

Lesson Plan

Name of Institute	: Ambala College of Engineering and Applied Research
Name of the Faculty member	: Dr. Ashwani Verma (Assistant Professor)
Discipline	: Mechanical Engineering
Semester	: 5 th
Subject	: Production Technology (MEC-303 A)
Lesson Plan Duration	: 15 weeks (from October 2021 to January 2022)
Work Load	: L-3 T-0 P-2

Week	Theory		Practical	
	Lecture day	Topic (including assignment/test)	Practical day	Topic
1 st	1 st	UNIT-I Theory of metal machining: Overview of machining technology: Types of machining operations, Cutting tools, Cutting conditions.	1 st	To prepare a job on a lathe having various operations viz. drilling, boring, taper turning, thread cutting, knurling, etc.
	2 nd	Theory of chip formation in metal cutting: Orthogonal cutting model, Actual chip formation, Force relationship and the Merchant Equation: Forces in metal cutting.		
	3 rd	The Merchant Equation, Power and energy relationships in machining.		
2 nd	4 th	Cutting temperature, Numerical related to shear angle, shear strain, and shear strength.	2 nd	-do-
	5 th	Machine tools and machining operations: Turning and related operations: Cutting conditions, Operations related to turning, Engine lathe.		
	6 th	Other lathes and Turning machines, Boring machines, Drilling and related operations: Cutting conditions, operations related to drilling, drill presses.		
3 rd	7 th	Milling: types of milling operations, cutting conditions, Milling machines.	3 rd	Demonstration of formation of cutting parameters of single point cutting tool using bench grinder / tool & cutter grinder.
	8 th	High-speed machining, abrasives, grit, grade, structure of wheels.		
	9 th	Selection of grinding wheels, Grinding Machines: types, wet and dry grinding.		
4 th	10 th	UNIT-II Technology and materials of cutting tools: Tool wear, Tool life,	4 th	To make a spur gear of given part drawing involving operations namely drilling, boring, reaming, honing, key slotting, gear teeth machining, lapping and gear teeth finishing.
	11 th	Taylor Tool life equation, Numerical.		
	12 th	Tool materials: High speed steel, cast cobalt alloys, cemented carbides.		
5 th	13 th	Cermets and coated carbides, ceramics, synthetic diamonds, cubic boron nitrides, Tool geometry: single point tool geometry.	5 th	-do-
	14 th	Effect of tool material on tool geometry, multiple cutting edge tools		
	15 th	Cutting fluids: Types of cutting fluids, applications and selection of cutting fluids.		
6 th	16 th	Metrology and Inspection: Limits, fits and tolerances, Interchangeability.	6 th	Introduction to various grinding wheels and demonstration on the cylindrical and surface grinder.
	17 th	Surface finish measurement by contact and non-contact methods. Gauge design.		
	18 th	Linear measurement, Angular Measurement, Form Measurement (Straightness, Squareness, Flatness, Roundness, Cylindericity) by mechanical and optical methods.		
7 th	19 th	Linear measurement, Angular Measurement, Form Measurement (Straightness, Squareness, Flatness, Roundness, Cylindericity) by mechanical and optical methods.	7 th	-do-

	20 th	Linear measurement, Angular Measurement , Form Measurement (Straightness, Squareness, Flatness, Roundness, Cylindricity) by mechanical and optical methods.		
	21 st	Inspection of screw threads, Tolerance analysis in manufacturing and assembly.		
8 th	22 nd	UNIT-III Threads: Standard forms of screw threads,	8 th	To demonstrate surface milling /slot milling.
	23 rd	Methods of making threads, thread chasing, thread cutting on lathe.		
	24 th	Thread Rolling, Thread Tapping.		
9 th	25 th	Thread Milling, Thread Grinding.	9 th	-do-
	26 th	Automatic screw cutting machines.		
	27 th	Inspection and Measurement of Threads.		
10 th	28 th	Work holding devices for Machine Tools: Introduction, Conventional fixture design, Tool Design Steps, Clamping considerations, clamps.	10 th	To cut V Groove/ dovetail / Rectangular groove using a shaper.
	29 th	Chip Disposal, Unloading and Loading Time, Example of Jig Design.		
	30 th	Types of Jigs, Conventional Fixtures.		
11 th	31 st	Modular Fixturing, Setup and Change over: Single-Minute-Exchange - of Die (SMED), Other Workholding Devices: Assembly Jigs.	11 th	-do-
	32 nd	Magnetic Workholders, Electrostatic Workholders.		
	33 rd	Economic Justification of Jigs and Fixtures.		
12 th	34 th	UNIT-IV Gear Manufacturing and Finishing: Introduction to different types of gears, Terminology, Methods of gear manufacturing.	12 th	To cut external threads on a lathe and practice thread measurements.
	35 th	Gear forming: selecting a form cutter for cutting spur gears, selecting a form cutter for cutting helical gears.		
	36 th	Broaching of gears.		
13 th	37 th	Generating methods: Gear Shaper Process.	13 th	-do-
	38 th	Rack Planning Process, Gear Hobbing Process.		
	39 th	Gear Finishing Operations: shaving, burnishing, grinding, lapping, honing, Gear Inspection.		
14 th	40 th	CNC machines: Classification of CNC machines, Modes of operation of CNC.	14 th	Manufacture and assembly of a unit consisting of 2 to 3 components to have the concept of tolerances and fits (shaft and bush assembly or shaft, key and bush assembly or any suitable assembly).
	41 st	CNC axis and motion nomenclature, Axis Identification in CNC turning and Machining Centers.		
	42 nd	CNC Toolings: tool pre-setting, qualified tool, tool holders and inserts.		
15 th	43 rd	Automatic Tool Changer (ATC), Working of Machine Structure.	15 th	-do-
	44 th	CNC Part Programming: Programming format and structure of part programme.		
	45 th	ISO G and M codes for turning and milling: meaning and applications of important codes.		

(Signature of the teacher concerned with date)