SWARNANDHRA COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)
Narsapur, West Godavari District, A.P. 534280
DEPARTMENT OF MECHANICAL ENGINEERING

TEACHING PLAN

Course Code	Course Title	Semester	Branches	Contact Periods /Week	Academic Year	Date of commencement of Semester
20ME5T02	MACHINE TOOLS AND METROLOGY	V	Mechanical Engineering	6	2024-25	05-06-2024

COURSE OUTCOMES

1	Describe the metal cutting theory and analyze importance of process parameters for machining.[K2]
2	Illustrate the working principles of different types of lathe and various operations performed.[K2]
3	Summarize working principle of shaping, slotting, planning, grinding machines and various operations performed.[K2]
4	Show the basic concepts of metrology and measurements. [K3]
5	Generalize the principles of linear and angular measurement various methods. [K2]

UNIT	Out Comes / Bloom's Level	Topics No.	Topics/Activity	Text Book / Reference	Contact Hour	Delivery Method
I	Describe the metal cutting theory and analyze importance of process parameters for machining. (K2)	1.1	Elementary treatment of metal cutting theory	T1, T2, R1	1	Chalk & Talk, PPT, NPTEL video
		1.2	Element of cutting process	T1, T2, R1	1	
		1.3	Geometry of single point cutting tool	T1, T2, R1	1	
		1.4	Chip formation and types of chips and	T1, T2, R1	1	
		1.5	Built up edge and its effects, chip breakers	T1, T2, R1	1	
		1.6	Mechanics of orthogonal cutting	T1, T2, R1	1	
		1.7	Merchant's force diagram, cutting forces	T1, T2, R1	1	
		1.8	Merchant's force diagram, cutting forces	T1, T2, R1	1	
		1.9	Cutting speeds, feed, depth of cut	T1, T2, R1	1	
		1.10	Tool life, Taylor's tool life equation,	T1, T2, R1	1	
		1.11	Coolants, Tool materials	T1, T2, R1	1	
		1.12	Tool materials	T1, T2, R1	1	
				Total	13	

II	Explain the working principles of different types of lathe and various operations performed.[K2]	**LATHE MACHINES**				
		2.1	Engine lathe - principle of working, lathe components	T1, T2, R2	1	Chalk & Talk, PPT, Working animation video
		2.2	lathe operations, specification of lathe	T1, T2, R2	1	
		2.3	lathe operations, specification of lathe	T1, T2, R2	1	
		2.4	Types of lathe	T1, T2, R2	1	
		2.5	Types of lathe	T1, T2, R2	1	
		2.6	Work holding devices	T1, T2, R2	1	
		2.7	Work holding devices	T1, T2, R2	1	
		2.8	Tool holding devices	T1, T2, R2	1	
		2.9	Turret and capstan lathes	T1, T2, R2	1	
		2.10	Turret and capstan lathes	T1, T2, R2	1	
		2.11	Principal features of automatic lathes	T1, T2, R2	1	
		2.12	Single spindle and multi-spindle automatic lathes	T1, T2, R2	1	
				Total	13	
III	Explain working principle of shaping, slotting, planning, grinding machines and various operations performed.[K2]	**SHAPING, SLOTTING AND PLANNING MACHINES**				
		3.1	Principles of working-Shaping	T1, T2, R1	1	Chalk & Talk, PPT, Web resources
		3.2	Principles of working-Slotting	T1, T2, R1	1	
		3.3	Principles of working-Planning	T1, T2, R1	1	
		3.4	Principal parts, specification,	T1, T2, R1	1	
		3.5	Operations performed	T1, T2, R1	1	
		3.6	Whitworth quick return mechanism	T1, T2, R1	1	
		3.7	Crank and slotted link mechanism	T1, T2, R1	1	
		3.8	Machining time calculations	T1, T2, R1	1	
		GRINDING MACHINES				
		3.9	Classification of grinding machines	T1, T2, R1	1	Chalk & Talk, PPT
		3.10	Cylindrical grinding machines	T1, T2, R1	1	
		3.11	Surface grinding machines	T1, T2, R1	1	
		3.12	Tool and cutter grinding machines	T1, T2, R1	1	
				Total	13	

