MSE-314 – Manufacturing Processes (3 CH)

Pre-requisites: ME-120 (Workshop Practice)

Course Objectives

1. The course is designed to introduce the basic concepts of manufacturing processes for engineering applications, to undergraduate students of materials engineering. The specific course objectives are:

- To learn about metal casting processes and equipment
- To study the forming and shaping processes e.g. rolling, forging, extrusion and drawing, sheet-metal forming etc.
- To introduce powder metallurgy and its use in manufacturing
- To understand material removal processes and machines

Course Contents

2. General introduction to manufacturing, Design process and Concurrent Engineering., Forming and shaping processes and equipment, Rolling of metals, Forging, Extrusion and drawing of metals, Sheet metal forming.Metal injection molding, ceramic injection molding.

Powder metallurgy

3. Fundamental theory and principles, Production of metallic powders, compaction of metal powder, cold compaction, hot compaction, Powder characterization techniques, Lubricants and binders, Shaping processes, Sintering, Characterization of sintered components, manufacturing of sintered carbides.

Machining processes

4. Fundamentals of Cutting, Material removal processes and machines, Machining, Advanced machining processes, Computer integrated manufacturing technology.

5. **Course Outcome:**

a. The student should be able to understand the process of rolling, forging, extrusion and drawing on metallic alloy components and their effect on microstructure and mechanical properties.
b. The student should be able to understand fundamental theory and principles of powder metallurgical processing including compaction, calcination and sintering.
c. The student should be able to understand fundamental and advanced machining processes.

Suggested Books:

1. Randall M. German, Powder Metallurgy, 2nd Edition, Metal Powder Industries Federation, (1994)
2. SeropeKalpakjian, Steven R. Schmid, Manufacturing Engineering and Technology, 6th Edition, Prentice Hall, (2010)
3. Mikell P. Groover, Fundamentals of Modern Manufacturing, 4th Edition, Wiley, (2010)