

1.	Title of the course	Design and Manufacturing Laboratory-I
2.	Course number	ME518P
3.	Structure of credits	0-0-3-2
4.	Offered to	PG
5.	New course/modification to	Modification To ME5191/12
6.	To be offered by	Department of Mechanical Engineering
7.	To take effect from	July 2022
8.	Prerequisite	Nil
9.	<p>Course Objective(s): This laboratory consists of experiments in Design and Manufacturing domains. Objectives of this laboratory include hands-on experience on modal analysis of different types of systems. By doing these experiments students would appreciate the theory that they learnt in class as well as get to know how modal analysis is performed in the industry. Emphasis is given on the different methodologies that are currently adopted worldwide in this field. To help the students prove the concepts or theory learned in the Manufacturing courses through practical experiments.</p>	
10.	<p>Course Content: Estimation of natural frequencies and mode shapes of a single and two degree of freedom discrete systems with different combination of masses and stiffness. Modal analysis of 2 DOF system for gear vibrations. Estimation of young's modulus of a cantilever beam by modal analysis (impulse hammer) and determination of the damping ratio of a vibration absorber using half power bandwidth method. Determination of acceleration response along all three coordinate directions for a vibration source (Electric motor or compressor) Determination of the natural frequencies of a structure using shaker. Study of influence of process parameters on the four layer thin wall deposited over a supporting plate using cold wire tungsten inert gas welding process. Characterization of AM parts based on surface roughness, dimensional and geometrical errors. Analysis of residual stress distribution on the thin wall component using XRD technique. Metallography studies on the thin wall component.</p>	
11.	<p>Textbook(s):</p> <ol style="list-style-type: none"> 1. Ian Gibson, David W. Rosen and Brent Stucker, <i>Additive manufacturing technologies: rapid prototyping to direct digital manufacturing</i>, Springer (2010). 2. Meirovitch L, <i>Fundamentals of Vibrations</i>, McGrawHil (2001). 	
12.	<p>Reference(s):</p> <ol style="list-style-type: none"> 1. Andreas Gebhardt, <i>Understanding additive manufacturing: rapid prototyping, rapid tooling, rapid manufacturing</i>, Hanser Publishers (2011). 2. Hartog J P D, <i>Mechanical Vibration</i>, Dover Publications (2000). 	