Course Type	Course Code	Name of Course	L	T	P	Credit
DE	NMED517	Laser Processing of Materials	3	0	0	3

Course Objective
Students will learn about the applications of various types' lasers in industry/research. Laser interaction with the solids. Lasers operations in material removal, joining, forming and surface modification processes.
Pre-requisite:
Students must had studied manufacturing processes like casting, machining, and welding in undergraduate.
Learning Outcomes
Upon successful completion of this course, students will able to: • Understand the uses of laser for processing of materials • Use laser for different applications like cutting, drilling, marking etc. • Understand the principle of laser based Additive Manufacturing Process

Module	Topics	Lecture Hours	Learning Outcome
1	Introduction to industrial lasers: He-Ne, CO_2, Excimer, Nd:YAG, Diode, Fiber and Ultra-short pulse lasers and their output beam characteristics; laser beam delivery systems. Laser interaction with the materials.	7	Student will be able to understand different lasers and their applications, laser parameters and their control for engineering applications, Safety precautions.
2	Industrial & scientific applications of laser; Laser cutting, drilling, welding, marking and their process characteristics.	10	After completion of this module, the learner will understand the process physics of laser cutting, drilling, marking etc.
3	Laser surface modifications: Heat treatment, surface remelting, surface alloying and cladding, surface texturing, LCVD and LPVD.	8	This module emphasizes the application of lasers for various surface modification processes.
4	Ultra-short laser processes; pulse interaction, metallurgical considerations and micro fabrication.	8	The student will understand the laser based cold cutting process.
5	Laser additive manufacturing. Laser metal forming: Mechanisms involved including temperature gradient, buckling, upsetting. Laser peening: Laser Shock Processing.	9	This module will enlighten the applications lasers in additive manufacturing, sheet metal forming.
	Total	**42**	

Text:

1. Steen, William M., JyotirmoyMazumder. Laser material processing. Springer science & business media, 2010.
2. Duley, Walter W. Laser processing and analysis of materials. Springer Science & Business Media, 2012.

References:

1. Ion, John. Laser processing of engineering materials: principles, procedure and industrial application. Elsevier, 2005.
2. Chryssolouris, George. Laser machining: theory and practice. Springer Science & Business Media, 2013.
3. Schaeffer, Ronald. Fundamentals of laser micromachining. CRC press, 2016.