Course Type	Course Code	Name of Course	L	T	P	Credit
DE	NFMD506	Metal Forming Technology	3	0	0	3

Prerequisites: Students with B Tech in Metallurgy/Materials/Mechanical/Production/Mineral/Mining

Course Objective
The main objective of the course is to understand various forming processes used in industries for metallic materials and their effect on microstructure and mechanical properties
Learning Outcomes
Upon completion of this course, students will be able to • Find the force, energy requirement, etc. for a forming industry • Microstructural changes during metal forming • Solve numerical problems related to metal forming

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1	Deforming system analysis. flow curves and their significance related to upsetting, forging, rolling, extrusion, deep drawing, determination of flow curves, constitutive equations, the role of friction and temperature in metal forming, the Concept of friction hill, the concept of uniform work, redundant work, frictional work, deformation efficiency, etc.	8	Students will get an overview of the subject and knowledge about the deformation analysis
2	Extrusion: Hot and cold extrusion, analysis of extrusion using plasticity theory, extrusion tooling, extrusion as a primary and secondary process, adiabatic and isothermal extrusion, heat and velocity management in hot extrusion, defects in extrusion.	8	Students will get knowledge about extrusion and its deformation analysis
3	Rolling: Analysis of rolling process, calculation of rolling loads, defects in rolling	7	Students will get knowledge about the rolling and its deformation analysis
4	Forging: open and closed die forging, calculation of forging loads, defects in forging	7	Students will get knowledge about the forging and its deformation analysis
5	Wire, rod and tube drawing: analysis of loads, the concept of drawability limits, defects in drawing, Introduction to sheet metal forming	6	Students will get knowledge about the drawing and its deformation analysis
6	Generation of processing map: instability criteria, strain rate sensitivity map, efficiency map, application of FEM simulation for forming process optimization, numerical problems	6	Students will get knowledge about the processing map generation and its application and use of FEM in deformation analysis
	Total	**42**	

Text books:

1. Mechanical Metallurgy, Dieter G E, 3rd edition, McGraw Hill

Reference Books:

1. Metal Forming: Mechanics and Metallurgy, Hosford W F and Caddell W M, 4th edition, New York: Cambridge University Press.
2. Applied Metal Forming: Including FEM analysis, Henry S Valberg, 1st edition, New York: Cambridge University Press