

GANPAT UNIVERSITY									
FACULTY OF ENGINEERING & TECHNOLOGY									
Programme	Master of Technology				Branch/Spec.	Mechanical Engineering/ AMS			
Semester	I				Version	1.0.0.0			
Effective from Academic Year		2021-22			Effective for the batch Admitted in		July 2021		
Subject code	3ME1103		Subject Name		Advanced Manufacturing Processes-I				
Teaching scheme					Examination scheme (Marks)				
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	1	0	4	Theory	40	60	100
Hours	3	0	2	0	5	Practical	30	20	50
Pre-requisites:									
A student has to understand following subjects before learning these subjects:									
<ul style="list-style-type: none"> • Production Technology • Manufacturing Technology 									
Course Objective:									
<ul style="list-style-type: none"> • A basic about tool life, MRR, Cutting forces and surface finish in different machining process • Understand the various types of forming methods • To understand the basic concepts of non-traditional machining processes • To understand the basic concepts of jig and fixture • Fundamental of manufacturing process of thread and gear manufacturing 									
Theory syllabus									
Unit	Content							Hrs	
1	STRESS STRAIN RELATIONSHIP & YIELD CRITERIA: Theory of Elasticity and Plasticity, Stress transformation, plane stress and plane strain, yield criteria, effective stress and strain, flow rules of plastic stress-strain relationship, work hardening, strain rate and temperature effect							6	
2	ANALYSIS OF METAL FORMING PROCESS: Forging: classification, plain strain load calculation, Forging of circular disc - Effect of friction defects & Remedies etc. Rolling: classification, types of mill, calculation of roll separating force, angle of bite, maximum reduction in rolling, defects, roll flattening etc. Wire Drawing: introduction, maximum possible reduction, load calculation, defects etc. Sheet Metal: Bending of plates, bendability, spring back, bending load etc.							10	
3	THEORY OF METAL CUTTING AND ECONOMICS OF MACHINING PROCESS: Orthogonal and oblique cutting, theory of chip formation, Types of chips, Thickness ratio and shear plane angle, Forces and energy calculations (Merchant's Analysis) – Power consumed – MRR- Effect of Cutting variables on Forces, Force measurement using Dynamometers. Cutting Temperature Effect of Cutting variables, selection of cutting tool materials. Concept of machinability, Tool wear and tool life, Economics of machining, Cutting fluids, Types, Properties and scope of use. Thermal Analysis.							6	
4	GEAR AND THREAD MANUFACTURING: Different types thread manufacturing methods and tooling involved study of different gear generating and forming methods with their special features, Gear finishing processes.							3	
5	JIGS AND FIXTURES: Definition, Its importance in mass production, Design principles, Types of locating & clamping devices, Jig bushes, Types of drilling jigs, Types of fixtures, Design of jigs and fixtures for turning, drilling, milling, broaching and grinding operations.							3	

6	UNCONVENTIONAL FORMING PROCESS: Explosive forming, magnetic pulse forming, high energy rate forming, hydro forming, stretch forming, contour roll forming etc.	4
7	NON-TRADITIONAL MACHINING PROCESS: Process principle, metal removal mechanism, parametric analysis of processes: Abrasive jet machining, abrasive water jet machining, ultrasonic machining, water jet machining, chemical machining, electrochemical machining, electrical discharge machining, laser beam machining, electron beam machining, Hot machining, cryogenic machining, micro machining, deep hole drilling, ultra-precision machining.	10
Practical content		
The term work shall be based on experimental and analytical work on the topics mentioned above and will be defended by the candidates.		
Text Books		
1	Dieter G. E., "Mechanical Metallurgy", McGraw Hill, 1988.	
2	P. C. Pandey and H. S. Shan, 'Modern Machining Processes', Tata McGraw Hill, New Delhi, 2003.	
Reference Books		
1	William F. Hosford and R. M. Caddell, 'Metal Forming Mechanics and Metallurgy', Prentice Hall, 1993.	
2	A. Ghosh and A. K. Mallik, 'Manufacturing Science', East west press, New Delhi, 2006.	
3	Mielnik Edward M., 'Metal Working Science and Engineering', McGraw Hill, 1991.	
4	Rao P.N., 'Manufacturing Technology', Tata McGraw Hill, 1990.	
5	Wangoner Robert H. and Jean-Loup Chenot, 'Fundamentals of Metal Forming', John Wiley & Sons, 1997.	
6	Beddoes J. and Bibby M. J., 'Principles of Metal Manufacturing Processes', Viva Books, 2000.	
7	P. K. Mishra, 'Nonconventional machining', Narosa publishing house, New Delhi 2011.	
8	V. K. Jain, 'Introduction to Micro Machining', 1st Edition, Narosa publishing house, New Delhi, 2010	
9	G. Benedict, 'Non-traditional manufacturing processes', 1st Edition, Marcel Dekker, New York, 1987.	
10	V. K. Jain, 'Advanced Machining processes', Allied publishers, New Delhi, 2008.	
Mooc Links:		
1	https://nptel.ac.in/courses/112/105/112105233/	
2	https://nptel.ac.in/courses/112/105/112105233/	
3.	https://nptel.ac.in/courses/112/105/112105127/	
4	https://nptel.ac.in/courses/112/105/112105127/	
5	https://nptel.ac.in/courses/112/105/112105127/	
Course Outcomes:		
<ol style="list-style-type: none"> 1. Imparting knowledge of materials plastic deformation. 2. Analyze the stresses and yield criteria for metal deforming. 3. Evaluate and selection of nontraditional machining. 4. Understand the parametric effect on quality of product produced by non-traditional machining processes. 		