IV	Explain the basic concepts of metrology and measurements. [K3]	BASICS OF METROLOGY AND MEASUREMENT				
		4.1	Need, process, role in quality control	T1, T2, R1	1	Chalk & Talk, PPT, NPTEL video course
		4.2	Factors affecting measurement	T1, T2, R1	1	
		4.3	Measurement uncertainty	T1, T2, R1	1	
		4.4	Statistical analysis of measurement	T1, T2, R1	1	
		4.5	Measurement system analysis	T1, T2, R1	1	
		4.6	Calibration of measuring instruments	T1, T2, R1	1	
		4.7	ISO standards	T1, T2, R1	1	
		4.8	Introduction to Systems of limits and fits nominal size	T1, T2, R1	1	
		4.9	Tolerance, types	T1, T2, R1	1	
		4.10	Limits, deviations, allowance	T1, T2, R1	1	
		4.11	Fits and their types	T1, T2, R1	1	
		4.12	Problems – limits, fits	T1, T2, R1	1	
				Total	13	
V	Explain the principles of linear and angular measurement various methods. [K2]	LINEAR AND ANGULAR MEASUREMENTS				
		5.1	Vernier caliper	T1, T2, R2	1	Chalk & Talk, PPT, Students Seminar
		5.2	Micrometer	T1, T2, R2	1	
		5.3	Telescopic gauge	T1, T2, R2	1	
		5.4	Height gauge, Depth gauge	T1, T2, R2	1	
		5.5	Gauge blocks use and precautions	T1, T2, R2	1	
		5.6	Bevel protractor	T1, T2, R2	1	
		5.7	Clinometer, angle gauges	T1, T2, R2	1	
		5.8	Angle dekkor	T1, T2, R2	1	
		5.9	Sine bar	T1, T2, R2	1	
		5.10	Angle alignment telescope	T1, T2, R2	1	PPT, Video
		5.11	Autocollimator	T1, T2, R2	1	
		5.12	Autocollimator	T1, T2, R2	1	
Content beyond syllabus						Chalk & Talk, PPT, Students Seminar
			Tool Dynamometers	T1, T2, R1	1	
			Estimating machining time, cutting tool materials	T1, T2, R2	1	
			Cutting force and torque	T1, T2, R1	1	
			Errors in measurement	T1, T2, R1	1	
			Comparators - Mechanical	T1, T2, R2	1	
				Total	13	
CUMULATIVE PROPOSED PERIODS					**Total**	**65**

Text Books:

S.No.	
T1	R.K. Jain, Production Technology, 1st edition, Khanna Publishers, 2012.
T2	P.N.Rao, Manufacturing Technology: Metal Cutting and Machine Tools, 4th edition, McGraw-Hill Education, 2018.
T3	R.K. Jain, Engineering Metrology, 21st edition, Khanna Publishers, 2018.
Reference Books:	
S.No.	
R1	Bhattacharya A and Sen, Principles of Machine Tools,1st Edition, New Central Book Agency, 2009
R2	Beckwith G and Thomas G, Mechanical Measurements, 6th Edition, Pearson Education, 2013
Web Details	
1	https://nptel.ac.in/courses/112105233
2	https://nptel.ac.in/courses/112106179

		Name	Signature with Date
i.	Faculty	L.RAVI KISHORE	L.Ravi 1/6
ii.	Faculty II (for common Course)	ADBUL. AZEZ	
iii.	Course Coordinator	L.RAVI KISHORE	L. Ravi 1/6
iv.	Module Coordinator	Dr.R.SANJEEV KUMAR	
v.	Programme Coordinator	Dr. A. GOPI CHAND	

Principal