

III B.Tech I Semester

15AME25 - MACHINE TOOLS

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Course Objective:

- The objectives of this course are to introduce to demonstrate the fundamentals of machining processes and machine tools.
- To develop knowledge and importance of metal cutting parameters, tool materials, cutting fluids and tool wear mechanisms.
- To apply knowledge of basic mathematics to calculate the machining parameters for different machining processes and acquire knowledge on advanced manufacturing processes.

UNIT I

Elementary treatment of metal cutting theory - Elements of cutting process - Geometry of single point tool and angles, chip formation and types of chips - built up edge and its effects, chip breakers. Mechanics of orthogonal cutting -Merchant's Force diagram, cutting forces - cutting speeds, feed, depth of cut, heat generation, tool life, machinability. cutting Tool materials and cutting fluids -types and characteristics .

Learning outcome & suggested Student Activities:

After completion of this unit students are able to understand the basic concepts of the philosophy of metal cutting and the mechanism of chip formation. Student will understand the interface in the machining zone between the tool and the work piece and how the physical and mechanical parameters dictate the cutting performance.

UNIT II

Engine lathe - Principle of working- specification of lathe - types of lathes - work holders and tool holders -Taper turning, thread turning and attachments for Lathes. Turret and capstan lathes - collet chucks - other work holders - tool holding devices - box. Principal features of automatic lathes - classification - Single spindle and multi-spindle automatic lathes.

Learning outcome & Suggested Student Activities:

After completion of this unit students are able to understand the basic concepts of turning. Student shall be made familiar with various tooling accessories used in turning and understand different constructions of lathe depending on the nature of operation.

UNIT III

Drilling and Boring Machines - Principles of working, specifications, types, operations performed - tool holding devices - twist drill - Boring tools - machining time calculation. Shaping, Slotting and Planning machines -Principles of working - Principal parts - specification, classification, Operations performed. Machining time calculations

Learning outcome & suggested Student Activities:

After completion of this unit students are able to understand the basic principle of drilling, boring, shaping and planning operation, parts of the drilling, boring, shaping and planning machines and tool holding devices, operations performed on drilling, shaping and planning and machining time calculations.

UNIT IV

Milling Machine - Principles of working - specifications - classifications of milling machines - Principal features - machining operations, Types and geometry of milling cutters- methods of

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indexing - Accessories to milling machines.

Grinding Machine -Theory of grinding - classification- cylindrical and surface grinding machine - Tool and cutter grinding machine - special types of grinding machines - Grinding wheel: Different types of abrasives - bonds, specification and selection of a grinding wheel. Static and dynamic balancing of a wheel Truing and Dressing of wheels.Lapping, Honing and Broaching machines.

Learning outcome & Suggested Student Activities:

After completion of this unit students are able to understand the principle of milling, grinding, Lapping, Honing and Broaching operation, parts of the milling machine and types of milling and grinding machines.

UNIT V

Principles of design of Jigs and fixtures and uses, 3-2-1 Classification of Jigs & Fixtures - Principles of location and clamping - Types of clamping & work holding devices, Typical examples of jigs and Fixtures.

Learning outcome & Suggested Student Activities:

After completion of this unit students are able to understand the design of Jigs and fixtures and uses, Classification of Jigs & Fixtures - Principles of location and clamping. Some examples of jigs and fixtures.

TEXT BOOKS:

1. Manufacturing Technology: Metal Cutting and Machine Tools, 3e (Volume 2), P.N.Rao, Tata McGraw-Hill Education.
2. Production Technology by R.K. Jain and S.C. Gupta, Khanna Publishers, 17th edition, 2012.

REFERENCE BOOKS:

1. Manufacturing Technology-Kalpakzian- Pearson.
2. Metal cutting Principles by Milton C.Shaw, oxford Second Edn, 2nd editstion, 2012
3. Production Technology by H.M.T. (Hindustan Machine Tools),TMH, 1 edition, 2001
4. Production Technology by K.L.Narayana, IK International Pub.
5. Unconventional Machining process by V.K.Jain, Allied Pub
6. Machining and machine tools by AB. Chattopadyay, WileyEdn,2013
7. Machine Technology Machine tools and operations by Halmi A Yousuf&Harson, CRC Taylor and Francies

SUGGESTED LINKS:

www.hgfarley.com
www.kennametal.com/ - United States
www.mini-lathe.com/links.htm; machinedesign.com/.../designer-s-guide-to-metalcutting-machinery-0608 - www.metalwebnews.com/wc.html
www.britannica.com/EBchecked/topic/463000/planer www.americanmachinist.com
www.machinetools.net.tw/parts/taiwan_voltage_regulator.htm

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