Subject Code: 01ME1607
Subject Name: Advance Manufacturing Processes
B. Tech. Year - III (Semester - 6)

Type of course : Graduate

Prerequisite : NA

Rationale : The course is prepared to provide the understating of Advance Manufacturing Processes.

Course Outcome :

After completion of this course, student will be able to

1. Understand the physics of non conventional machining process
2. Identify the limitation of conventional machining processes
3. Selection of advanced manufacturing process for product development
4. Analysis of advanced manufacturing machining processes
5. Product development using the advanced manufacturing processes

Teaching and Examination Scheme :

Teaching Scheme			Credits	Examination Marks					
				Theory Marks			Practical Marks		Total Marks
Theory	Tutorial	Practical	C	ESE(E)	IA	CSE	Viva (V)	Term Work (TW)	
3	0	2	4	50	30	20	25	25	150

Content :

Sr. No.	Content	Total Hrs.
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,	03
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	03

3	**Non Conventional Machining Processes-Thermal Processes** Physics of thermal non conventional machining processes, Classification of 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	**08**
4	**Non Conventional Machining Processes-Electro-Chemical & Mechanical** Physics of Electro-Chemical Processes, Classification of Electrochemical **Electro Chemical Machining (ECM):** Working Principal, Process 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 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**

Distribution of Theory Marks

R Level	**U** Level	**A** Level	**N** Level	**E`** Level	**C** Level
10	**20**	**25**	**25**	**10**	**10**

Legends: R: Remember**; U:** Understand**; A:** Apply**; N:** Analyze**; E:** Evaluate**; C**: Create

List of Experiments :

1. Capability analysis of the conventional Lathe Machine

2. Challenges in machining the advanced material
3. Process parameter and MRR Calculation of EDM
4. Process parameter and MRR Calculation of EBM
5. Process parameter and MRR Calculation of LBM
6. Process parameter and MRR Calculation of AJM
7. Process parameter and MRR Calculation of USM
8. Process parameter and MRR Calculation of ECM
9. Development of product using Photo polymerization
10. Development of product using FDM
11. Case study on selective laser sintering process
12. Virtual Lab

Reference books :

1. Modern Machining Process by P.C Pandey and H S Shah McGraw Hill Education India Pvt. Ltd. 2000
2. Production technology HMT McGraw Hill Education India Pvt. Ltd 2001
3. K. Jain, Advanced Machining Processes, Allied Publishers, 1st Edition, 2013.
4. M. K. Singh, Unconventional Machining processes, New Age International Publishers, 1st Edition, 2010
5. Chua C K, Leong K F, Chu S L, Rapid Prototyping: Principles and Applications in Manufacturing, World Scientific.
6. Gibson D W Rosen, Brent Stucker., Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing, Springer.

List of Open Base Software / learning website :

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