

Course Plan

Name of the Course: Manufacturing Technology

Code of the course: 5ME4-03

Name of Faculty: AMIT SHARMA

Course Outcomes

- CO-1:** Understand different manufacturing processes and classify them based on material, energy, and production methods.
- CO-2:** Analyze metal forming processes including casting, forging, rolling, and extrusion.
- CO-3:** Examine machining processes and evaluate material removal rates, tolerances, and surface finish.
- CO-4:** Apply joining processes such as welding, brazing, and soldering to engineering problems.
- CO-5:** Evaluate the selection of manufacturing processes for a given component based on cost, quality, and sustainability.
- CO-6:** Develop manufacturing solutions and process improvements for enhanced productivity and efficiency.

Unit	Topic	Lecture	CO	Specific Objective	Expected Outcomes	Primary Reference (P.C. SHARMA)
1	Introduction: Objective, scope and outcome of the course and classification of Metal removal process.	1	CO1	Students will be able to characterize various metal process	Understand the classification of material removal process	Ch.1 p.1–6
1	Overview of Metal Forming (Casting, Forging, Rolling, Extrusion)	2	CO2	Introduce forming processes	Understand forming basics	Ch.2, p.11–25
1	Geometry of single point cutting tool and tool angles	2	CO3	Students will be able to characterize various cutting tool geometry	understand the concept of various cutting angle in a single point cutting tool.	Ch.3 p.45–55

1	Tool nomenclature in ASA, ORS	3	CO3	Students will be able to characterize the tool nomenclature and differentiate both the standardization of tool angles	Understand the concept of tool nomenclature	Ch.3 p.50–55
1	Concept of orthogonal and oblique cutting	4	CO3	Students will be able to understand the concept of orthogonal and oblique cutting	Differentiate cutting types	Ch.3 p.55–60
1	Types of chips, Mechanics of metal cutting.	5	CO3	Students will be able to understand the mechanics of metal cutting and classification of chips	Analyze chip formation and understand Merchant circle diagram.	Ch.3 p.60–65
1	Interrelationships between cutting force.	6	CO3	Students will be able to understand the relationship of cutting forces	Identify the thermal aspects of cutting.	Ch.3 p.65–70
1	Shear angle	7	CO3	Students will be able to learn the concept of shear angle	Calculate the shear angle	Ch.3 p.70–72

1	Strain and strain rate	8	CO3	Study deformation	Understand cutting physics	Ch.4, p.176–195
1	Thermal aspects of machining	9	CO3	Analyze heat generation	Identify the thermal aspects of cutting.	Ch.5, p.196–210
1	Measurement of chip tool interface temperature	10	CO3	Explain methods	Measure cutting temp	Ch.5, p.211–225
2	Concept of machinability, machinability index, factors affecting machinability,	11	CO3	Define machinability, machinability index and factors	Understand the basic concept of machinability	Ch.6, p.226–240
2	Different mechanism of tool wear and types of tool wear (crater, flank etc.,)	12	CO3	Explain wear types	Understand the effect of tool wear on metal cutting and analyze tool failure	Ch.6, p.241–260
2	Concept of tool life	13	CO3	Understand the concept of tool life	Understand the concept of tool life.	Ch.7, p.261–275
2	Taylor's tool life equation and its numerical	14	CO3	Taylor's tool life equation and practice of numerical related to tool life	Problem solving on tool life.	Ch.7, p.276–290
2	Introduction to economics of machining	15	CO5	Analyze cost factors	Optimize machining cost	Ch.8, p.291–305
2	Cutting fluids: Types, properties, selection and application.	16	CO5	Study types & selection	Understand the concept of economics of machining	Ch.8, p.306–320

3	Basic machine tools: Constructional configuration (lathe).	17	CO3	Explain constructional configuration and operation of Lathe Machine	Understand the basic operation performing on lathe machine.	Ch.9, p.321–330
3	Machining Time Estimation (Lathe machine)	18	CO3	Calculate MRR & time	Estimate production	Ch.9, p.351–354
3	Basic machine tools: Constructional configuration (Drilling Machine).	19	CO3	Explain constructional configuration and operation of Drilling Machine	Understand the basic operation performing on Drilling machine.	Ch.9, p.331–330
3	Machining Time Estimation (Drilling machine)	20	CO3	Calculate MRR & time	Estimate production	Ch.9, p.355–370
3	Milling, Grinding & Gear Cutting	21	CO3	Study advanced machining	Analyze surface finish	Ch.10, p.371–400
3	Special Purpose machine Tools: Automatic lathes	22	CO6	Introduction of Special purpose machine tools	Understand the concept of automatic lathes.	Ch.10, p.401–410
3	Capstan and turret lathe machines	23	CO6	Differentiate capstan and turret lathe	Understand the difference of Capstan and Turret lathes.	Ch.10, p.411–420
3	Operational planning and turret layout	24	CO6	Concept of turret layout	Understand the Layout of turret.	Ch.10, p.421–430

3	Sequence of operations.	25	CO6	Sequence of operation	Understand the sequence of operation	Ch.12, p.471–480
4	Joining Processes Overview	26	CO4	Introduce joining processes	Classify processes	Ch.11, p.401–420
4	Welding Processes	27	CO4	Explain welding	Apply welding concepts	Ch.11, p.421–450
4	Brazing & Soldering	28	CO4	Compare joining methods	Select joining process	Ch.11, p.451–470
4	Introduction to Grinding and different methods of grinding.	29	CO3	Explain grinding	Understand the basic concept of grinding process	Ch.13, p.511–525
4	Abrasives, natural and synthetic	30	CO3	Study materials	Understand the selection of abrasives in grinding wheel.	Ch.13, p.526–540
4	Manufacturing and selection of grinding wheels	31	CO3	Selection of grinding wheel	Understand the selection of grinding wheel.	Ch.13, p.541–555
4	Wheel specifications. Honing, lapping, super finishing	32	CO3	Explain finishing	Understand the polishing and buffing process.	Ch.14, p.556–575
5	High velocity forming methods	33	CO2	Study advanced forming	Understand the concept of high velocity forming methods.	Ch.15, p.576–590
5	Hydraulic and explosive forming	34	CO2	Explain forming methods	Understand the concept of explosive forming.	Ch.15, p.591–605
5	Electro-hydraulic forming	35	CO2	Study modern forming	Understand the concept of Electro-hydraulic forming.	Ch.15, p.606–620
5	Magnetic pulse forming	36	CO2	Study modern forming	Understand the concept of Magnetic pulse forming.	Ch.15, p.621–635
	Content beyond syllabus	37	CO6	Introduction	Notes	

	Content beyond syllabus	38	CO6	Basics	Notes	
	RTU Previous question papers	39	-	-	papers	
	GATE Previous question papers	40	-	-	Papers	
S No.		Name of Books			Author	
1		A text book of Production Engineering Dr. P. C. Sharma, S. Chand and Company, Ltd, new Delhi.				
2		Manufacturing Technology, R. K Jain.				
3		Technology of Machine Tools, Steve Krar & Albert Check, Mc Graw Hill International Tool related concepts.				
4		Manufacturing technology- Volume 1 & Volume 2, Tata McGraw Hill (India).				