GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering
Subject Code: 3162507

Allied Manufacturing Technology
SEMESTER VI

Type of course: Departmental elective

Prerequisite: Basic Knowledge of Manufacturing Processes

Rationale:

To impart comprehensive knowledge about consideration of manufacturing processes and metal removal rate during different advanced processes.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P	C	Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
3	0	2	4	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs
1	**Thread Manufacturing:** Introduction, thread standards, thread terms, thread making methods like casting, rolling, chasing, die and tap cut, grinding, milling, screw broaching, their constructional details, Working principles, Tooling and effect of different process parameters, Screw thread inspection.	**5**
2	**Gear Manufacturing** Introduction, methods of manufacturing gears like casting, hot-rolling, stamping, powder-metallurgy, extruding, coining, gear machining methods like form tooth process, template-process, cutter generating process etc. gear finishing processes like gear shaving or burnishing, gear grinding, gear lapping, shot blasting, Gear testing.	**5**
3	**Unconventional Machining Processes:** **Mechanical Energy Based Processes** Abrasive Jet Machining (AJM), Water Jet Machining (WJM), Abrasive Water Jet Machining (AWJM), Ultrasonic Machining (USM). Working Principles – equipment used – Process parameters – MRR- Applications. **Electrical Energy Based Processes** Electric Discharge Machining (EDM)- working Principle- equipment used -Process Parameters - Surface Finish and MRR - electrode / Tool – Power and control Circuits-Tool Wear – Dielectric – Flushing – Wire cut EDM – Applications. **Chemical and Electro-Chemical Energy Based Processes** Chemical machining and Electro - Chemical machining (CHM and ECM) - Etchants – Maskant - techniques of applying maskants - Process Parameters – Surface finish and MRR	**23**

	- Applications. Principles of ECM - equipments-Surface Roughness and MRR Electrical circuit-Process Parameters- ECG and ECH - Applications. **Thermal Energy Based Processes** Laser Beam machining and drilling (LBM), Plasma Arc machining (PAM) and Electron Beam Machining (EBM). Principles – Equipment –Types - Beam control techniques – Applications.	
4	**Micro-Machining** Introduction to micromachining technologies, Microelectro discharge Machining: Principles of micro-EDM, micro-EDM by Die-sinking and WEDG, micro-WEDM, micro-WEDG, micro-ECM, Principles of microturning, micro-drilling and micro-milling, micro grinding, hybrid micromachining method, on-line measurement by machine vision and integrated probe, Measuring Techniques in micro-machining, surface integrity and other related measurements.	**5**
5	**Advanced Fine Finishing Process** Abrasive Flow Machining; Magnetic Abrasive Finishing; Magneto Rheological Abrasive Finishing: Process principle, process equipment; Analysis and modelling of finishing mechanism; Parametric analysis; Applications	**5**

Reference Books:

References:

1. Unconventional Machining process, Dr. Senthil, A R S Publishers
2. Modern Machining Processes, P. C. Pandey, H. S. Shan, Tata McGraw-Hill
3. Design for Advanced Manufacturing: Technologies and Processes, LaRoux K. Gillespie, McGraw-Hill Education
4. Advanced Machining Processes / Non Traditional and Hybrid Machining Processes, Hassan El-Hofy,McGraw-Hill

Distribution of marks weightage for cognitive level

Bloom's Taxonomy for Cognitive Domain	Marks % weightage
Recall	10
Comprehension	10
Application	30
Analysis	30
Evaluate	20
Create	00

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Course Outcome:

After learning the course the students will able to:

Sr. No.	CO statement	Marks % weightage
CO-1	Illustrate the concepts of advanced manufacturing processes.	20
CO-2	Select proper manufacturing method for thread manufacturing and gear manufacturing based on their application,	15
CO-3	Compare advanced manufacturing processes for better surface finish and material removal rate.	30
CO-4	Make use of different micro machining processes in production.	15
CO-5	Evaluate advanced fine finishing processes.	20

List of Experiments:

1. Case Studies/ Brain storming for selection criteria for different manufacturing processes.
2. Case studies for cost estimation of various advanced manufacturing processes.
3. Study on thread and gear manufacturing.
4. Case study of design for advance machining processes.
5. Case study of micro machining for super finishing.

Major Equipment: If available or Industrial visit

1. Lathe Machine,
2. Abrasive Jet Machining (AJM), Water Jet Machining (WJM), Abrasive Water Jet Machining (AWJM), Ultrasonic Machining (USM). Electric Discharge Machining (EDM**),** Chemical machining and Electro - Chemical machining (CHM and ECM), Laser Beam machining and drilling (LBM), Plasma Arc machining (PAM) and Electron Beam Machining (EBM)

List of Open Source Software/learning website:

1. http://nptel.ac.in