

<b>5<sup>th</sup> Semester</b>	<b>RPR5C001</b>	<b>Metrology and Inspection</b>	<b>L-T-P 3-0-0</b>	<b>3 Credits</b>
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**Module I:** (10 hours)

**Concepts of Metrology:** Principles of Measurements, Line and End & optical Standards, Calibration, accuracy and Precision, Random error and systemic error, Measurement of Surface Roughness, Screw Thread and Gears, Limits, Fits and Gauges, Assembly by full, partial and group interchangeability, geometric tolerances, Measurement of straightness, Flatness and circularity.

Terminologies - Standards of measurement - Line and End & optical Standards - Errors in measurement - Interchangeability and Selective assembly - Accuracy and Precision- Calibration of instruments - Basics of Dimensional metrology and Form metrology

**Module II:** (10 hours)

**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.

**Module III:** (8 hours)

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

**Module IV:** (6 hours)

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

**Books:**

- [1] Engineering Metrology, R.K. Jain, Khanna Publisher, Delhi
- [2] A text book of Engineering Metrology I.C. Gupta, Dhanpat Rai & sons, Delhi.
- [3] Whitehouse, D.J., "Surface and their measurement", Hermes Penton Ltd, 2004

**Digital Learning Resources:**

Course Name: Engineering Metrology  
 Course Link: <https://nptel.ac.in/courses/112/104/112104250/>  
 Course Instructor: Dr. Amandeep Singh and Prof. J. Ramkumar  
 IIT Kanpur