19ME211 MACHINING TECHNOLOGY

Source: *https://www.google.com/search?q=machining+technology&source=lnms&tbm=isch&sa*

Hours Per Week :

L	T	P	C
3	-	2	4

Total Hours :

L	T	P
45	-	30

WA/RA	SSH/HSH	CS	SA	S	BS
20	15	-	5	-	3

PRE-REQUISITE COURSE: Workshop

COURSE DESCRIPTION AND OBJECTIVES:

This course deals with concepts of conventional and unconventional machining process, constructional features of machine tools. The objective of this course is to acquire knowledge on importance of metal cutting/process parameters, tool materials, cutting fluids and tool wear mechanisms and to get hands-on experience to work in a typical machine shop.

COURSE OUTCOMES:

Upon completion of the course the student will be able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Study basic elements and philosophy of metal cutting and the mechanism of metal removal.	1,5
2	Analyze the effect of cutting speed, feed, depth of cut on tool life, cutting forces and machinability.	1,5
3	Understand importance of principal parts in machine tools and drive mechanisms.	1
4	Evaluate the effect of process parameters on metal removal rate in conventional and unconventional.	1,5
5	Select suitable tool materials, work and tool locating devices.	1,5

SKILLS:

- ✓ *Identify required operations and prepare sequence of operations to produce a product.*
- ✓ *Operate different machine tools to perform various machining operations.*
- ✓ *Design and use work and cutting tool holding devices.*
- ✓ *Estimate cutting forces and tool life.*
- ✓ *Study effect of process parameters on machining characteristics.*

UNIT- I **L-9**

INTRODUCTION: Principles and elements of machining, Machine Tools classification, Types of cutting tools and their geometry, Merchant's force diagram, Velocity relationship, Machinability, cutting speed, feed, depth of cut, tool life and surface finish; Wear tool materials, Cutting tool materials, Holding tools - Jigs and fixtures, principles, applications and design.

UNIT - II **L-9**

CONVENTIONAL MACHINING OPERATIONS: Lathe Classification, Lathe parts and specifications, Lathe operations - Turning, Facing, Taper turning, Drilling, Boring, Knurling and Thread cutting; work holding devices - Three jaw chuck, Four jaw chuck, and other work holding devices; Capstan and Turret lathe - constructional features, comparison of Capstan, Turret and conventional lathe; Shaper, Planer and Slotting machines - specifications, quick return mechanism.

UNIT- III **L-9**

DRILLING MACHINE: Classification and specifications, Drill bits, Twist drill, Nomenclature, Tool holding devices, Drilling operations.

MILLING MACHINE: Classification of Milling machines, Parts and specifications, Types of milling cutters, Milling Operations, Indexing, Plain and universal dividing heads.

FINISHING PROCESSES: Grinding, Lapping, Honing and super finishing operations.

UNIT - IV **L-9**

UNCONVENTIONAL MACHINING PROCESSES: Abrasive Jet Machining, Abrasive Water Jet Machining, Ultrasonic Machining, Electrical Discharge Machining, Wire EDM, Constructional feature of machines, Effect of process parameters on metal removal rate in AJM, USM, EDM, WEDM

UNIT - V **L-9**

UNCONVENTIONAL MACHINING PROCESSES: Electro-chemical machining (ECM), Laser Beam Machining (LBM), Plasma Arc Machining (PAM) and Electron Beam Machining (EBM), Constructional features and effect of process parameters on metal removal rate in ECM, LBM, PAM, EBM; Micro machining.

LABORATORY EXPERIMENTS

LIST OF EXPERIMENTS **TOTAL HOURS: 30**

1. To estimate taper angle and perform step and taper turning.
2. To perform thread cutting and knurling.
3. To calculate indexing and execute gear turning.
4. To Simulate and estimate cutting forces in step turning using Advantedge software.
5. To simulate and estimate thrust force in drilling process using Advantedge software.
6. To Simulate and estimate cutting forces in milling using Advantedge software.
7. To perform step cutting on planer machine.
8. To perform slot cutting on internal surface using slotting machine.
9. To perform surface grinding on surface grinding machine.
10. To evaluate effect of process parameters on MRR in EDM.
11. To estimate electrode wear in EDM.

TEXT BOOKS:

1. B.S.RaghuVamshi, "Workshop Technology", Vol II, 10th edition, Dhanpat Rai & Co, 2013.
2. R.K. Jain and S.C. Gupta, "Production Technology", 17th edition, Khanna Publishers, 2012.

REFERENCE BOOKS :

1. Milton C.Shaw, "Metal cutting Principles", 2nd edition, Oxford University Press, 2015.
2. S Kalpak Jain and Steven Schmid, "Manufacturing Engineering and Technology", Pearson, 2014.
3. AB. Chattopadyay, "Machining and machine tools", John Wiley & Sons, 2013.