



PSN COLLEGE OF ENGINEERING AND TECHNOLOGY
Melathediyoar, Tirunelveli 627152
(An Autonomous Institution affiliated to Anna University, Chennai)
Approved by AICTE, Recognized by UGC under Section 2(f)
An ISO 9001:2015 Certified Institution
Accredited by NAAC with A+ Grade in 3rd Cycle



DEPARTMENT OF MECHANICAL ENGINEERING

COURSE PLAN

(Regulation 2022)

Version: 01

ODD SEM

Academic year: 2024-2025

Subject Name & Code	MANUFACTURING TECHNOLOGY &ME630203
Course Type	Core
Programme	B.E.(Mechanical)
Year/Semester/Section	II / III
Nature of Course/Credit	Theory / 03
Course Coordinator	Mr.S.Paramasivan AP/Mech,

INSTITUTION VISION & MISSION

Institution Vision	To provide an academic environment to learn, work and do research enabling the students to face challenges in life with strong ethical values.	
Institution Mission	IM-1	To achieve greater heights of excellence in technical knowledge and skill development through innovative teaching and learning practices.
	IM-2	To develop the infrastructure to meet the demands of technological revolution.
	IM-3	To improve and foster research in all dimensions for betterment of society.
	IM-4	To develop individual competencies to enhance employability and entrepreneurship in students.
	IM-5	To instill higher standards of discipline among students, inculcating ethical and moral values for societal harmony and peace.

DEPARTMENT VISION & MISSION

Department Vision	To provide an academic environment to learn, work and do research and enabling the students to face challenges in life with strong ethical values.	
Department Mission	DM-1	To achieve greater heights of excellence in technical knowledge and skill development through innovative teaching and learning practices
	DM-2	To develop the infrastructure to meet the demands of technological revolution.
	DM-3	To improve and foster research in all dimensions for betterment of society
	DM-4	To develop individual competencies to enhance employability and entrepreneurship in students.
	DM-5	To instil higher standards of discipline among students, inculcating ethical and moral values for societal harmony and peace.

1. PRE-REQUISITE:

Basic mechanical engineering
Engineering Mechanics

2. COURSE DESCRIPTION:

To develop the fundamental principles applied in the fields like production research and to explore the implications of these principles for machine and tool behavior.

To develop the problem solving skills essential to good engineering practice of tool life cost in real world applications.

3. CAREER OPPORTUNITIES:

- All the production engineering sectors
- Primarily for Mechanical, Mechanical and Automation, Aeronautical Engineering sectors.

4. SYLLABUS

PSN College of Engineering and Technology		Regulation: 2018				
Department:	Mechanical Engineering	Branch Code/ Degree/Branch (mention all branches for which the subject is offered)	10/ B.E – MECH			
Semester:	III					
Subject Code:	ME630203		L	T	P	C
Subject Title:	MANUFACTURING TECHNOLOGY		3	0	0	3

Course objective:

To make the student to understand the important concepts of basic manufacturing processes. To understand the principles of various fabrication and forming processes and bulk deformation processes, sheet metal . To understand the concept and mechanics of metal cutting, working of standard machine tools such as lathe, shaping and allied machines, milling, drilling and allied machines, grinding and allied machines and broaching.

UNIT - I METAL CASTING PROCESS

. Sand casting-Patterns: Types, allowance, materials, design-Moulding sand: Types,properties -Core making-Solidification Cooling –Riser and gating design-Methods of sand testing-CO2 process-moulding machines-Melting furnaces, Special casting process-Shell, investment casting –Pressure die casting –Centrifugal casting-casting defects –Inspection methods

9

UNIT II JOINING PROCESSES

Gas welding:Tyes –Equipments-Flame characteristics-Arc welding: Equipment-Electrodes-Coating and specifications-Resistance welding:Spot,butt,seam and percussion welding-Gas metal arc welding-Submerged arc welding-Electro slag welding-Tungsten Inert gas welding, Principle and application of special welding processes-Plasma arc welding-Thermit welding-Electron Beam welding, Laser Beam welding, Friction stir welding, Ultrasonic welding-Weld defects-Brazing and soldering process-Methods and process capabilities –Filler materials and fluxes for all processes

