TEACHING PLAN: MANUFACTURING PROCESS-II

SCHOOL OF ENGINEERING AND TECHNOLOGY		**ACADEMIC SESSION: 2022-23**		**FOR STUDENTS' BATCH: 2021-2025**	
1	**Course code**	**PCC-ME 212**			
2	**Course Title**	**MANUFACTURING PROCESS-II**			
3	**Credits**	**4**			
4	**Learning Hours**	**Contact Hours: 3** **Practical Teaching: 0** **Project, Tutorial, and Assessment: 0** **Total hours: 3**			
5	**Course Objective**	i. To analyze and understand the metal cutting phenomena ii. To select process parameters and tools for obtaining desired machining characteristic iii. To understand principles of manufacturing processes.			
6	**Course Outcomes**	CO1: To apply the knowledge of various manufacturing processes CO2: to identify various process parameters and their effect on processes CO3: Students should be able to design and analyze various manufacturing processes and tooling CO4: To figure out the application of modernization in machining. CO5: Get the knowledge of Jigs and Fixtures so as to utilize machine capability for a variety of operations			
7	**Outline syllabus:** Mechanism of Metal Cutting, Tool Wear and Machinability, Cutting Tool Materials & Cutting Fluids, Gear Manufacturing, Jigs & Fixtures				
7.01	**Paper Code**	**Unit**	**Introduction**	**Reference number**	**Teaching methods**
	PCC-ME 212	(I)	Mechanism of Metal Cutting: Deformation of metal during machining, the nomenclature of a lathe, milling tools, mechanics of chip formation, built-up edges, mechanics of orthogonal and oblique cutting, Merchant cutting force circle and shear angle relationship in orthogonal cutting, factors affecting tool forces. Cutting speed, feed and depth of cut, surface finish. Temperature distribution at tool chip interface. Numericals on cutting forces and Merchant circle.	Manufacturing engineering and technology by serope kalpakjian and steven r Schmid, page no 566 to 599.	Whiteboard, PPT slides, Tutorials, Demonstration
		(II)	Tool Wear and Machinability: Types of tool wear, tool life, factors governing tool life, Machinability: Definition and evaluation.	Manufacturing engineering and technology by serope	Whiteboard, PPT slides, Tutorials, Demonstrati

			Economics of machining, Numerical on tool life.	kalpakjian and steven r Schmid, page no 566 to 599.	on
		(III)	Gear Manufacturing: Introduction, methods of manufacture. Gear generation and forming: Gear cutting by milling, single-point form tool, gear hobbing, and shaping. Gear finishing operations: Gear shaving, gear burnishing, gear grinding, lapping.	Manufacturing engineering and technology by serope kalpakjian and steven r Schmid, page no 866 to 702.	Whiteboard, PPT slides, Tutorials, Demonstrati on
		(IV)	Jigs & Fixtures: Introduction, location and location devices, clamping and clamping devices, Drill Jigs, Milling Fixtures.	Manufacturing engineering and technology by serope kalpakjian and steven r Schmid	Whiteboard, PPT slides, Tutorials, Demonstrati on
		(V)	Unconventional Machining Processes: introduction, classification of unconventional machining processes, Abrasive jet machining: Principles, advantages, disadvantages, and applications. Ultrasonic machining: Principles, advantages, disadvantages, and applications. Electro-chemical machining and grinding: Principles of operation, advantages, disadvantages, and applications. Electric discharge machining: Principles, advantages, disadvantages, and applications. Electron beam machining: principle, advantages, disadvantages, and applications. Laser beam machining: Principles and applications.	Manufacturing engineering and technology by serope kalpakjian and steven r Schmid, page no 769 to 796.	Whiteboard, PPT slides, Tutorials, Demonstrati on

8	**Course Evaluation**	
8.10	**CA: 20%**	
8.1	**Attendance**	10%
8.12	**Homework**	10%
8.13	**Quizzes**	-
8.14	**Projects**	-
8.15	**Presentation**	-
8.16	**Any other**	-
8.2	**MTE(IA)**	20%
8.3	**End-term examination: 60%**	
9	**Text Books & References**	
9.1	**Text books**	1. Manufacturing Technology – Metal cutting and machine Tools: P.N. Rao, T.M.H, New Delhi 2. Workshop Technology -Vol II (Machine Tools) B.S Raghuwanshi, dhanpat Rai and Company.

