Syllabus for Bachelor of Technology

Subject Code: 01ME0607

Subject Name: Advanced Manufacturing Processes

B. Tech. (III Year) Semester- 6: Mechanical Engineering

Type of course: Engineering

Prerequisite: Conventional Manufacturing Processes.

Rationale: Understanding of Advancement in Manufacturing Processes

Teaching and Examination Scheme:

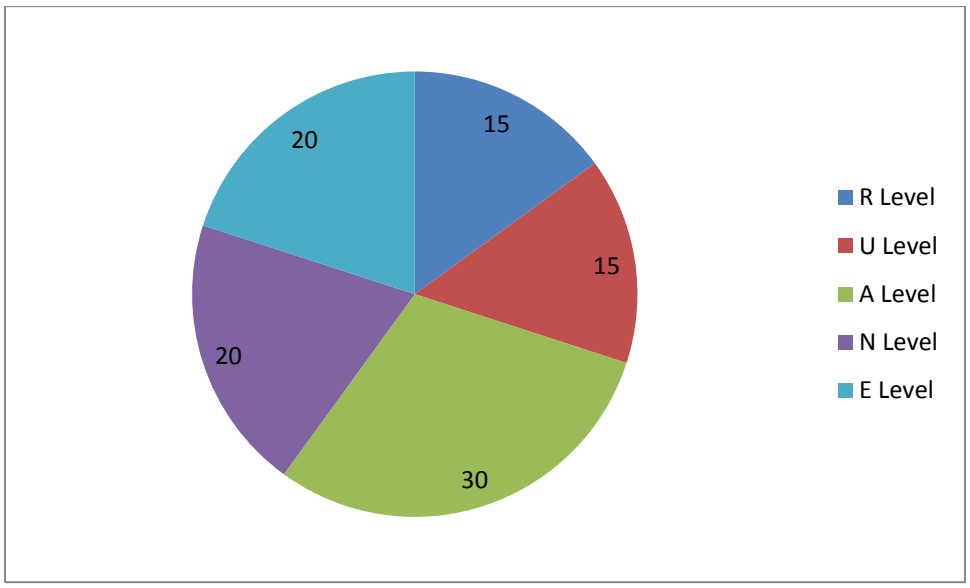
Teaching Scheme			Credits	Examination Marks					Total Marks
				Theory Marks			Practical Marks		
L	T	P	C	ESE	IA	CSE	VIVA	TW	
3	--	2	4	50	30	20	25	25	150

Content

No	Module	Sub Module	Weightage	Duration
1	Introduction of Ultra Precision Machining	Evolution of cutting technology and precision, progress in machining accuracy in the 21st century, positioning accuracy of machine tools and processing equipments, Tolerances or allowances error of products,	20%	10
2	Advanced Processing Equipments	Introduction to working principle, process parameter, application, advantage and disadvantages of unconventional machining like Electro Discharge Machining, Electron Beam Machining, Laser Beam Machining, Ultrasonic Machining, Ion Beam Machining, Ultrasonic Machining	25%	12
3	Chemical and Electrochemical Processing	Chemical Milling/Etching, Chemically Reactive, Deposition, Electrochemical or Electrolytic Plating, Electro Chemical Machining	15%	08
4	Nano Mechanical processing	Introduction to nano mechanical processing, processing energy :no defect, nano processing with point defect, Nano-machining as Atomic Cluster Processing, Nano-machining ,Ultra-precision Aspheric Lenses, Polishing of Si wafers	10%	4

5	Nanolithography	Photoresist Patterning, Photolithography systems, Optical photolithography, Electron Beam Lithography for Masks, Ion Beam and X-ray Lithography	10%	4
6	Energy Beam Forming Processes	Mechanism of Photon or Laser Beam Forming, Laser Beam Forming Processes & Equipment, Electron Beam Forming, Ion Beam Forming Processes	10%	4
7	Recent Manufacturing Methods	Nano processing systems and mechanism, Electroless Plating, etc.	10%	4

R Level	U Level	A Level	N Level	E Level
15	**15**	**30**	**20**	**20**



List of Experiment:

1. To study about ultra precision machining
2. To study about advanced processing equipments
3. To study about chemical and electro chemical processing
4. To study about nano mechanical processing
5. Nanolithography
6. To study about Energy Beam Forming Processes

Reference Books/ Journals:

1. Materials Characterization and Mechanism of Micro-Cutting in Ultra-Precision Diamond Turning by Wing Bun Lee, Springer
2. Ultra precision Machining of Hybrid Freeform Surfaces Using Multiple-Axis Diamond Turning by Neo, Dennis Wee Keong, Springer
3. Wafer Manufacturing: Shaping of Single Crystal Silicon Wafers by lmin Zao (Author), Milind Bhagavat
4. Ultraclean Surface Processing of Silicon Wafers: Secrets of VLSI Manufacturing by Takeshi Hattori Springer
5. Nanolithography and Patterning Techniques in Microelectronics 1st Edition by D Bucknall Woodhead Publishing
6. Laser Processing of Materials: Fundamentals, Applications and Developments, Peter Schaaf Springer .
7. Advance Method of Machining McGeough, J.A Springer
8. Micromachining of Engineering Materials J.A. McGeough. CRC Press.
9. Fundamentals of Microfabrication Mark Madou CRC Press
10. Modern Machining Processes, Pandey, P.C., and Shan, H.S. Tata McGraw-Hill Education

Course Outcome:

1. Analyzing the conventional machining processes for extension of new machining process
2. Apply basic science concept for developing new manufacturing processes
3. Application of various advanced manufacturing processes for 21st century
4. Selection of best manufacturing processes for 21st century

List of Open Source Software/learning website:

https://www.youtube.com/watch?v=Jg6YXvTO5FE&list=PLB8BC0AB0AD5DA4E2

https://www.youtube.com/watch?v=1MkWjVjNFhY&list=PLSGws_74K018tAv9U7K7MFDZ9GSCy4bDf