

25MEMJ207: Manufacturing Technology

w.e.f. Academic Year:	2025-26
Semester:	3
Category of the Course:	HSMC
Prerequisite:	Basic knowledge of engineering materials, workshop practice, and fundamentals of mechanical engineering.
Rationale:	To provide fundamental understanding of manufacturing processes, machine tools, and CNC machining for industrial applications

Course Outcomes:

After Completion of the Course, Student will able to:

	Course Outcome (CO)	RBT Level (Cognitive Domain)
CO1	Understand fundamentals of manufacturing processes and classification of machine tools.	Understand
CO2	Explain construction, working principles, and operations of boring, shaper, planer, and slotter machines.	Understand / Apply
CO3	Describe construction, working, and operations of milling and drilling machines.	Understand / Apply
CO4	Understand lathe, grinding, sawing, broaching machines, and finishing processes.	Understand / Analyze
CO5	Understand CNC machine concepts, components, industrial applications, and future trends in manufacturing technology.	Understand / Apply

Teaching and Evaluation Scheme:

Teaching Scheme					Examination Scheme				
L	T	P	C	Hrs/Week	IE	Theory	CIA	Practical	Total Marks
2	0	4	4	6	40	60	30	20	150

IE: Internal Evaluation

Theory: Theory Exam (End Semester)

CIA: Continuous Internal Assessment

Practical: Practical Exam (End Semester)

Detailed Syllabus:

Topic		Hrs.	Marks % Weightage (approx.)
UNIT: 1	Introduction to Manufacturing Technology: Definition of manufacturing, Classification of manufacturing processes, Primary, secondary and tertiary manufacturing processes, Selection of manufacturing processes, Manufacturing industries and applications, Basic requirement of Machine tool Boring Machine: Boring principal, Purpose and field of application, Boring machine classification, Boring machine operations, Boring Bar.	8	25

	Planers, Shaper and Slotters: Construction and Advantages, limitations, Applications, Working principal, Operations, Types of each machine, comparison of planner, shaper and slotter.		
UNIT: 2	Milling Machine: Construction and working of milling machine, Types of milling machines, Milling cutters, Milling operations: Plain milling, Face milling, End milling, Slot milling, Gear cutting, Advantages and disadvantages Drilling machine: Construction and working of drilling machine, Types of drilling machines, Drilling operations: Drilling, Reaming.	7	25
UNIT: 3	Lathe Machine & Operations: Construction and working of lathe, Advantages and Disadvantages of Lathe machine, Lathe accessories and attachments, Types of lathes, Lathe operations: Facing, Turning, Taper turning, Thread cutting, Knurling, Parting-off. Grinding Machine: Introduction to grinding, Grinding wheel materials and selection, Types of grinding machines, Surface grinding, Cylindrical grinding, Finishing processes: Honing, Lapping, Super finishing. Sawing and Broaching Machine: Definition, Working Principle, Types of Sawing Machines, Advantages and Application. Types of Broaching Machines.	8	25
UNIT: 4	Introduction to CNC Machine: Introduction to NC and CNC, Need for CNC machines, Advantages and limitations of CNC, Comparison between conventional machines and CNC machines, Basic components of CNC system, Machine Control Unit (MCU), Drive system, Feedback devices, Display and input devices, Types of CNC machines, Preventive maintenance of CNC machines, Operator responsibilities Industrial Applications: Applications of CNC and VMC machines, CNC in mass production, CNC in aerospace, automotive, and tool industries, Future trends in CNC machining	7	25
		30	100

List of Practical:

Topic	Hrs
To study identification and classification of manufacturing processes and machine tools.	4
Perform identification of parts and explain working of lathe machine .	4
Perform basic lathe operations : facing, turning, taper turning, and parting-off.	6
Perform identification of parts and explain working of milling machine .	4
Perform basic milling operations : plain milling, slot milling, and end milling.	6