		3. Manufacturing Processes- H S Shan, Cambridge University Press 2nd Edition 2017 4. Manufacturing Engg. & Tech, Kalpakian, Serope Addison -Wisly Publishing Co. New York. 5. Modern Machining Processes: P.C. Pandey & H.S. Shan, T.M.H. Company, New Delhi 6. Text Book of Production Engineering: P.C. Sharma, S.Chand & Sons.
9.2	**References**	1. Wang, Bing, et al. "Advancements in material removal mechanism and surface integrity of high-speed metal cutting: A review." International Journal of Machine Tools and Manufacture 166 (2021): 103744. 2. Lokesh, K. S., Thomas Pinto, and C. G. Ramachandra. "Effect of tool wear & machinability studies on polymer composites; a review." International Journal of Engineering and Information Systems 1.5 (2017): 71-77. 3. Gupta, Kapil, Neelesh Kumar Jain, and R. F. Laubscher. "Advanced gear manufacturing and finishing: classical and modern processes." (2017). 4. Radhwan, H., et al. "Design and Analysis of Jigs and Fixtures for Manufacturing Process." IOP Conference Series: Materials Science and Engineering. Vol. 551. No. 1. IOP Publishing, 2019. 5. Jayappa, Pradeep, et al. "An overview on role of unconventional machining processes on different materials." Materials Today: Proceedings (2021).
9.3	**Video References**	1. https://nptel.ac.in/courses/112104204 2. https://nptel.ac.in/courses/112107219s

Mapping of Outcomes v. Topics

Course Outcome	**Program Outcome**												**PSO**			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	3	3	3	3	2	3	2	2	2	2	2	3	3	3	3	2
CO2	3	3	3	3	2	1	2	1	2	2	2	3	3	3	3	2
CO3	3	3	3	3	2	2	2	1	3	2	2	3	3	3	3	3
CO4	3	3	3	3	3	2	2	1	2	1	2	3	3	3	3	2
CO5	3	3	3	2	2	2	2	1	2	2	2	3	3	3	3	2

QUESTION BANK

1. What is a tool signature.
2. What is the side rake angle? And mention its effects?
3. What is the clearance angle? And mention its types?
4. Explain the nose radius.
5. Sketch the orthogonal cutting.
6. What is the shear plane?
7. What is cutting force?
8. What is a chip and mention its different types?

9. Define machinability of metal.
10. Write Taylor's tool life equation
11. Explain orthogonal cutting and oblique cutting with its neat sketches and compare.
12. What is the tool life equation and state the factor affecting the tool life.
13. What is machinability? And explain.
14. Explain the various tool materials.
15. Write short notes on surface finish.
16. What are the different types of cutting fluids used in machining process
17. Write short notes tool wear.
18. What is the process of self-sharpening of the grinding wheel
19. What are the four moments in a cylindrical center type grinding.
20. What is meant by centerless grinding.
21. Define the terms abrasive grains.
22. What is meant by grit or grains size.
23. Define the term grade used in grinding wheel.
24. what is an open and dense structure
25. What is meant by dressing and truing
26. What is meant by honing
27. What is superfinishing
28. Discuss the various bonding materials and abrasives used for making grinding wheels.
29. Explain the working principle of the cylindrical, surface, and centreless grinding process.
30. Classify the grinding machines, factors considered to select
31. grinding wheels also explain truing and dressing.
32. Write briefly about broaching machines and their operations with neat sketches.
33. Discuss push and pull type broaching machines with neat sketches.
34. Explain the working principles of the continuous broaching machine and also state the advantages and limitations of broaching.