

Course Code	Course Name	Credits
MEDLO6023	Metal Forming Technology	03

Objectives:

1. To conversant with the basic knowledge on fundamentals of metal forming processes
2. To study various metal forming processes
3. Understanding plastic deformation and technical analysis of forming processes

Outcomes: Learner will be able to...

1. Understand the concept of different metal forming process.
2. Approach metal forming processes both analytically and numerically
3. Design metal forming processes
4. Develop approaches and solutions to analyze metal forming processes and the associated problems and flaws.

Module	Details	Hrs
1.	Introduction to Metal Forming: Metallurgical aspects of metal forming, slip, twinning mechanics of plastic deformation, effects of temperature, strain rate, microstructure and friction in metal forming-yield criteria and their significance, Classification of Metal Forming Processes, Advantages and Limitations, Stress strain relations in elastic and plastic deformation, concept of flow stresses, deformation mechanisms, Hot and Cold Working Processes and Its Effect on Mechanical Properties.	08
2.	Rolling: Introduction and Classification, Types of Rolling Mills, Forces and Geometrical Relationships in Rolling, Calculation of Rolling Load, Roll Pass Design, and Defects in Rolled Products.	07
3.	Forging: Introduction and Classification, operation and principle of Forging Processes and Equipment, Methods of forging, Open and Close Die Forging Processes, Defects, Structure and Properties of Forged Products. Force Analysis in forging.	07
4.	Extrusion: Introduction and Classification, Extrusion Equipment, Forces in extrusion, Analysis of Extrusion Process, Extrusion of components including Seamless Pipes and Tubes. Extrusion of pipes by cold working,	06
5.	Drawing: Introduction and Classification, Wire Drawing, Rod Drawing, Tube Drawing, Deep Drawing, Analysis of Wire Drawing Process and Load Calculations.	06
6.	Sheet Metal Forming: Principle, process parameters, equipment and application of the following processes: spinning, stretch forming, plate, V and edge bending, Curling, Ironing, Roll Bending, Metal Spinning. Press brake forming, explosive forming, Hydro forming, electro hydraulic forming, and magnetic pulse forming. High Velocity forming of metals and High energy Rate forming	06

Assessment:**Internal Assessment for 20 marks:****Consisting Two Compulsory Class Tests**

First test based on approximately 40% of contents and second test based on remaining contents (approximately 40% but excluding contents covered in Test I)

End Semester Examination:

Weightage of each module in end semester examination will be proportional to number of respective lecture hours mentioned in the curriculum.

1. Question paper will comprise of total six questions, each carrying 20 marks
2. Question 1 will be compulsory and should cover maximum contents of the curriculum
3. Remaining questions will be mixed in nature (for example if Q.2 has part (a) from module 3 then part (b) will be from any module other than module 3)
4. Only Four questions need to be solved.

Text/Reference Books: -

1. Lin D Balint M Pietrzyk, Microstructure Evolution in Metal Forming Processes 1st Edition
2. Amitabha Ghosh and Asok Kumar Mallick, Manufacturing Science, Affiliated East-West Press
3. Christian Brecher and Ozdemir , Advances in Production Technology, Springer Publications
4. P.C.Sharma , A Text Book on Production Engineering, S.Chand Publications
5. P. N. Rao, “Manufacturing Technology”, Tata McGraw Hill
6. Aviter, “Fundamental of Metal Working”, McGraw Hill Publisher
7. Dieter, “Mechanical Metallurgy”

Links for online NPTEL/SWAYAM courses:

<https://nptel.ac.in/courses/112/107/112107250/> - Principles of Metal Forming Technology, IIT Roorkee

<https://nptel.ac.in/courses/112/106/112106153/> - Forming, IIT Madras