

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Mechanical Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
8MERE1 CAD/CAM	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hrs	3	1	2	3	1	1	5

Course Objectives:

1. To understand the basics of CAD/CAM.
2. To understand the concepts of computer graphics and its tools.
3. To learn about the geometric modeling techniques concerned to the manufacturing of parts.
4. To understand the latest advances in the manufacturing methods.

Prerequisite(s): Engineering Drawing, Machine Design & Drawing.

COURSE CONTENTS

UNIT-I

Fundamentals of CAD\CAM: Introduction to CAD\CAM, CIM, CAE, Reverse Engineering, Concurrent/Simultaneous Engineering.

Hardware: Types of Computer Systems, Workstations, Peripheral Devices, Storage Devices, CPU.

Computer Graphics: 2D & 3D Transformations, Concatenations.

CAD/CAM Software Features & its Organizations.

UNIT-II

Computer Aided Design: Introduction to Design process, Product Life Cycle, Areas of Applications and benefits of CAD. Geometrical Modeling: Wire frame and Surface Modeling - Parametric representation of Analytical and Synthetic Curves and Surfaces, Solid Modeling - Boundary representation, Constructive Solid Geometry. Parametric & Variational Modeling.

CAD/CAM Data Exchange Standards.

UNIT-III

Computer Aided Manufacturing: Introduction to CAM, Fundamentals of Numerical Control and Computer Numerical Control Systems: Coordinate Systems, Motion and Position Control.

CNC Control Systems: Direct Numerical Control and Distributed Numerical Control, Adaptive Control.

Part Programming Methods: CNC Codes & Standards, Manual Programming, Computer Assisted Part Programming, APT language.

UNIT-IV

Rapid Prototyping Technologies and Robotics: Basic RP Techniques: Stereo Lithography, Selective Photo Curing, Selective Sintering, Fused Deposition Modeling, Laminated Object Manufacturing, 3D Printing, Application of RP Techniques, RP Methodology. Rapid Tooling.

Robot Configurations, Motion and Position Control of Robot Arm, Robot Applications.

UNIT-V

Group Technology and FMS: Introduction to Group Technology Concept, Part Classification & Coding Systems, Machine Cell Formations, Introduction to Flexible Manufacturing Systems: Concept, Components and Types, CAPP and its types, Computer Aided Inspection and Quality Control.

Course Outcomes:

Upon Completing the Course, Student will be able to:

- CO1. Understand the importance of CAD/CAM principles in the Product development.
- CO2. Develop programs related to manufacturing using codes.
- CO3. Analyse the importance of networking in manufacturing environment.

BOOKS RECOMMENDED:

- [1]. Groover and Zimmers, *CAD/CAM: Computer Aided Design and Manufacturing*, PHI Pvt. Ltd., New Delhi.

- [2]. Groover Mikell P, *Automation, Production Systems and Computer Integrated Manufacturing*, PHI Pvt. Ltd., New Delhi.
- [3]. Zeid Ibrahim, *Mastering CAD/CAM*, Tata McGraw Hill Publishing Company Ltd., New Delhi.
- [4]. Rao P. N., *CAD/CAM Principles and Applications*, Tata McGraw Hill Publishing Company Ltd., New Delhi, Second Edition.

LIST OF PRACTICAL ASSIGNMENTS

1. Introduction to CAD/CAM Software (Proe, etc) and understanding its UI and Tools.
 2. To Perform Wireframe Modeling using Sketching tool.
 3. To Model a 3D Solids (Gears, Pulleys, Keys, Cotter, Shaft etc.).
 4. To Perform Surface Modeling.
 5. To Create 2D drawing from 3D part generated as above.
 6. To Create Assembly of Parts.
 7. To Simulate the assembly and create the exploded views.
 8. To Generate Automated CNC Tool Path and G-Code from Modeled Part.
 9. To Study the Constructional Features of the CNC Trainer Lathe.
 10. To create G Code and M Code program for CNC Lathe and Mill Machine.
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Course Outcome:

Students earned credits will develop ability to

CO. No.	CO	PO
CO1	Understand the importance of CAD/CAM principles in the Product development.	PO1, PO2, PO4, PO5
CO2	Develop programs related to manufacturing using codes.	PO1, PO3, PO4, PO12
CO3	Analyse the importance of networking in manufacturing environment.	PO1, PO2, PO3, PO11
CO4		
CO5		

CO-PO Relationship

CO	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1	3	3		3	3							
CO2	3		3	3								2
CO3	3	3	3								2	
CO4												
CO5												

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

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