AMPL21 CAD/CAM/CAE FOR PLASTICS ENGINEERING

UNIT-1 COMPUTER AIDED DESIGNING

1.1 Fundamentals: Output primitives (pints, 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++.,

1.3 Creation of surface, solids etc., using solid modeling package (prismatic and revolved parts), Data exchange, customizing.

1.4 Computer Graphics: Representation of curves- Bezier curves- Cubic spline curve- B Spline curves- Rational curves

1.5 Surface Modeling Technique- surface patch- coon's 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- sold removal algorithms shading- coloring. Introduction to parametric and variation geometry based on soft wares and their principles creation of prismatic and lofted parts using these packages.

2.2 Graphics and computing standards GKS- Bitmaps- Open Gl- Data Exchange standards- IGES- STEP- CALS- DXF Communication standards- WAN- LAN.

2.3 CAD/Graphics integration 2D Representation- Development of surfaces- Integration of design analysis and Cad- Graphical aid for preprocessing in FEA- mesh generation techniques-

2.4 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- Computer Monitoring- Types & Strategies.

UNIT-5 COMPUTER AIDED ENGINEERING

5.1 Computer modeling for polymer processing: Models of Material Behaviour, Model simplifications, Finite difference,

5.2 Finite element techniques for field problems, Simulationof viscoelastic fluid flow, computer implementation of Process models.

5.3 Advanced computational techniques, Supercomputing and Visualization of Results.

5.4 Concept of A.I. and knowledge based systems in selection and processing of polymers.

5.5 CAE in Mould Manufacture: Computerized numerical control. 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).
5. CAD/CAM principles, practice and manufacturing management - By Chris McMohan and Jimmi (Browne Pearson Education Asia,Ltd.,2000).