MANUFACTURING METHODS IN PRECESSION ENGINEERING

Course Code	19ME4702C	Year	IV	Semester	I
Course Category:	Program Core	Branch	ME	Course Type	Theory
Credits:	3	L – T – P	3 – 0 – 0	Prerequisites:	Nil
Continuous Evaluation:	30	Semester End Evaluation:	70	Total Marks:	100

Course Outcomes		
Upon successful completion of the course, the student will be able to		
CO1	Illustrate various precision manufacturing methods and documentation for precision equipment	L2
CO2	Explain Various accuracies required in machines and errors in numerical positioning	L2
CO3	Apply standards and applications of Lasers in Precision measuring systems.	L3
CO4	Identify various in-process or In-situ process measurement and Optical features of measurement	L3
CO5	Select various Nano positioning systems and Servo positioning systems in Precision manufacturing.	L3

Course Articulation Matrix:

	Contribution of Course Outcomes towards achievement of Program Outcomes Strength of correlations (3: High, 2: Moderate, 1: Low)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3										1	2	3	1
CO2	3	2								1	1	2	3	1
CO3	3	2			2	1	1			1	1	2	3	1
CO4	3	2	1			1	1			1	1	2	3	1
CO5	3	2	1		2	1	1			1	1	2	3	1

Course Content		Mapped CO s
UNIT-1	**Introduction to manufacturing and precision engineering:** Introduction to manufacturing process, precision engineering and conventional and unconventional machining process, micromachining, Precision machining and finishing operations. Methods of measurements during machining and during assembly **Assembly and tolerancing:** Documentation for manufacture of precision equipment	**CO1**
UNIT-2	**Concepts of accuracy:** Introduction - concept of accuracy of machine tools, spindle and displacement accuracies, Accuracy of numerical control systems, Errors due to numerical interpolation, Displacement measurement system and velocity lags	**CO2**
UNIT-3	**Precision measuring systems**: Units of length, legal basis for length measurement, traceability, Processing system of nanometer, accuracies - LASER light source - LASER interferometer, LASER alignment telescope - LASER micrometer-on-line and in-process,	**CO3**

	measurements of diameter and surface roughness using LASER - Micro holes and topography measurements,	
UNIT-4	**In processing or in situ measurement**: Introduction, In processing or in situ measurement of position of processing point-Post process and on-machine measurement of dimensional features and surface, mechanical and optical measuring systems.- Straightness and flatness measurement – Optoelectronic Measurement Systems in Metrology, Optoelectronic devices contact and noncontact types.	**CO4**
UNIT-5	**Nano positioning systems of Nano accuracy & repeatability:** Guide systems for moving elements - Servo control systems for tool positioning, Computer aided digital and ultra-precision position control.	**CO5**

Learning Resources	
Text Books:	1. M. V. Suryaprakash ,"Precision Engineering" Narosa publications. 2. V C Venkatesh ," Precision Engineering" Mc GRAW HILL Publications 3. Hiromu Nakazawa" Principles of precision engineering" Oxford University Press
Reference Books:	1. Kalpakjian, "Manufacturing engineering & technology", Addison – Wesley, 2nd Edition 2. Debitson A., "Hand book of precision engineering" 3. J. A. McGeough, "Advanced methods of machining", Chapman and Hall, London, 1988 4. Jain V. K., "Introduction to micromachining", Narosa Publishers 5. G. Chryssolouris, "Laser machining – theory and practice", Springer Verlag, New York, 1991
E-Resources & other digital Material:	