

**B.E Semester: 5 Automobile Engineering**  
**Subject Name: Modern Manufacturing Processes (MA505-N-C)**  
**[Dept. Elect.-1]**

**A. Course Objective:**

- The objective of course is to covers the details of the modern machining theory and practices.
- To understand material removal by using various forms of energy and machining new materials and complex parts with high accuracy by using non-traditional machining.

**B. Teaching / Examination Scheme:**

Teaching Scheme				Total Credit	Evaluation Scheme					
L	T	P	Total		Theory		Mid Sem Exam	CIA	Pract.	Total
Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	Marks
3	0	2	5	4	3	70	30	20	30	150

**C. Detailed Syllabus:**

Unit No.	Details
1	<b>Introduction:</b> Trends in modern manufacturing; characteristics and classification of modern manufacturing methods, considerations in the process selection.
2	<b>Mechanical Processes:</b> Introduction, principle, process description, process capabilities, material removal mechanism, parametric analysis, tool design, limitations, and applications of Ultrasonic Machining (USM), Abrasive Jet Machining (AJM), Water Jet Machining (WJM) and Abrasive Water Jet Machining (AWJM) processes.
3	<b>Electrochemical &amp; Chemical Processes:</b> Fundamental principle, process description, process capabilities, mechanism of material removal, surface finish and accuracy, limitations, and applications of Electrochemical Machining (ECM), Electrochemical Grinding (ECG), Electrochemical deburring, Electrochemical honing and Chemical Machining (C M) processes.
4	<b>Thermal Metal Removal Processes:</b> Electrical Discharge Machining (EDM): Working principle, process description, process capabilities, power circuits, mechanism of material removal, selection of tool electrode and dielectric fluid, limitations, and applications. Wirecut electro discharge machining, powder mixed electro discharge machining process Laser Beam Machining (LBM): Working principle, type of lasers, machining applications of lasers, mechanism of material removal, shape and material, applications and limitation. Electron Beam Machining (EBM): Generation and control of electron beam, EBM systems, process analysis & characteristics, mechanism of material removal, shape and material, applications and limitations. Plasma Arc Machining (PAM) and Ion Beam Machining (IBM): Process principle, analysis and characteristics of process, mechanism of material removal, shape and material, applications and limitations.

5	<b>Hybrid Machining Processes:</b> Concept, classification, process capabilities, and applications of various hybrid machining methods based on USM, EDM, ECM, etc.
6	<b>Micromachining Processes:</b> Introduction to micro machining methods; material removal mechanism and process capability of micro machining methods like micro -turning, micro-milling, micro-drilling, micro EDM, micro-WEDM, micro ECM, etc. ultra-precision machining, electrolytic in-process dressing and grinding.
7	<b>Additive Processes:</b> Introduction to additive manufacturing processes; classification; laminated object manufacturing process; adhesive manufacturing process; digital manufacturing process.

<b>Total hours (Theory):48</b>
<b>Total hours (Practical):32</b>
<b>Total hours:80</b>

#### D. Lesson Planning:

Sr. No.	Date/Week	Unit	Weight age	Topic No
1	1 <sup>st</sup> ,2 <sup>nd</sup> ,3 <sup>rd</sup>	Unit 1	20%	1
2	4 <sup>th</sup> .5 <sup>th</sup> ,6 <sup>th</sup>	Unit 2	20%	2
3	7 <sup>th</sup> , 8 <sup>th</sup> ,9 <sup>th</sup>	Unit 3	20%	3
4	10 <sup>th</sup> .11 <sup>th</sup> . 12 <sup>th</sup>	Unit 4	20%	4,5
5	13 <sup>th</sup> , 14 <sup>th</sup> ,15 <sup>th</sup> ,16 <sup>th</sup>	Unit 5	20%	6,7

#### E. Instructional Method & Pedagogy

1	At the start of course, the course delivery pattern , prerequisite of the subject will be discussed
2	Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & equal Weight age should be given to all topics while teaching and conduction of all examinations.
3	Attendance is compulsory in lectures and laboratory, which may carries five marks in overall evaluation.
4	One/Two internal exams may be conducted and total/average/best of the same may be converted to equivalent of 30 marks as a part of internal theory evaluation.
5	Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carry an importance of ten marks in the overall internal evaluation.
6	Surprise tests/Quizzes/Seminar/Tutorial may be conducted and having share of five marks in the overall internal evaluation.
7	The course includes a laboratory, where students have an opportunity to build an appreciation for the concept being taught in lectures. Suggested list of experiment is given below

#### G. List of Practicals:

1	Introduction to Modern Manufacturing Processes.
2	To study about Ultrasonic Machining Methods.
3	To study Abrasive and Water Jet Machining.
4	To perform experiment on Electrochemical Machining.

5	To perform experiment Electrical Discharge Machining.
6	To study Laser Beam Machining
7	To study about Plasma Arc Machining.
8	To study Hybrid Machining Processes.
9	To study Micromachining Processes.
10	To study Additive Processes.

#### F. Students Learning Outcomes:

1	The student can identify different areas and applications of Modern Manufacturing Process.
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#### G. Text Books & Reference Books:

1	P. C. Pandey and H. S. Shan, Modern Machining Processes, Tata Mcgraw Hill, New Delhi, 2003.
2	P. K. Mishra, Nonconventional machining, Narosa publishing house, 2011
3	V. K. Jain, Introduction to micro machining, Narosa publishing house, New Delhi, 1st Edition, 2010
4	V. K. Jain, Advanced Machining processes, Allied publishers, New Delhi, 2008.
5	G. Benedict, Nontraditional manufacturing processes, Marcel Dekker, New York, 1st Edition, 1987.
6	J. A. McGeough, Advanced methods of machining, Chapman & Hall, London, 1st Edition, 1988
7	A. Ghosh and A. K. Mallik, Manufacturing Science, East-West Press, New Delhi, 2006.
8	D. T. Pham and S. S. Dimov, Rapid manufacturing, Springer-Verlag, 1st Edition, 2001.