Gautam Buddha University; Greater Noida

School of Engineering (Mechanical Engineering)

Degree	Course Name	Course Code	Marks:100
M. Tech.	Computer Aided Inspection	MEM 527	SM+MT+ET 25+25+50
Semester	**Credits**	**L-T-P**	**Exam.**
II	3	3-0-0	3 Hours

Unit - I

Metrology and Techniques: Standards in metrology-definition; Traceability; characteristics length & angular measurements-Review of standard instruments; GD and tolerance procedure-Review of dimension & form tolerance and methods of measurement; Tolerance analysis; Surface metrology-Instruments; Methods and new approaches. **(08 Hours)**

Unit - II

Laser Applications in Metrology: LASER light source; LASER interferometer; LASER alignment telescope; LASER micrometer; On-line and in-process measurements of diameter; Roundness and surface roughness using LASER; Micro holes and topography measurements; Straightness and flatness measurement. **(07 Hours)**

Unit - III

Special Measuring Instruments and Techniques: Optoelectronic devices; Contact and non-contact types; Applications in on-line and in-process monitoring systems; Tool wear measurement; Surface measurement; Machine vision; Shape identification; Edge detection techniques; Normalization; Gray scale correlation; Template Techniques; Surface roughness using vision system; Interfacing robot and image processing system. **(08 Hours)**

Unit - IV

Co-ordinate Measuring Machine: Types of CMM; Probes used; Applications; Non-contact CMM using electro optical sensors for dimensional metrology; Non-contact sensors for surface finish measurements; statistical evaluation of data using computer; Data integration of CMM and data logging in computers.

(08 Hours)

Unit - V

Sensors in Inspection: Manufacturing applications of photo detectors; Deflection methods-beam detection; Reflex detection; & Proximity detection; Applications of inductive and capacitive proximity sensors; Understanding microwave sensing applications laser sensors and limit switches. **(08 Hours)**

Unit - VI

Advanced Sensors in Inspection: Advanced sensor technology-Bar code systems; Principles and applications of colour sensors; Electro-magnetic identifier; Tactile sensors; Ultrasonic sensors; Odor sensors. **(06 Hours)**

Recommended Books:

1. Fundamentals of Dimensional Metrology; T. Busch and R. Harlow; Delmar; 3rd Edition.
2. Engineering Metrology; G. Thomas and G. Butter Worth; PUB.
3. Sensors and Control systems in Manufacturing; Sabne Soloman; McGraw Hill Book
4. Measurement systems: Applications & Design; Doebelin; International Student Edition.
5. Optoelectronics for Technology and Engineering; Robert G. Seippel; Prentice Hall India.
6. Interface Technology for Computer Controlled Manufacturing processes; Ulrich-Rembold; Armbruster and Ulzmann; Marcel Dekker Publications; NY.
7. Optoelectronics; J. Watson; Van Nostrand Rein Hold (UK) Company.