**MANUFACTURING METHODS IN PRECESSION ENGINEERING**

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|---|---|---|---|---|---|
| **CourseCode** | 20ME6504 | **Year** | III | **Semester** | I |
| **Course Category** | HONORS | **Branch** | ME | **Course Type** | Theory |
| **Credits** | 4 | **L – T – P** | 3 – 1 – 0 | **Prerequisites** | MP, MCMT |
| **Continuous Internal Evaluation** | 30 | **Semester End Evaluation** | 70 | **Total Marks** | 100 |

**Course Outcomes:** Upon successful completion of the course, the student will be able to

| | Statement | Skill | BTL | Units |
|---|---|---|---|---|
| **CO1** | Illustrate various precision manufacturing methods and documentation for precision equipment | Understand Communication | L2 | 1 |
| **CO2** | Explain Various accuracies required in machines and errors in numerical positioning | Apply, Communication | L3 | 2 |
| **CO3** | Apply standards and applications of Lasers in Precision measuring systems. | Apply, Communication | L3 | 3 |
| **CO4** | Identify various in-process or In-situ process measurement and Optical features of measurement | Apply, Communication | L3 | 4 |
| **CO5** | Select various Nano positioning systems and Servo positioning systems in Precision manufacturing. | Apply, Communication | L3 | 5 |

**Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:High, 2: Medium, 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 |

**Syllabus**

| UNIT | Contents | Mapped COs |
|---|---|---|
| **I** | **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<br>**Assembly and tolerancing:** Documentation for manufacture of precision equipment | **CO1** |
| **II** | **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** |
| **III** | **Precision measuring systems**: Units of length, legal basis for length measurement, traceability, Processing system of nanometer, accuracies | **CO3** |

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|---|---|---|
| | - LASER light source - LASER interferometer, LASER alignment telescope - LASER micrometer-on-line and in-process, measurements of diameter and surface roughness using LASER - Micro holes and topography measurements, | |
| **IV** | **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** |
| **V** | **Nano positioning systems for 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** |
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| **Text books** |
| 1. M. V. Suryaprakash ,"Precision Engineering" Narosapublications.<br>2. V C Venkatesh ," Precision Engineering" McGRAW HILLPublications<br>3. HiromuNakazawa"Principlesofprecisionengineering"OxfordUniversityPress |
| **ference books** |
| 1.Kalpakjian,"Manufacturingengineering&technology",Addison–Wesley,2ndEdition<br>2.Debitson A., "Hand book of precisionengineering"<br>3.J.A.McGeough,"Advancedmethodsofmachining",ChapmanandHall,London,1988<br>4.Jain V. K., "Introduction to micromachining", NarosaPublishers<br>5.G.Chryssolouris,"Lasermachining–theoryandpractice",SpringerVerlag,NewYork,1991 |