ADVANCED MANUFACTURING TECHNOLOGY

II Semester

Course Code: 19ME2106

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Course Outcomes: At the end of the course, the student will be able to
CO1: Identify the mechanism of metal removal.
CO2: Explain the applications of special machining and high speed machining processes.
CO3: Identify features and applications of non-traditional machining.
CO4: Explain various micro machining processes.
CO5: Discuss material addition process and its importance.

UNIT-I **(10-Lectures)**

Fundamentals of machining: Introduction - mechanics of cutting - cutting forces and power - temperatures in cutting, tool life, wear and failure, surface finish, integrity and machinability.

Learning outcomes:
1. Define the mechanics of cutting. (L1)
2. Determine the tool life calculations. (L3)
3. Measure the cutting forces and power requirements. (L5)

UNIT-II **(10-Lectures)**

Special machining: Deep hole drilling – gun drills – gun boring – trepanning – honing – lapping – super finishing – AFM – MAF – burnishing – broaching.

High speed machining, application of HSM – tools for HSM - design of tools for HSM – high speed and high performance grinding – ultra precision machining.

Learning outcomes:
1. Describe the special machining and superfinishing processes. (L1)
2. Select between high speed machining and ultra-precision machining. (L4)
3. Contrast between high speed machining and special machining. (L2)

UNIT-III **(10-Lectures)**

Non-traditional machining: Introduction – USM, WJM, AJM, LBM, EBM, plasma machining, hybrid machining processes, electro-discharge machining (EDM) and electro-chemical machining (ECM) – mechanism of metal removal, characteristic features and applications.

Learning outcomes:
1. Describe the concepts of non-traditional machining processes. (L3)
2. Identify the mechanisms for metal removal in non-traditional machining process. (L1)
3. Summarize the characteristic features and applications. (L2)

UNIT-IV **(10-Lectures)**

Micro machining: various micro machining processes, application of micro machining in semiconductor IC technology, micro actuator and micro sensors-CVD, PVD and Ion implantation.

Learning outcomes:

1. Choose from various micro machining processes. (L5)
2. Illustrate surface modification methods. (L3)
3. Associate appropriate micro actuator and sensor to micromachining. (L2)

UNIT-V **(10-Lectures)**

Rapid prototyping processes: Fused deposition modelling, Stereo- lithography, Multi jet modelling, Selective laser sintering, Three- dimensional printing, Laminated object modelling, Solid ground curing, Laser engineered net shaping, virtual prototyping, rapid tooling.

Learning outcomes:

1. Demonstrate the basic skills of rapid prototyping processes. (L3)
2. Apply appropriate rapid prototyping method. (L3)
3. Determine solid, liquid and powder based rapid prototyping techniques. (L3)

TEXT BOOK:

1. S.Kalpakjian and S.R.Schmid, *Manufacturing Engineering and Technology*, 4th Edition, Pearson Education, 2013.

REFERENCE BOOKS:

1. Boothroyd G. and Knight W.A., *Fundamentals of Metal Machining and Machine Tools*, 1st Edition, Marcel Dekker, 1989.
2. P.C.Pandey and Shaw, *Modern Machining Process*, TMH, 1980.
3. Gunashekaran A, *Agile Manufacturing*, Elsevier, 2001.