SEMESTER S5

ADVANCED MANUFACTURING PROCESSES

Course Code	PEIET521	CIE Marks	40
Teaching Hours/Week (L: T:P: R)	3:0:0:0	ESE Marks	60
Credits	3	Exam Hours	2 Hrs. 30 Min.
Prerequisites (if any)	None	Course Type	Theory

Course Objectives:

1. To provide students with a comprehensive understanding of advanced manufacturing methods and its processes parameters.
2. To enable students to apply the process capabilities of the modern manufacturing methods in industries.

SYLLABUS

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Module No.	Syllabus Description	Contact Hours
1	**Mechanical processes**: Ultrasonic machining- elements of process, effect of parameters, applications, limitations of the process, advantages and disadvantages. Abrasive jet machining (AJM) - variables in AJM, metal removal rate in AJM. Water jet machining- jet cutting equipment, process details, advantages and applications.	9
2	**Electrochemical processes:** Electrochemical machining (ECM) - elements of ECM process, tool work gap, chemistry of the process, metal removal rate, accuracy and surface finish, advantages, applications, limitations. Electrochemical grinding - material removal, surface finish, accuracy, advantages, applications.	9
3	**Thermal processes:** Electric discharge machining (EDM) or spark erosion machining processes, mechanism of metal removal, electrode feed control, dielectric fluids, selection of electrode material, surface finish, machining accuracy, applications, wire cut EDM. Laser beam machining (LBM)- apparatus, material removal, cutting speed and accuracy of cut, advantages and limitations.	9

4	**Plasma arc and Electron beam processes:** Plasma arc machining (PAM) - plasma, non-thermal generation of plasma, mechanism of metal removal, PAM parameters, safety precautions, other applications of plasma jets. Electron beam machining (EBM) - generation and control of electron beam, theory of electron beam machining, process capabilities and limitations. **High energy rate forming processes:** Explosive forming processes- principles, effect of process in material properties, types of explosives forming. Magnetic pulse forming processes - general principles, applications.	**9**

Course Assessment Method
(CIE: 40 marks, ESE: 60 marks)

Continuous Internal Evaluation Marks (CIE):

Attendance	Assignment/ Microproject	Internal Examination-1 (Written)	Internal Examination- 2 (Written)	Total
5	15	10	10	40

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End Semester Examination Marks (ESE)

In Part A, all questions need to be answered and in Part B, each student can choose any one full question out of two questions

Part A	Part B	Total
• 2 Questions from each module. • Total of 8 Questions, each carrying 3 marks **(8x3 = 24 marks)**	• Each question carries 9 marks. • Two questions will be given from each module, out of which 1 question should be answered. • Each question can have a maximum of 3 subdivisions. **(4x9 = 36 marks)**	**60**

Course Outcomes (COs)

At the end of the course students should be able to:

Course Outcomes		Bloom's Knowledge Level (KL)
CO1	Apply the concepts of non conventional mechanical material removal processes.	**K3**
CO2	Identify the various electrochemical machining processes.	**K3**
CO3	Apply the principles and concepts of thermal material removal processes.	**K3**
CO4	Make use of the concepts of high energy rate forming, plasma arc and electron beam machining processes.	**K3**

Note*: K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create*

CO-PO Mapping Table (Mapping of Course Outcomes to Program Outcomes)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	2	-	3	-	-	-	-	-	-	2
CO2	3	1	2	-	3	-	-	-	-	-	-	2
CO3	3	1	2	-	3	-	-	-	-	-	-	2
CO4	3	1	2	-	3	-	-	-	-	-	-	2

Note: *1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), -: No Correlation*

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Text Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Manufacturing Science	Amitabha Ghosh A. K., Mallik	East West Press	2nd Edition, 2010
2	Production Technology	HMT	McGraw Hill Education	1st Edition, 2017
3	Modern Machining Processes	P. C. Pandey, H. S. Shan	McGraw Hill Education	1st Edition, 2017

Reference Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Unconventional Machining Processes	M. Adithan	Atlantic	1st Edition, 2018
2	Advanced Methods of Machining	Mc Geongh J. A.	Chapman and Hall	1st Edition, 1988
3	Non-Traditional Machining Processes	Jagadeesha T.	I K International Publishing House	0th Edition, 2016

Video Links (NPTEL, SWAYAM…)	
Link ID	https://archive.nptel.ac.in/courses/112/103/112103202/

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