

Course Title	LASER based manufacturing techniques	Course Code	ME xxxx			
Dept./ Specialization	Mechanical	Structure (LTPC)	3	1	0	4
To be offered for	UG/PG	Status	Core		Elective	<input type="checkbox"/>
Faculty Proposing the course	Dr. Avinash Kumar	Type	New		Modification <input type="checkbox"/>	
Recommendation from the DAC: Yes		Date of DAC	01-06-2021			
External Expert(s)	Prof. G. Vijaya Prakash, Physics Department, IIT Delhi					
Pre-requisite	Manufacturing Processes – I and Manufacturing Processes – II	Submitted for approval	46 th Senate			
Learning Objectives	This course introduces the students about optics and lasers with their applications in manufacturing. Student will learn several manufacturing techniques in terms of laser characteristics. It also introduces the laser safety which is required for laser industry aspirants.					
Learning Outcomes	At the end of the course, the students will learn about- (a) Basics of optics and Lasers, (b) how to apply these in manufacturing, (c) Different laser based manufacturing techniques in terms of laser characteristics, (d) Also the laser safety in industry perspective.					
Contents of the course (With approximate break-up of hours for L/T/P)	<p>Introduction to Optics and Lasers (L9 + T3) Light and Wave, Properties of Light and Waves, Reflection, Refraction, Interference, Diffraction, Optical fibres, Lens, Mirror, Population inversion, Optical pumping, Lasers, Types of Laser.</p> <p>Laser Safety (L3 + T1) Class of Lasers, Laser exposure, damages and hazards, Safety measures.</p> <p>Laser Power delivery (L6 + T2) Optics performance at high optical powers, Adaptive optics for high peak power lasers, Fiber optics for remote delivery of high power pulsed laser beams, Beam path conditioning for highpower laser systems, Optical system for high power laser sintering.</p> <p>Laser based manufacturing techniques (L18 + T6) Laser Rapid Manufacturing, Lasers in Metal Forming, Laser Forming of Metal Foams, Laser Drilling, Laser Cutting, Laser Welding, Lasers in Surface Engineering, Laser Micromachining.</p> <p>Applications and case studies of Laser based Manufacturing (L6 + T2) Application of Laser for Manufacturing, Surface engineering and Bio-medical devices. Case studies of Laser based manufacturing in industries and other fields.</p>					
Text Book	<ol style="list-style-type: none"> 1. Gabriel Laufer, Introduction to Optics and Lasers in Engineering, Cambridge University Press, 2005. 2. J. Paulo Davim, Lasers in Manufacturing, Wiley, 2012. 3. J. Wilson and J. F. B. Hawkes, Lasers: Principles and Applications, Prentice Hall Publications, 1987. 					
Reference Books	<ol style="list-style-type: none"> 1. D. C. O'Shea, W. R. Callen and W. T. Rhodes, Introduction to Lasers and their Applications, Addison-Wesley Publishing Company, 1977. 2. R. Ifflander, Solid State Laser Material Processing: Fundamental Relations & Technical Realizations, Springer, 2001 3. M. J. Weber, (1991) Handbook of Laser Science and Technology, CRC Press, 1991. 					