Course Type	Course Code	Name of Course	L	T	P	Credit
DC	NMEC 503	Theory of Metal Forming	3	1	0	4

Course Objective
• To understand the basic principles of Metal Forming Theory • To know the various types of forming processes • To know about advanced metal forming methods
Learning Outcomes
• Choose forming techniques for various applications • Estimate power requirement for forming processes • Understand the various techniques for product development

Module	Topics	L+T	Learning Outcome
1	Need and classification of forming processes, theory and practice of forming processes	4L+1T	Understanding the fundamentals of the Theory of Metal Forming.
2	Conventional Forming Processes: Massive metal and sheet metal forming-comparisons; fundamentals of plastic deformations: elastic and plastic deformation, yielding criterion and flow rules; plastic anisotropy and visco plasticity; concept of solid and flow formulations.	8L+2T	Understanding of conventional forming processes and their application in industry.
3	Basics of plastic deformation analysis techniques-slab method, upper bound method, and slip line method	6L+3T	Understanding of plastic deformation of metals.
4	Plain strain problems: drawing of sheet and extrusion of plate, rolling of plate and forging of strip; axisymmetric problems: drawing of wire and extrusion of bar and tube, forging of solid and hallow disc; bending and deep drawing.	8L+4T	Understanding of solving the problems in the forming industry for different product development.
5	Unconventional Forming Processes: Classification; process principle, applications, equipment, process analysis and die design of explosive forming; electro-magnetic forming; electro-hydraulic forming; laser beam bending and laser-assisted deep drawing.	8L+2T	Understanding of unconventional forming processes and their application in industry
6	Micro Forming Processes: Classification; process principle and applications of conventional micro forming processes and unconventional micro-forming processes.	8L+2T	Understanding of Micro Forming Processes and their application in industry.
	Total	**42L+14T**	

Text books:

- Manufacturing Processes for Engineering Materials, Kalpakjian and Schmid, Prentice Hall.
- Manufacturing Technology: Foundry, Farming and Welding, P N Rao, McGraw Hill.

References:

- Materials and Processes in Manufacturing, Degarmo, J. T. Black, Prentice Hall of India Pvt Ltd.
- Fundamentals of modern manufacturing processes, M. P. Groover.
- Manufacturing Science: Ghosh and Mallick, East-West Press Private Limited
- Machining and Metal Working Handbook, Ronal A Walsh and Denis Cormier McGraw Hill Publication.