

## MME305: CAD CAM

Programme: B.Tech. (MME)

Year: 3<sup>rd</sup>

Semester:

Even

Course : Core/Program/Open/HSS/Science/Math

Core

Credits :3

Hours

:40

### Course Context and Overview (100 words):

This is a compulsory course offered to the third year students of MME branch. The objective of the course is to provide the students with basic knowledge of the CAD/CAM systems such as computer graphics, NC/CNC machines and rapid prototyping etc. Basic principles, operation features and characteristics of various CAD/CAM systems are covered.

### Prerequisites Courses:

(Course name and course code) NIL

### Course outcomes (COs):

<b>On completion of this course, the students will have the ability to:</b>
CO1: Demonstrate the applications and benefits of computer aided design.
CO2: Demonstrate the understanding of various concepts of geometric modeling.
CO3: Demonstrate the knowledge of computer aided manufacturing.
CO4: The student would have gained basic knowledge in CIM and rapid prototyping.

### Course Topics:

Topics	Lecture Hours	
<b>UNIT - I</b>		
<b>1. Topic: Introduction to CAD/CAM</b>		
1.1 Introduction to CAD/CAM, Historical Developments and Future trends,	1	11
1.2 Necessity of CAD, Product life cycle.	1	
1.3 CAD / CAM Hardware, Basic structure, CPU, Memory types, input devices, display devices, hard copy devices, storage devices.	1	
1.4 Introduction to Graphic standards, Output primitives- Line drawing algorithm and Circle generating algorithm,	2	

1.5 World/device Coordinate Representation, Windowing and clipping.	1	
1.6 Geometric Transformations: 2 D Geometric transformations- Translation, Scaling, Shearing, Rotation & Reflection Matrix representation,	3	
1.7 Composite transformation, 3 D transformations, multiple transformation.	2	
<b>UNIT - II</b> <b>2. Topic: Geometric modeling</b>		
2.1 Curves representation, Interpolation vs approximation, Parametric representation of analytic curves such as Spline curve, Bezier curve, Continuity conditions.	3	8
2.2 Polygon surfaces, Quadric and Super quadric surfaces, blobby objects and Fractals	2	
2.3 Fundamentals of Solid modeling-Set theory, Boundary representation, Constructive solid geometry, Sweep representation, Color models, Application commands for AutoCAD & Solid works software.	3	
<b>UNIT - III</b> <b>3. Topic: Introduction to CAM</b>		
3.1 Automated Manufacturing systems, Need of automation, Basic elements of automation, Levels of automation, Automation Strategies	1	13
3.2 Historical development and future trends. Fundamental of Numerical Control, elements of NC machine tools,	2	
3.3 Classification of NC machine tools, Advantages, suitability and limitations of NC machine tools,	1	
3.4 DNC, CNC, Adaptive control.	2	
3.5 CNC machines and tooling: Vertical machining center, horizontal machining center, universal machining center, Controls and interpolators, Sensors.	1	
3.6 CNC Part Programming: Manual part programming (in word address format) with examples of Drilling, Turning and Milling,	3	
3.7 Computer aided part programming using APT language, Geometry, Motion and Additional statements.	3	
<b>UNIT - IV</b> <b>4. Computer integrated manufacturing systems</b>		
4.1 Computer aided process planning, Group Technology	2	8
4.2 Cellular manufacturing, Flexible Manufacturing System, CIM,	2	
4.3 Computer aided Inspection, Material handling and storage system, transfer lines,	2	
4.4 Rapid prototyping.	2	

**Textbook references (IEEE format):**

1. Hearn & Baker, *Computer Graphics*, Prentice Hall of India.
2. MP Groover & EW Zimmers, Jr. *CAD/CAM*, Prentice Hall India Ltd.

3. MP Groover, *Automation, production systems and computer-integrated manufacturing*, Prentice Hall India Ltd.
4. Tirupathi R. Chandrupatla, *Introduction to finite elements in engineering*, Prentice Hall
5. Yorem Koren , *Computer control of manufacturing systems*, TMH.

**Reference books**

1. DF Rogers & JA Adams, *Mathematical Elements for Computer Graphics*, McGraw Hill
2. Ibrahim Zeid & R Sivasubramaniam, *CAD/CAM Theory and Practice*, McGraw Hill.
3. J.N. Reddy, *An Introduction to finite element method*, McGraw Hill.
4. Farid Amirouche, *Principles of Computer Aided Design and Manufacturing*, Pearson
5. Alavala, *CAD/CAM: Concepts and Applications*, PHI
6. Warren S Seames, *Computer Numerical Control Concepts and programming*, Thomson.

**Evaluation Methods:**

Item	Weightage
Midterm exam	30
Teachers assessment (Assignment, Quiz etc)	20
End term	50

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**Last Update: 22-09-2015**