

Devi Ahilya Vishwavidyalaya, Indore, India Institute of Engineering & Technology					III Year B.E. (Mechanical Engg.) (Full Time)	
Course Code & Name	Instructions Hours per Semester and Credits					
5RMPC1: MACHINE DESIGN I Duration of Theory Paper- 04 Hours	Classroom Instruction (CI)		Lab Instruction (LI)	Term Work (TW) and Self Learning (SL)	Total no. of Hours Per semester	Total Credits (Total Hours/30)
	L	T	P	TW+SL	90	3
	20	10	00	60		

COURSE CONTENTS

UNIT-I

Theory of Failures & Applications: Theories of failure, their applications to the design problems. Design of parts subjected to torsional and/ or bending such as spiral, helical and leaf springs.

UNIT-II

Pressure Vessels and Cover Plates: Analysis of thick cylindrical and spherical shells, compound cylinders, joint for steam and hydraulic pipes, parts of press fit and shrink fit, design consideration of pressure vessels and cover plates.

UNIT-III

Rotating Rings and Disks: Disk of uniform thickness and disk of uniform strength. Effect of drilled hole and extra mass, design of flywheel and pulleys.

UNIT-IV

Design Analysis of Curved Machine Members: Crane Hook, Chain link, open and closed links, M/c. Frames, Wall brackets, design and selection of hooks and wire ropes.

UNIT-V

Experimental Methods in Design: Brief idea about experimental stress analysis techniques and their applications and limitations.

Learning Objectives:

1. Develop an understanding of the theories of failure and their application in the design of machine elements subjected to bending and torsional loading.
2. Develop the ability to analyze and design pressure vessels, cover plates, pipe joints, and shrink-fit components considering strength and safety requirements.
3. Develop the ability to design rotating machine components such as discs, flywheels, and pulleys by considering stress distribution and operating conditions.
4. Develop an understanding of stress analysis and design principles for curved machine members such as crane hooks, chain links, machine frames, wall brackets, and wire ropes.
5. Develop an understanding of experimental stress analysis techniques, their applications, limitations, and role in validating machine designs.

Course Outcomes

Course Outcome (CO)	After completion of the course, students will be able to:
CO1	apply failure theories to analyze and design components under bending and torsional loads
CO2	design pressure vessels, cover plates, and joints for mechanical systems.
CO3	design rotating discs and rings with considerations for dynamic stresses and practical applications.
CO4	evaluate and design curved machine members such as crane hooks, links, and frames.
CO5	analyze and select appropriate experimental stress analysis techniques by considering their applications and limitations in machine design.

CO-PO-PSO Mapping

Course Name: **Machine Design I**

Course Code: **MER5C1**

COs / POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	3	3	1	1	–	2	3	–	–	3	2	1
CO2	3	3	3	3	2	1	–	2	3	–	–	3	2	1
CO3	3	3	3	3	2	1	–	2	3	–	–	3	2	1
CO4	3	3	3	3	2	1	–	2	3	–	–	3	2	1
CO5	3	3	3	3	2	1	–	2	3	–	2	2	3	1
Average	3	3	3	3	1.8	1	–	2	3	–	2	2.8	2.2	1