9

UNIT III FUNDAMENTALS OF MACHINING		
Introduction: Material removal processes, types of machine tools-Metal cutting theory: Mechanics of metal cutting, chip formation, orthogonal cutting, shear zones, Merchants circle, cutting tool geometry, cutting tool materials, tool wear, tool life, surface finish, cutting fluids-Influence of tool angles-Influence of tool height		9
UNIT IV GEAR MANUFACTURING AND SURFACE FINISHING PROCESSES		
Gear manufacturing processes:Extrusion,Sampling and Powder metallurgy, Gear machining:Forming,Gear generating process-Gear shaping, Gear hobbing,Surface finishing-Abrasive processes: Types of grinding process-cylindrical grinding,surfacegrinding,centerless grinding-grinding wheel specifications and selection, Fine finishing processes-Honning,lapping, super finishing, polishing and buffing, power brushing-tumbling-Metal spraying-Metallization.		9
UNIT V MACHINE TOOLS FOR NON-CIRCULAR COMPONENTS AND MAKING		
Reciprocating machine tools: shaper, planer, slotter (Construction details only) Milling machines: Horizontal milling m/c and Vertical milling m/c specifications, parts, milling cutters, work holding devices, operations. Hole making: Drilling, boring, tapping-sawing		9
Total: 45 Periods		
TEXTBOOK:		
1.Hajra Choudhury, “Elements of Workshop technology, Vol. I” ,Media PromotorspvtLtd .Mumbai,2012 2.Hajra Choudhury, “Elements of Workshop technology: Machine tools (volume -2)”, Media promoters,2010..		
REFERENCEBOOK:		
1.B.S .NagendraParasar&R.K.Mittal, “Elements of Manufacturing processes” ,Prentice Hall of India,2004 2.P.N.Rao, “ Manufacturing technology:Foundry ,Forming and Welding-Volume I” ,Tata McGraw-Hill publishing Limited,4 th Edition,2013 3.Rao,P.N Manufacturing technology” ,Metal cutting and machine tools, 3 rd edition Tata McGraw-Hill,New Delhi-2013 4.P.C. Sharma. “ A text book of production technology(Manufacturing processes) 7 th Edition”,S. Chand and Company,2008		

5. COURSE OUTCOME (COs) :

CO1.....CO5 (should follow Bloom’s taxonomy)

After successful completion of the course, the students should be able to			
CO’s	CO – STATEMENTS	Blooms level	PO’s
CO1	To identify various types and defects in metal casting Process	K1	1,2,3,4,12
CO2	To explain various advanced metal joining processes	K4	1,2,3,4,12
CO3	Explain the mechanism of material removal	K2	1,2,3,4,12

	process		
CO4	Explain the types of super finishing processes apart from gear manufacturing processes	K5	1,2,3,4,12
CO5	Describe the constructional and operational features of shaper ,planner,milling and Drilling	K4	1,2,3,4,12

6.INSTRUCTIONAL LEARNING OUTCOMES (UNIT WISE/ASSIGNMENTS/TUTORIALS):

Unit	Assessment Procedure
I	Students will learn about the to identify various types and defects in metal casting Process. This outcome will be assessed through Assignment – 1, Class Test – 1 , CAT-I and MCQ
II	Students will learn about to explain various advanced metal joining processes.This outcome will be assessed through assignment – 2, class Test – 2, CAT-I and MCQ
III	Students will learn about explain the mechanism of material removal process. This outcome will be assessed through assignment – 3, class Test – 3 and CAT-II and MCQ
IV	Students will learn about explain the types of super finishing processes apart from gear manufacturing processes. This outcome will be assessed through assignment – 4, class Test – 4 ,CAT-II and MCQ
V	Students will learn the Describe the constructional and operational features of shaper ,planner, milling and Drilling. This outcome will be assessed through assignment – 5, class Test – 5 ,CAT –III and MCQ

7. PROGRAM EDUCATIONAL OBJECTIVES (PEOS):

S.No	Topic	PEOs
PEO1	<i>Fundamental Knowledge</i>	To impart fundamental knowledge in mathematics, basic sciences and Mechanical Engineering to identify and solve design problems in industry using modern tools
PEO2	Technical Knowledge	To train the graduates to manufacture engineering components through proper production methodologies, and industrial automation processes considering safety aspects
PEO3	Skill Development &Ethics	To develop healthy interpersonal skills, entrepreneurship skills, communication skills, team work, adhering to professional, ethical practices and lifelong learning

