

Devi Ahilya Vishwavidyalaya, Indore, India Institute of Engineering & Technology				II Year B. Tech. (Mechanical Engineering) (Full Time)	
Course Code & Name	Instructions Hours per Semester and Credits				
4RMPC3 Computer Aided Machine Design & Drawing	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	
	30	10	20	60	120

Learning Objectives:

By the end of this course, students will be able to:

1. Understand fundamentals of conventional and computer-aided design practices.
2. Apply knowledge of design stresses, factor of safety, and material properties in machine design.
3. Design temporary and permanent joints, power transmission elements, and fasteners.
4. Develop proficiency in machine drawing concepts including limits, fits, tolerances, GD&T, and assembly drawings.
5. Utilize CAD packages (AutoCAD, SolidWorks, Fusion, etc.) for modelling, drafting, and assembly of machine elements. Interpret and prepare assembly drawings with BOM using both conventional and computer-aided methods.

Prerequisite(s): Engineering Graphics and Design

COURSE CONTENT

UNIT-I

Design Practice Introduction: Introduction, Classification, General Considerations and Procedure of conventional Design, Introduction to Computer Aided Design and Drafting, Advantages of Computer Aided Design and Drafting, Introduction to CAD Hardware and Software, Introduction to CAD Packages (AutoCAD/Autodesk Fusion/SolidWorks/etc.)

UNIT-II

Design of Temporary Joints: Introduction to Design Stresses, Factor of Safety, Engineering Materials and their Applications, Design of Cotter and Knuckle.

UNIT-III

Design of Power Transmission Elements: Design of Pins / Keys, Shafts and Couplings. Design of Screw Fasteners for Direct and Eccentric loading.

UNIT-IV

Design of Permanent Joint: Design of Riveted Joints for Boiler, Structures and Eccentric Loading. Design of Welded Joints for Direct and Eccentric loading.

UNIT-V

Machine Drawing Concepts and Assembly Drawing Practices: Limits, Fits and Tolerances (GD & T), Symbols and Conventional Representation, Introduction, Classification and Principles of Machine Drawing and Assembly drawings, Assembly procedures, Importance of BOM, Conventional and Computer Aided Assembly drawings of temporary and permanent joints.

Books Recommended:

- [1]. V B Bhandari, *Design of Machine Elements*, 3/e, McGraw Hill Education, 2015.
- [2]. N D Bhatt and V M Panchal, *Machine Drawing*, Charotar Publishing House, 2015.
- [3]. K. Mahadevan, K. Balaveera Reddy, *Design Data Hand Book*, CBS Publishers & Distributors, New Delhi, 2015.
- [4]. V B Bhandari, *Design Data Hand Book*, McGraw Hill Education, 2015.
- [5]. PSG, *Design Data: Data Book of Engineers* by PSG college –Kalaikathir Achchagan-Coimbatore.
- [6]. P S Gill, *A Text Book of Machine Drawing*, S K Kataria & Sons, 2015.
- [7]. P C Gope, *Machine Design: Fundamentals and Applications*, 1/e PHI, 2015.
- [8]. R L Norton, *Machine Design: An Integrated Approach*, Pearson Education, 2015.

List of Lab/Practical Assignments:

1. Study of different Computer Hardware and software components of CAD.
2. Design of Cotter and Knuckle Joints using conventional/CAD methods.
3. Design of Keys using conventional/CAD methods.
4. Design of Shaft using conventional/CAD methods.
5. Design of Couplings using conventional/CAD methods.
6. Design of Screw Fasteners using conventional/CAD methods.
7. Design of Riveted Joints using conventional/CAD methods.
8. Design of Welded Joints using conventional/CAD methods.
9. Study of Limits, Fits and Tolerances using CAD package.
10. Prepare Assembly and Production drawings of Cotter Joint using conventional method/CAD Software.
11. Prepare Assembly and Production drawings of Knuckle Joint using conventional method/CAD Software.
12. Prepare Assembly and Production drawings of Shaft, Keys and Couplings using conventional method/CAD Software.
13. Prepare Assembly and Production drawings of Bolted Joint using conventional method/CAD Software.
14. Prepare Assembly and Production drawings of Riveted Joint using conventional method/CAD Software.
15. Prepare Assembly and Production drawings of Welded Joint using conventional method/CAD Software.

Course Outcome:

Course Outcome (CO)	After completion of the course, students will be able to:
CO1	Understand conventional and CAD-based design practices.
CO2	Design temporary joints (cotter, knuckle) with material and safety considerations.
CO3	Design power transmission elements (pins, keys, shafts, couplings, fasteners).
CO4	Design permanent joints (riveted, welded) for different loading conditions.
CO5	Apply GD&T, limits, fits, tolerances, and prepare assembly drawings with BOM and Integrate conventional design knowledge with modern CAD/CAM practices.

CO-PO- PSO Relationship

Course Outcomes (COs)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PSO 1	PSO 2	PSO 3
CO1	3	2	3	2	3	–	–	–	2	3	2	3	2	0
CO2	3	3	2	2	2	2	2	2	–	2	2	3	2	1
CO3	3	3	3	2	3	2	2	–	2	2	2	2	2	1
CO4	3	2	3	2	3	–	–	–	3	3	3	2	2	0
CO5	3	3	3	2	3	2	2	2	2	3	3	3	1	0

* CO (rows) mention nil/very small/insignificant contribution to the PO (column)

1 → relevant and small significance 2 → medium or moderate and 3 → strong