

# AMPTE16 CAD/CAM/CAE FOR PLASTICS ENGINEERING

## UNIT-1 COMPUTER AIDED DESIGNING

- 1.1 Fundamentals: Output primitives (points, lines, curves, etc.,) 2-D Transformation, Translation, Scaling, Rotation, windowing, View ports clipping transformation.
- 1.2 CAD Software: Interactive programs w.r.t design problems and production of drawing using any languages like Autocad , Auto LISP/C/C+., creation of surface, solids etc., using solid modeling package (prismatic and revolved parts), Data exchange, customizing.
- 1.3 Computer Graphics: Representation of curves- Bezier curves- Cubic spline curve- B Spline curves- Rational curves- Surface Modeling Technique- surface patch- coons patch - bi-cubic patch- Bezier and B-spline surfaces- Volume modeling- Boundary models- CSG other modeling techniques.

## UNIT-2 VISUAL REALISM

- 2.1 Hidden- Line- Surface- solid removal algorithms shading- coloring.
- 2.2 Introduction to parametric and variation geometry based on soft wares and their principles creation of prismatic and lofted parts using these packages.
- 2.3 Graphics and computing standards GKS- Bitmaps- Open GI- Data Exchange standards- IGES- STEP- CALS- DXF Communication standards- WAN- LAN.
- 2.4 CAD/Graphics integration 2D Representation- Development of surfaces- Integration of design analysis and Cad- Graphical aid for preprocessing in FEA- mesh generation techniques- post processing- Machine from 3D Model- Generative machining- cutter location- gouge deletion- tool path generation from solid models.
- 2.5 Assembly of parts, tolerance analysis mass property calculations, mechanism simulation, Integration of design, analysis and CAD graphical aid.

## UNIT-3 COMPUTER AIDED MANUFACTURING

- 3.1 Introduction to CAD / CAM software packages, Automation strategies in production process- G-Codes & M-Codes - NC system- Computer assisted part programming- APT language- DNC-CNC and Adaptive Control.
- 3.2 Accuracy, repeatability, End effectary, sensors, control systems & type of programming, post processing.
- 3.3 Linear Feedback control system- process model formulation, Transfer function and block diagram, Laplace Transforms, Control Actions- Linear System analysis- system Design,
- 3.4 Optimal Control – Structural Model of a Manufacturing Process, Steady state optimal control, Adaptive Control, on-line search strategies.

## UNIT-4 CAD / CAM INTERFACE FUNDAMENTALS OF CNC MACHINES

- 4.1 Manufacturing methods for fabrication of moulds & dies- Design FMS workstations- analysis methods- automated Materials Handling- Types
- 4.2 Computer Integrated Production Planning System- Computer Processes interface
- 4.3 Process Monitoring- Supervisory Computer Control
- 4.4 Computer Monitoring- Types & Strategies.

## **UNIT-5 COMPUTER AIDED ENGINEERING**

- 5.1 Computer modeling for polymer processing: Models of Material Behaviour, Model simplifications, Finite difference, Finite element techniques for field problems,
- 5.2 Simulation of viscoelastic fluid flow, computer implementation of Process models. Advanced computational techniques, Supercomputing and Visualization of Results.
- 5.3 Concept of A.I. and knowledge based systems in selection and processing of polymers.
- 5.4 CAE in Mould Manufacture: Computerized numerical control.
- 5.5 Flexible manufacturing.

### **References Books:**

1. Computer Integrated Manufacturing Systems Yoram Koren(McGraw Hill, 1983).
2. Automation, Production and Systems and Computer - Integrated Manufacturing Mikell P. Groover,(Prentice Hall of India Pvt. Ltd., 1998).
3. Computer Graphics- Donald Hearn and M.Pauline Baker (Prentice Hall, Inc., 1992).
4. CAD/CAM – Theory and Practice- Ibrahim Zeid (McGraw Hill, International Edition, 1998).