8.PROGRAM OUTCOMES (POS):

PO's No	KNOWLEDGE	STATEMENTS
1	Engineering Knowledge	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2	Problem Analysis	Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using

		first principles of mathematics, natural sciences, and engineering sciences.
3	Design / Development of Solutions	Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4	Conduct Investigations of Complex Problems	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5	Modern Tool usage	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6	The Engineer and Society	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7	Environment and Sustainability	Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8	Ethics	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9	Individual and Team Work	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10	Communication	Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11	Project Management and Finance	Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12	Life-long Learning	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

9. PROGRAM SPECIFIC OUTCOMES (PSOs) :

PSO1	Ability to apply the knowledge of applied mathematics and advanced software tools for design specification, development of products, analysis of the physical systems, components and processes involved in mechanical engineering
PSO2	Development of skill and attitude to analyze the cause and effects on machine elements, processes and systems

10. CO AND PO MAPPING :

	PO'S											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	2	2	1								2
CO2	3	2	2	1								2
CO3	3	2	2	1								2
CO4	3	2	2	1								2
CO5	3	2	2	1								2

11. TEXT BOOK S & REFERENCE BOOKS :

S.No .	Name of the Author	Book Name /	Text Book/ Reference book
1	Hajra Choudhury	Elements of Workshop technology, Vol. I	Text Book
2	Hajra Choudhury	Elements of Workshop technology, Vol. 2	Text Book
3	B.S NagendraParasar&R.K. Mittal	Elements of Manufacturing processes	Reference Book
4	P.N.Rao	Manufacturing technology:Foundry ,Forming and Welding-Volume I	Reference Book
5	.P.C. Sharma	“ A text book of production technology	Reference Book

12. WEB RESOURCES :

S.No	Topic	Web link
1.	Casting Processes" by Georgia Tech - Manufacturing Processes	https://www.me.gatech.edu/Manuf/Class/MFG%20Procss/Chapter6.pdf

13. E – LEARNING VIDEOS/NPTEL/ SWAYAM AND OTHER RESOURCES RELATED TO SYLLABUS :

V 1	https://youtu.be/jdFrBtHeJbs
V 2	https://youtu.be/uRVaLUQUmA8

14. LESSON PLAN

S.No	Unit	Topic to be covered	Hours Needed	Mode of Teaching (BB/PPT/ Others)	Text/ Ref. Book	Page No
1	I	Sand casting-Patterns: Types, allowance, materials	1	BB	T1	1.1
2		Moulding sand: Types,properties	1	BB	T1	1.2- 1.6
3		Core making-Solidification Cooling –Riser and gating design	1	BB/PPT	T1	1.12- 1.35
4		-Methods of sand testing	1	BB	T1	1.44
5		CO2 process-moulding machines-Melting furnaces	2	BB/PPT	T1	1.51
6		Special casting process-Shell, investment casting –Pressure die casting	2	BB	T1	1.74
7		Centrifugal casting-casting defects –Inspection methods	1	BB	T1	1.86
8	II	Gas welding:Tyes –Equipments-Flame characteristics	1	BB	T2	1.3-1.8, 1.40
9		Arc welding: Equipment-Electrodes-Coating and specifications	1	BB	T2	2.3
10		Resistance welding:Spot,butt,seam and percussion welding	1	BB/PPT	T2	2.20

11		Gas metal arc welding Submerged arc welding-Electro slag welding-Tungsten Inert gas welding	2	BB/PPT	T2	2.37-2.40
12		special welding processes-Plasma arc welding-Thermit welding-Electron Beam welding Laser Beam welding, Friction stir welding, Ultrasonic welding	2	BB/PPT	T2	2.58, 2.119
13		Weld de Filler materials and fluxes for all processes fects-Brazing and soldering process	2	BB	T2	2.135
14	III	Introduction: Material removal processes, types of machine tools	1	BB	T1	3.1
15		Metal cutting theory: Mechanics of metal cutting	2	BB/PPT	T1	3.5-3.10
16		chip formation, orthogonal cutting, shear zones	1	BB/PPT	T1	3.14
17		Merchants circle, cutting tool geometry cutting tool materials	2	BB/PPT	T1	2.16-3.22
18		tool wear, tool life, surface finish, cutting fluids	2	BB/PPT	T1	3.45
19		Influence of tool angles-Influence of tool height	1	BB	T1	3.62
20	IV	Gear manufacturing processes, Extrusion Sampling and Powder metallurgy	1	BB/PPT	T1	4.1
21		Gear generating process- gear shaping gear hobbing	1	BB	T1	4.20
22		Types of grinding process-cylindrical grinding,surfacegrinding,centerless grinding	2	BB/PPT	T1	4.25
23		grinding wheel specifications and selection	1	BB/PPT	T1	4.48
24		Fine finishing processes-Honning,lapping, super finishing	1	BB/PPT	T1	4.29
25		polishing and buffing, power brushing-tumbling	1	BB	T1	4.31
26		Metal spraying process	1	BB	T1	4.34

