COURSE CONTENT

MACHINING PROCESSES AND METROLOGY LABORATORY								
IV Semester: ME								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
AMED18	Core	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		0	0	2	1	40	60	100
Contact Classes: Nil	**Tutorial Classes: Nil**	**Practical Classes: 45**				**Total Classes:45**		
Prerequisite: Manufacturing Processes								

I. COURSE OVERVIEW:

This course introduces the principles of manufacturing, emphasizing the metal cutting mechanism for shaping various geometrical forms using a diverse range of cutting tools. The curriculum highlights the growing demand for innovative materials and the application of cutting-edge technology tools in the manufacturing process. Students will acquire practical knowledge in a variety of machining processes, including turning, shaping, planning, drilling, milling, and grinding, aimed at producing products with specific shapes. Additionally, the course covers the use of metrological equipment to measure the form and positional accuracy of machined components and instructs students on interpreting the obtained results.

II. COURSES OBJECTIVES:

The students will try to learn

I. The empirical knowledge on machine tools so that they can identify, manipulate and control various process parameters during machining processes in the manufacturing industry.
II. The mechanics of machining process and significance of various process parameters in order to yield the optimum machining.
III. The principles of linear and angular measuring instruments for accurate measurement of a given component.

III. COURSE OUTCOMES:

At the end of the course students should be able to:

CO1 Apply the appropriate cutting parameters for prismatic operations and their critical tool development/selection of Lathe, Milling, drilling, slotting shaping and surface grinding machines for manufacturing the components of their requirement
CO2 Apply surface grinding operations to improve the quality of the surface with desired dimensions by removing uneven spots on the surface
CO3 Analyze the chip formation mechanism by measuring the cutting forces during the chip formation process
CO4 Estimate machining times for machining operations at specified levels of cutting parameters of machine tools
CO5 Apply the principles of limits, fits and tolerance while designing and manufacturing the components of their requirement to get form and position
CO6 Apply equipment’s like Surface Roughness tester, and Tool makers Microscope to find out parameters of gear, thread, tool and surface roughness

IV. COURSE CONTENT:

WEEK 1: LATHE MACHINE

Perform step turning, taper turning, thread cutting and knurling operations using lathe machine

WEEK 2: DRILLING AND TAPPING OPERATION
Perform the drilling, reaming, tapping, counter bore and counter sink using drilling machine

WEEK 3: SHAPING
Perform surface planning, straight V- groove and incline groove using shaping machine.

WEEK 4: SLOTTING
Perform the internal key-ways in the specimen using slotting machine.

WEEK 5: MILLING
Perform the surface plaining operation on the specimen using vertical milling machine.

WEEK 6: SURFACE GRINDING
Perform the surface grinding on the rectangular specimen to acquire micron finish.

WEEK 7: CYLINDRICAL GRINDING
Perform the Cylindrical grinding on the given shaft to acquire micron finish.

WEEK 8: VERNIER CALIPERS
Measure the Length, depth, diameter of given specimen using vernier calipers.

WEEK 9: MICROMETER
Measure the Length, depth, diameter of given specimen using micrometer.

WEEK 10: BORE GAUGE
Measure the bore diameter of engine block using bore gauge**.**

WEEK 11: ANGLE MEASUREMENT - I
Measure different angles using bevel protractor

WEEK 12: ANGLE MEASUREMENT - II
Determine the Morse taper angle through the utilization of a sine bar setup.

WEEK 13: TOOL MAKERS MICROSCOPE
Determine the tool signature using tool makers microscope

WEEK 14: SURFACE ROUGHNESS MEASUREMENT
Measure the Surface roughness of a specimen using talysurf to determine the roughness value

V. TEXT BOOKS:

1. Dr. R. Kesavan, "Machine Tools" Laxmi publications, 4th edition, 2021.
2. N. K Mehta, "Metal Cutting and Design of Cutting Tools, Jigs and Fixtures", McGrawHill Education, 5th edition, 2020.
3. R. K. Jain, Engineering Metrology, Khanna Publishers, 1st Edition, 2013.4. R. K. Jain, Engineering Metrology, Khanna Publishers, 6th edition, 2022.

VI. REFERENCE BOOKS:

1. Geofrey, "Fundamentals of metal machining and machine tools", Tata McGraw Hill Education, 4th edition, 2019.
2. M Mahajan "A Textbook of Metrology ", Dhanpatrai 5th edition, 2019.

VII. ELECTRONIC RESOURCES:

1. https://nptel.ac.in/courses/112106286.
2. https://akanksha.iare.ac.in/index?route=course/details&course_id=33.
3. https://akanksha.iare.ac.in/index?route=course/details&course_id=31.
4. https://akanksha.iare.ac.in/index?route=course/details&course_id=1293.

VIII. MATERIALS ONLINE:

1. Course Template
2. Lab manual