ATME College of Engineering

ISO 9001:2015

Department of Mechanical Engineering

Lesson Plan & Work-Done Diary for AY:2024-25, Even Semester

Course with Code: Machining Science & Metrology [BME402]				Faculty: Prof. Devaraj M R			Semester & Section: 4th Sem	
Class No.	**Date Planned (DD/MM)**	**Topics to be covered**	**TLP Planned**	**Class No.**	**Date of Conduction (DD/MM)**	**Topics Covered**	**TLP Executed**	**Remarks if any deviation**
MODULE-1:								
1		**Introduction to Metal cutting:** Orthogonal and oblique cutting.	Chalk & Talk PPT					
2		Classification of cutting tools: single, and multipoint; tool signature for single point cutting tool.	Chalk & Talk PPT					
3		Mechanics of orthogonal cutting; chip formation, shear angle and its significance,	Chalk & Talk PPT					
4		Merchant circle diagram. Numerical problems.	Chalk & Talk PPT					
5		Merchant circle diagram. Numerical problems.	Chalk & Talk PPT					
6		Cutting tool materials and applications.	Chalk & Talk PPT					

7		**Introduction to basic metal cutting machine tools: Lathe-** Parts of lathe machine, accessories of lathe Machine and	Chalk & Talk PPT					
8		various operations carried out on lathe. Kinematics of lathe.	Chalk & Talk PPT					
9		Turret and Capstan lathe.	Chalk & Talk PPT					
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MODULE-2:								
10		**Milling Machines**: up milling & down milling, classification of milling machines,	Chalk & Talk PPT & Video					
11		constructional features (Column and Knee and vertical milling machine), milling cutter nomenclature,	Chalk & Talk PPT & Video					
12		various milling. operations, calculation of machining time.	Chalk & Talk PPT & Video					
L1		Preparation of one model on lathe involving - Plain turning, Facing, Knurling, Drilling, Boring, Internal Thread cuts and Eccentric turning.	Lab Visit	1				
L2		Preparation of One model on lathe involving - Plain turning, Facing, Taper turning, Step turning, Thread cutting, Facing, Knurling, Drilling, Boring, Internal Thread cutting and Eccentric turning.	Lab Visit	2				

13		**Indexing:** Need of indexing Simple, compound and differential indexing	Chalk & Talk PPT					
14		calculations. Simple numerical on indexing.	Chalk & Talk PPT					
15		**Shaping, Slotting and Planning Machines Tools:** Driving mechanisms of Shaper, Slotter, and Planer.	Chalk & Talk PPT					
16		Operations done on Shaper, Planer & Slotter Difference between shaping and planning operations.	Chalk & Talk PPT					
17		**Drilling Machines:** Constructional features (Radial & Bench drilling Machines), operations,	Chalk & Talk PPT					
18		types of drill & drill bit nomenclature. Calculation of machining time.	Chalk & Talk PPT					
19		**Grinding:** Grinding operation, classification of grinding processes: cylindrical, surface & centreless grinding	Chalk & Talk PPT					
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MODULE-3:								
20		**Thermal aspects, Tool wear, and Machinability** **Temperature in Metal Cutting:** Heat generation in metal cutting; temperature distribution in metal cutting,	Chalk & Talk PPT					

21		**Temperature in Metal Cutting:** Heat generation in metal cutting; temperature distribution in metal cutting,	PPT & Video					
22		effect of cutting speed on temperatures, measurement of cutting temperatures.	Chalk & Talk PPT					
23		Tool life and tool Wear: progressive tool wear.	Chalk & Talk PPT					
24		**forms of wear in metal cutting:** crater wear, flank wear, tool-life criteria,	Chalk & Talk PPT					
25		cutting tool materials: basic requirements of tool materials,	Chalk & Talk PPT					
26		major classes of tool materials: high-speed steel, cemented carbide, ceramics,	Chalk & Talk PPT					
27		CBN and diamond, tool coatings; the work material and its machinability	Chalk & Talk PPT					
28		**Cutting fluids:** Action of coolants and application of cutting fluids.	Chalk & Talk PPT					
L3		One Job, Cutting of V Groove/ dovetail / Rectangular groove using a shaper.	Lab Visit	3				
L4		Cutting of Gear Teeth using Milling Machine.	Lab Visit	4				

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MODULE-4:								
29		**Introduction:** Introduction to metrology & measurements, definition, objectives and classification of metrology,	Chalk & Talk PPT					
30		standards of length- wavelength standard, subdivision of standards,	Chalk & Talk PPT					
31		numerical problems on length calibration.	Chalk & Talk PPT					
32		**Line & End Standards**: Line and end standard, slip gauges,	Chalk & Talk PPT					
33		wringing phenomena, numerical. problems on slip gauges.	PPT & Video					
34		**Systems of Limits, Fits & Tolerance**: Definition of tolerance, tolerance specification in assembly,	Chalk & Talk PPT					
35		principle of interchangeability and selective assembly, limits of size, Indian standards,	Chalk & Talk PPT					
36		concepts of limits of size and tolerances, cost v/s tolerances, compound tolerances, accumulation of tolerances,	Chalk & Talk PPT					
37		definition of fits, types of fits and their designation.	Chalk & Talk PPT					
L5		Simple operations and One Job on the drilling and grinding machine.	Lab Visit	5				

L6		**Demo**: Cutting force measurement with dynamometers **(Demonstration)** for turning, drilling, grinding operations.	Lab Visit	6				
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MODULE-5:								
38		**Gauges:** Classification of gauges, Taylor's principle,	Chalk & Talk PPT					
39		design of GO, NO GO gauges, wear allowance on gauges,	Chalk & Talk PPT					
40		types of gauges- plain plug gauges, ring gauges, snap gauge, limit gauge,	Chalk & Talk PPT					
41		simple problems.	PPT & Video					
42		**Comparators:** Introduction to comparators, classification, characteristics,	Chalk & Talk PPT					
43		systems of displacement amplification in mechanical comparators,	Chalk & Talk PPT					
44		Reed type, Sigma comparator, Zeiss ultra-optimeter,	Chalk & Talk PPT					
45		Solex air gauge, ultrasonic gauges, LVDT.	Chalk & Talk PPT					
46		**Angular Measurements**: Bevel protractor, sine bar,	Chalk & Talk PPT					

47		angular gauges, numerical on building of angles.	Chalk & Talk PPT					
L7		**Demo**: Analysis of chip formation and chip reduction coefficient in turning of mild steel by HSS tool with different depth of cut, speed, and feed rate.	Lab Visit	7				
L8		Study & **Demonstration** of power tools like power drill, power hacksaw, portable hand grinding, cordless screw drivers, production air tools, wood cutter, etc., used in Mechanical Engineering.	Demo with PPT/ Chalk & Talk	8				
L9 and L10		**Demonstration**/Experimentation of simple programming of CNC machine operations. **Demonstration** on Tool wear and tool life	Demo with PPT/ Chalk & Talk	9				

	Activity	Planned	Actual	Remarks
1	Theory Classes	47		
2	Demonstrations & Lab Visit/ Experiment conduction	09		
3	Assignments/ Quizzes/ reports	2+3		
4	Tutorials/ Extra classes	-		
5	Internal Assessments	3		
6	ICT based Teaching. (% of usage in Curriculum)	80 to 85%		
Planning			**Execution**	
Faculty Signature:			**Faculty Signature:**	
HoD Signature:			**HoD Signature:**	