Devi Ahilya Vishwavidhyalaya, Indore, India **Institute of Engineering & Technology**					**III Year B.Tech. (Mechanical Engineering)**	
Course Code & Name	**Instructions Hours per Semester and Credits**					
6RMPE1 **PRODUCTION ENGINEERING-II**	**Classroom Instruction (CI)**		**Lab Instruction (LI)**	**Term Work (TW) and Self Learning (SL)**	**Total no. of Hours Per semester**	**Total Credits (Total Hours/30)**
	L	**T**	**P**	**TW+SL**		
	20	**10**	**20**	**70**	**120**	**4**

Learning Objectives:
The course is designed
1. To provide an understanding of the mechanics of metal cutting processes and various aspects of machinability and tool wear.
2. To learn about the fundamentals of bulk metal forming processes.
3. To learn about the various unconventional machining processes.
4. To learn about the various methods to evaluate and measure the surface finish and methods to improve the surface finish of engineering components.
5. To learn about the methods to process particulate materials and composites.

Pre requisite(s): A basic course in manufacturing processes, material science and workshop practice.

COURSE CONTENTS

UNIT-I
Theory of Metal Cutting: Introduction, mechanics of metal cutting, oblique and orthogonal cutting, shear angle, rake angle and strain relationships, force and power relationships, heat generation and temperature rise in metal cutting. Machinability: criteria for evaluating machinability, factors affecting machinability, tool life and tool wear, variables influencing tool life, economics of metal cutting.

UNIT-II
Theory of Metal Forming: Introduction, plastic deformation and yield criteria, temperature and friction in metal forming, overview of bulk metal forming processes, mechanics of forming processes: rolling, forging, drawing, bending, extrusion; design consideration for the tooling/dies used in solid forming processes, defects in metal forming, advantages & limitations of hot & cold forming.

UNIT-III
Unconventional Machining Processes: Introduction, need and classification of unconventional machining processes. Principles, process parameters, set-up and applications of the following unconventional machining processes: electric discharge machining (EDM), electrochemical machining (ECM), ultrasonic machining (USM), abrasive jet machining

(AJM), laser beam machining (LBM), electron beam machining (EBM) and plasma arc machining (PAM).

UNIT-IV

Surface Finish Measurement and Surface Improvement: Introduction, elements of surface texture, evaluation and representation of surface roughness, effect of surface finish on functional properties of parts. Measurement of surface roughness, surface cleaning and surface treatment, diffusion and ion implantation, Surface coating and deposition processes: surface plating, conversion coating, physical vapour deposition and chemical vapour deposition processes.

UNIT-V

Processing of Particulate Metals, Ceramics-Composites: Introduction, basic P/M processes, powder manufacture, testing and blending, compacting, sintering, hot pressing, other techniques to produce high-density powder metallurgy products, properties of P/M products, advantages and limitations of powder metallurgy; Processing of traditional ceramics, processing of new ceramics and cermets, types and properties of composites and shaping processes for polymer matrix composites.

BOOKS RECOMMENDED:

[1] Ghosh Amitabh & Mullick Ashok, *Manufacturing science,* East West Press Pvt.Ltd,2ed,2010.
[2] Sharma P. C., *A Text Book of Production Engineering,* S. Chand Publishing,11ed,1982.

[3] HMT(Hindustan Machine Tools), *Production Technology,* McGraw-Hill Education,2017
[4] Mikell P Groover, *Fundamentals of Modern Manufacturing*, Wiley,6ed, 2015
[5] Rao P.N., *Manufacturing Technology,Vol-1,Vol-2,* McGraw-Hill Education,2017.

LIST OF PRACTICAL ASSIGNMENT

1. Measurement of various features of tool geometry of a given single point tool and the tool wear using a tool maker's microscope.
2. Measurement of surface finish of machined components
3. Measurement of a component features using a profile projector.
4. To perform process planning and prepare operations sheet and tool layout for machining a workpart on a capstan/turret lathe.
5. To machine a given workpart according to the prepared process plan and operations sheet.
6. To study the constructional features of EDM machine.
7. To machine a work part as per given drawing on EDM machine.
8. To study of the constructional features of universal cylindrical grinder.
9. To estimate the power requirements and the forces generated theoretically at the chip tool interface during turning, drilling and milling operations.
10. To measure the forces generated at the chip tool interface during machining operations.

Course Out Come (CO)	After completion of the course, students will be able to:
CO1	Learn the effect of various parameters on the metal cutting process, estimate the power requirements and carryout the operations planning, tool selection according to the work material.
CO2	Learn the mechanics of bulk metal forming processes and select the equipment and tooling needed for the various forming operations. Learn about the various defects which may occur and ways to mitigate them during forming operations.
CO3	Understand the importance of surface finish of manufactured parts and learn about the various methods to improve it.
CO4	Learn about the powder metallurgy processes and about the processing of ceramics and composites.

CO-PO-PSO Mapping

Course Name: **Production Engineering-II** Course Code: **6RMPE1**

CO	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PSO1	PSO2	PSO3
CO1	3	3	3	1	1	1	1	1	2	2	2	3	2	1
CO2	3	3	3	1	1	1	1	1	2	2	2	3	2	1
CO3	3	3	3	1	1	1	1	1	2	2	2	3	2	1
CO4	3	3	3	1	1	1	1	1	2	2	2	3	2	1
CO5	3	3	3	1	1	1	1	1	2	2	2	3	2	1
Avg.	3	3	3	1	1	1	1	1	2	2	2	3	2	1

* CO (rows) mention nil/very small/insignificant contribution to the PO(column)
1→ relevant and small significance 2 → medium or moderate and 3 →strong