. Smith,G.T., “Industrial Metrology”, Springer, 2002

8. Sonka,M., Hlavac,V. and Boyle.R., “Image Processing, Analysis, and Machine Vision”, CengageEngineering, 2007.

9. Whitehouse,D.J., "Surface and their measurement", Hermes Penton Ltd, 2004.

OBJECTIVES

- To teach the students basic concepts in various methods of engineering measurement techniques and applications, understand the importance of measurement and inspection in manufacturing industries.
- To make the students capable of learning to operate and use advanced metrological devices with ease in industrial environments.