27		. Metallization process	1	BB	T1	4.36
28	V	Reciprocating machine tools: shaper, planer (Construction details only)	2	BB/PPT	T2	5.47
29		Reciprocating machine tools slotter (Construction details only)	1	BB	T2	5.98
27		Milling machines Horizontal milling m/c	2	BB/PPT	T2	5.115
28		Milling machines Vertical milling m/c	1	BB/PPT	T2	5.96
29		milling cutters, work holding devices, operations	1	BB/PPT	T2	5.5
30		Hole making: Drilling, boring, tapping-sawing	2	BB	T2	5.13

15. ASSIGNMENTS :

S. No.	Assignment Topic	Submission date	CO Mapping
1	Sand casting-Special casting process-Shell, investment	I week of September	CO1
2	Gas welding: Types-Resistance welding: Spot, butt, seam, Friction stir welding, Ultrasonic welding	III week of September	CO2
3	chip formation, orthogonal cutting, tool wear, tool life, surface finish	I week of October	CO3
4	, Gear generating process-Gear shaping, Gear hobbing Types of grinding process-cylindrical grinding, surface grinding	III week of October	CO4
5	: shaper, planer, slotter (Construction details only. Hole making: Drilling, boring, tapping-sawing	I week of November	CO5

16. ASSIGNMENT RUBRICS :

Quality	Marks
Submission on Date	2
Understanding	3
Solving Skills/Presentation	3
End results with correct units conversions / Conclusion	2

17. MAPPING OF CO TO ASSIGNMENT :

S. No.	Assignment Topic	A1	A2	A3	A4	A5
1	Sand casting-Special casting process-Shell, investment	3				
2	Gas welding: Tyes-Resistanc welding: Spot, butt, s, Friction stir welding, Ultrasonic welding		3			
3	chip formation, orthogonal cutting, tool wear, tool life, surface finish			3		
4	Gear generating process-Gear shaping, Gear hobbingTypes of grinding process-cylindrical grinding,surface grinding				3	
5	shaper, planer, slotter (Construction details only. Hole making: Drilling, boring, tapping-sawing					2

18. INTERNAL ASSESSMENT:

Assessment Tool		Description
CONTINUOUS ASSESSMENT	40%	CAT – I(8marks), CAT – II(8marks), CAT –III(4marks) will be considered for 20 marks, class test -5 marks MCQ 10 marks, Project-5 marks Total 40marks
End semester Examination	60%	End semester Examination for 100 marks Converted to 60marks
Course End Survey		At the end of the Course, will be evaluated

19. DISTRIBUTION OF PORTIONS FOR ASSESSMENT TESTS

Assessments		Portion Covering Unit	% of weight age
CONTINUOUS ASSESSMENT	CAT – I	Unit-I & Unit-II	50
	CAT – II	Unit-III& Unit - IV	
	CAT-III	Unit-V	
	Class test	Unit – I to Unit - V	12.5
	Project	One project	12.5
	MCQ	Unit – I to Unit - V	25
End Semester		Unit - 1 to 5	100

20. MARK ALLOTMENT FOR CO ASSESSMENT

COs	CAT - I	CAT - II	CAT-III	project	Class test	MCQ	End Semester
CO1	25			100	26	6	100
CO2	25				26	6	
CO3		25			26	6	
CO4		25			26	6	
CO5			50		26	6	
Marks Converted to	20			5	5	10	60

Course Instructor**HOD /Mechanical****Dean (Academics)****Principal**