Course Syllabus
Gyanmanjari Institute of Technology
Semester-4

Subject: Manufacturing Process-1- BETME14307

Type of course: Major

Prerequisite: Introduction of Mechanical Engineering, Engineering materials and workshop.

Rationale: This subject explores a range of manufacturing processes essential for modern industry, with a focus on machining methods and their applications. By covering both conventional and advanced machining techniques, students gain a solid foundation in the science and principles behind material removal processes, tool selection, and machine operations, fostering a well-rounded skill set applicable to real-world manufacturing environments.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks					Total Marks
				Theory Marks		Practical Marks		CA	
CI	T	P	C	ESE	MSE	V	P	ALA	
4	0	2	5	60	30	10	20	30	150

Legends: CI-Classroom Instructions; T – Tutorial; P - Practical; C – Credit; ESE - End Semester Examination; MSE- Mid Semester Examination; V – Viva; CA - Continuous Assessment; ALA- Active Learning Activities.

Course Content:

Unit No	Course content	Hrs	% Weightage
1	**Basic Machine Tools and Metal Cutting Principles:** Machine tools classification, working and auxiliary motions in machine tools, Primary cutting motions in machines tools, cutting tool geometry and tool signature, cutting forces and power requirement in machining. **Metal Cutting Lathes:** Engine Lathes, construction all arrangement and principal units of engine lathes, type and size range of engine lathes, Operations carried on engine lathe, attachment extending the processing capacities of engine lathes, Types of lathe machines, Capstan and Turret lathes, Taper turning on lathe, Thread cutting on lathe using gear train and chasing dial, Alignment tests of lathes.	20	30
2	**Drilling Machines:** Purpose and field of application of drilling machines, Types of drilling machines, Drilling and allied operation: drilling, boring, reaming, tapping, counter sinking, counter boring, spot facing; deep hole drilling, alignment tests of drilling machine. **Boring Machine:** Purpose and filed of application, Horizontal boring machines, Precision boring machines.	15	20
3	**Milling Machines:** Purpose and types of milling machines, general purpose milling machines, different types of milling operations, milling cutters, attachments extending the processing capabilities of general-purpose milling machines, Indexing, Helical milling operation and its set up, Alignment tests of milling machine **Planers, Shapers and Slotters:** Classification of planers, Shapers and Slotters, Attachments extending the processing capacities of planers; Shapers and Slotters, machine and tooling requirements	15	30
4	**Sawing and Broaching Machines:** Metal sawing classification: reciprocating sawing machines, circular sawing machines, band sawing machines, Types of broaching machines, advantage and limitations of broaching	10	20

Continuous Assessment:

Sr. No	Active Learning Activities	Marks
1	**Comprehensive Report on Different Types of Lathe Machine Tools:** The faculty will assign different types of lathe machine tools to students, enabling them to understand their unique features, operational capabilities, and specific applications in machining processes and upload photographs on GMIU web portal.	10
2	**Design of jig or fixture:** The faculty will assign rods of varying diameters for students to design a jig or fixture for drilling precise holes and upload photographs on GMIU web portal.	10
3	**Soft Material Drilling Machine Design:** Students will work in groups to develop a machine or prototype designed to create holes in very soft materials and upload photographs on GMIU web portal.	10
	Total	30

Suggested Specification table with Marks (Theory):60

Distribution of Theory Marks (Revised Bloom's Taxonomy)						
Level	**Remembrance (R)**	**Understanding (U)**	**Application (A)**	**Analyze (N)**	**Evaluate (E)**	**Create (C)**
Weightage	30%	35%	25%	10%	-	-

Course Outcome:

After learning the course, the students should be able to:	
CO1	Study machine tool types, motions, cutting tools, power requirements, and engine lathe operations and attachments.
CO2	Learn about drilling machines, their operations, and boring machine types and applications.
CO3	Explore milling machines, their operations, and attachments, along with planers, shapers, and slotters.
CO4	Explore sawing, broaching, and grinding machines, along with wheel types and applications.

List of Practical:

Sr. No	Descriptions	Unit No	Hrs.
1	**Study of Machine Tools (Lathe, Shaper, Slotter, and Planner):** Analyze cutting tools and relative motions between the cutting tool and work piece on each machine tool, deriving their capacity and capability from specifications and available attachments.	1	4
2	**Study of Machine Tools (Grinding, Milling, and Drilling):** Examine the types of cutting tools, relative motions between cutting tool and work piece, and derive machine tools' capacity and capability based on specifications and attachments.	1	4
3	**Job Making on Lathe Machine:** Perform machining operations on a lathe machine to create a specified job.	1	6
4	**Alignment Test on Lathe Machine/Any Other Machine:** Conduct alignment tests on a lathe machine or other equipment to ensure accurate operation and alignment.	1	4
5	**Job Making on Drilling Machine:** Utilize a drilling machine for precision hole-making operations on a work piece.	2	2
6	**Job Making on Shaper/Slotter Machine:** Carry out machining operations on a shaper/slotter machine to produce a defined work piece.	3	2
7	**Job Making on Milling Machine:** Execute a job-making process using a milling machine to meet specified design requirements.	3	4
8	**Job Making on Grinding Machine:** Perform grinding operations on a work piece using a grinding machine to achieve desired surface finish.	4	4
		Total	30

Instructional Method:

The course delivery method will be based on the content requirements and student needs. The instructor will use a combination of traditional methods, such as lectures and blackboard teaching, along with demonstrations, quizzes, and brainstorming sessions.

Students will have access to supplementary resources like online videos, NPTEL/SWAYAM, e-courses, and virtual laboratories.

Internal evaluation will be based on Active Learning Assignments (ALAs).A practical/viva examination will be held at the end of the semester to assess students' laboratory performance.

Reference Books:

[1] Workshop Technology Vol. I, II & III, WAJ Chapman.

[2] Workshop Technology Vol. II, Hajra & Choudhari.

[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.