Perform identification of parts and explain working of drilling machine .	4
Perform drilling, reaming, and tapping operations on drilling machine.	6
Perform job observation and operation study on shaper machine .	4
To job observation and operation study on planer and slotting machines .	4
Perform operation study and surface finishing on grinding machine .	6
To operation study on sawing and broaching machines with applications.	4
Perform identification and operation study of CNC machine components and control panel .	4
Understand basic CNC part programs (turning/milling).	4
	60

Reference Books:

1. Workshop Technology Vol. I, II & III, WAJ Chapman.
2. Workshop Technology Vol. II, Hajra & Choudhary.
3. Manufacturing Processes, O.P. Khanna.
4. Production Technology, R. K. Jain
5. Processes and Materials of Manufacture; Lindberg Roy A.; Prentice-Hall India.
6. Principles of Manufacturing Materials and Process, J S Campbell.
7. CNC Fundamentals and Programming – P. M. Agrawal & V. J. Patel
8. CAD/CAM: Principles and Applications – P.N. Rao

Teaching Learning Method

- Chalk & board teaching
- Power Point Presentations
- Group discussions

Course Outcomes Mapping:

CO No.	Course Outcome (CO)	POs/ PSOs Mapped	Cognitive Level (RBT)	Knowledge Category	Class Sessions (Lecture)
CO1	Understand fundamentals of manufacturing processes and classification of machine tools.	PO1, PO2, PO5, PSO1	Understand	Conceptual	8
CO2	Explain construction, working principles, and operations of boring, shaper, planer, and slotter machines.	PO1, PO2, PO3, PO5, PSO1, PSO2	Understand / Apply	Conceptual / Procedural	7
CO3	Describe construction, working, and operations of milling and drilling machines.	PO1, PO2, PO3, PO5, PSO1, PSO2	Understand / Apply	Conceptual / Procedural	3
CO4	Understand lathe, grinding, sawing, broaching machines, and finishing processes.	PO1, PO2, PO3, PO5, PO6, PO7, PO12, PSO1, PSO2	Understand / Analyze	Conceptual / Procedural	5

CO5	Understand CNC machine concepts, components, industrial applications, and future trends in manufacturing technology.	PO1, PO2, PO3, PO5, PO6, PO7, PO12, PSO1, PSO2	Understand / Analyze	Conceptual / Procedural	7
------------	--	--	----------------------	-------------------------	---

Mapping of COs with POs & PSOs:

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

3: High, 2: Medium, 1: Low

Sustainable Development Goals (SDG) Integration

The course "Manufacturing Technology" provides fundamental understanding of manufacturing processes, conventional and CNC machine tools, machining operations, and industrial manufacturing applications. The course supports sustainable industrial development, efficient production practices, skill development, and responsible use of technology.

SDG Mapping with Course Outcomes

CO	Course Outcome	Relevant SDGs	Justification
CO1	Understand fundamentals of manufacturing processes and classification of machine tools.	SDG 4, SDG 8, SDG 9	Builds foundational manufacturing knowledge and technical competency required in modern industries.
CO2	Explain construction, working principles, and operations of boring, shaper, planer, and slotter machines.	SDG 4, SDG 8, SDG 9	Develops practical understanding of conventional machining systems used in industrial manufacturing.
CO3	Describe construction, working, and operations of milling and drilling machines.	SDG 4, SDG 8, SDG 9, SDG 12	Enhances machining and production skills while promoting efficient utilization of manufacturing resources.
CO4	Understand lathe, grinding, sawing, broaching machines, and finishing processes.	SDG 4, SDG 8, SDG 9, SDG 12	Supports quality manufacturing practices, precision machining, and sustainable production methods.
CO5	Understand CNC machine concepts, components, industrial applications, and future trends in manufacturing technology.	SDG 4, SDG 8, SDG 9, SDG 12, SDG 13	Introduces advanced manufacturing automation and sustainable industrial technologies that improve productivity and reduce resource wastage.