COURSE TITLE	**ADVANCE MANUFACTURING PROCESSES**
COURSE CODE	**01ME1607**
COURSE CREDITS	**4**

Objective:

1 Understanding of Advancement in Manufacturing Processes

Course Outcomes: After completion of this course, student will be able to:

1 Master cutting-edge manufacturing methods like 3D printing, CNC machining, and integrated hybrid technologies to create innovative products.

2 Critically evaluate and choose the best manufacturing techniques by considering material characteristics, design goals, and cost-effectiveness.

3 Skillfully leverage advanced digital tools—including CAD/CAM platforms and automation systems—to design, simulate, and manage manufacturing workflows.

4 Investigate how modern manufacturing approaches influence product performance, expenses, and environmental impact, ensuring alignment with regulatory and industry benchmarks

5 Lead continuous process enhancements that boost efficiency and quality, while embedding safety, sustainability, and ethical practices at every stage.

Pre-requisite of course: Conventional Manufacturing Processes

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
3	0	2	50	30	20	25	25

Contents : Unit	Topics	Contact Hours
1	**Conventional Manufacturing Processes- Review** Capability analysis of existing manufacturing processes,, Demand of new product in terms of size, shape, material, properties in various sector,, Challenges in manufacturing to fulfill the requirements of industries,	3
2	**Non Conventional Machining Processes** Basic physics of conventional metal cutting operation,, Difference between conventional and non conventional machining processes, Classification of Non conventional machining processes,, Requirement of non conventional machining processes, Advantage and Disadvantage of non conventional machining processes	3

Contents : Unit	Topics	Contact Hours
3	**Non Conventional Machining Processes-Thermal Processes** Physics of thermal non conventional machining processes, Thermal processes, Electro Discharge Machining (EDM) : Working Principal, Process Parameter MRR, Advantage, Disadvantage and Application, Variation of EDM, Electron Beam Machining (EBM) : Working Principal, Process Parameter MRR, Advantage, Disadvantage and Application, Variation of EBM, Basic concept of Ion Beam Machining, Laser Beam Machining (LBM) : Working Principal, Process Parameter, MRR, Advantage, Disadvantage and Application, Variation of LBM	8
4	**Non Conventional Machining Processes-Electro-Chemical & Mechanical** Physics of Electro-Chemical Processes, Classification of Electrochemical Processes,, Electro Chemical Machining (ECM): Working Principal, Process Parameter MRR, Advantage, Disadvantage and Application, Variation of ECM, Chemical Milling (CM): Working Principal, Process Parameter MRR, Advantage, Disadvantage and Application, Abrasive Jet Machining (ABM): Working Principal, Process Parameter MRR, Advantage, Disadvantage and Application, Water Jet Machining Processes, Ultrasonic Machining (USM): Working Principal, Process Parameter MRR, Advantage, Disadvantage and Application, Hybrid Processes: Working Principal, Process Parameter MRR, Advantage, Disadvantage and Application	10
5	**Additive Manufacturing** Introduction: Introduction to Prototyping, Traditional Manufacturing Vs. Additive Manufacturing, Need for time compression in product development, Usage of Additive Manufacturing parts, CAD Modeling and Data Processing for Additive Manufacturing: CAD model preparation, Data Requirements, Data formats (STL, SLC, CLI, RPI, LEAF, IGES, HP/GL, CT, STEP), Data interfacing, Part orientation and support generation, Support structure design, Model Slicing and contour data organization., Photo polymerization: Working Principal, Process Parameter, Advantage, Disadvantage and Application., Powder Bed Fusion Working Principal, Process Parameter, Advantage, Disadvantage and Application., Extrusion-Based AM Systems Working Principal, Process Parameter, Advantage, Disadvantage and Application.	12
Total Hours		**36**

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	**1. Capability analysis of the conventional Lathe Machine** 1. Capability analysis of the conventional Lathe Machine	4
2	**2. Challenges in machining the advanced material** . Challenges in machining the advanced material	2

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
3	**3. Process parameter and MRR Calculation of EDM** 3. Process parameter and MRR Calculation of EDM	2
4	**4. Process parameter and MRR Calculation of EBM** 4. Process parameter and MRR Calculation of EBM	2
5	**5. Process parameter and MRR Calculation of LBM** 5. Process parameter and MRR Calculation of LBM	2
6	**6. Process parameter and MRR Calculation of AJM** 6. Process parameter and MRR Calculation of AJM	2
7	**7. Process parameter and MRR Calculation of USM** 7. Process parameter and MRR Calculation of USM	2
8	**8. Process parameter and MRR Calculation of ECM** 8. Process parameter and MRR Calculation of ECM	2
9	**9. Development of product using Photopolymerization** 9. Development of product using Photopolymerization	2
10	**10. Development of product using FDM** 10. Development of product using FDM	2
11	**11. Case study on selective laser sintering process** 11. Case study on selective laser sintering process	2
Total Hours		**24**

Textbook :

1 Modern Machining Processes, P. C. Pandey, H. S. Shan, McGraw-Hill, 1980

2 Production Technology , N/A Hindustan Machine Tools , McGraw Hill Education , 2017

References:

1 Production Technology , Production Technology , N/A Hindustan Machine Tools , McGraw Hill Education , 2017

2 Advanced Machining Processes , Advanced Machining Processes , Prof. Vijay Kumar Jain , Allied Publishers , 2009

3 Unconventional Manufacturing Process, Unconventional Manufacturing Process, M.K. Singh, newagepublishers, 2007

4 Rapid Prototyping: Principles And Applications, Rapid Prototyping: Principles And Applications, Chee Kai Chua, Chu Sing Lim (Author), Kah Fai Leong (Author), World Scientific Publishing Co Pte Ltd, 2010

5 Additive Manufacturing Technologies, Additive Manufacturing Technologies, Ian Gibson , David W. Rosen , Brent Stucker, Springer, 2009

6 Rapid Prototyping: Principles and Applications, Rapid Prototyping: Principles and Applications, Rafiq I. Noorani, Wiley, 2005

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember / Knowledge	**Understand**	**Apply**	**Analyze**	**Evaluate**	**Higher order Thinking / Creative**
10.00	20.00	20.00	20.00	15.00	15.00

Instructional Method:

1 The manufacturing innovation that underlies advanced products comes about through rational, reasoned design and motivating the need for a manufacturing

Supplementary Resources:

1 https://colab.research.google.com
2 https://atom.io
3 https://www.anaconda.com