Year I, Semester II,
Computer Aided Design and Manufacturing   2   0   3   5   to   4

Course Description & Objective:
To acquaint and equip with the computer aided design   and manufacturing of farm machinery with the help of CAD.
Course outcomes:
Successful achievement of master level outcomes is required to receive a passing grade in the course. .
1. *Ability to create fully constrained solid models that can be quickly modified using standard software tools.*
2. *Ability to use, identify and explain standard features in solid modeling including protrusions, revolutions, cutouts, and patterns*
3. *Ability to use standard software tools to create engineering drawings, or other documents, to fully describe the geometries and dimensions of parts, as well as to document assemblies according to standard practice*
4. *Ability to use standard software tools to create part assemblies and check for clearances.*
5. *Ability to create the drawings of farm implements and their analysis.*
6. *Ability to write the CNC part programming*

UNIT I
Introduction: Introduction of CAD/CAM, Definition of CAD & CAM Tools, Design Process, Design criteria,Geometric modeling, entities, 2D & 3D Primitives.
2D & 3D Geometric Transformations: Translation, Scaling, Rotation, Reflection and Shearing, Conlatenation.

UNIT II
Wire frame modeling: Curves: Curve representation. Analytic curves – lines, Circles, Ellipse, Conis. Synthetic curves – Cubic, Bezier, B-Spline.
Surface Modeling: Surface entities, Surface Representation.Analytic Surface – Plane Surface, Ruled Surface, Surface of Revolution, Tabulated Cylinder.
Solid Modeling: Solid modeling techniques, Geometric and Topology, Types of solid modeling, Algorithms, CSG representation, 3D base primitives.

UNIT III
Application to farm machinery scheduling problem. Application to farm –factory co-ordination – case study. Design of farm machinery with the help of CAD.

UNIT IV
Introduction to Computer Control in NC, Computer Numerical control, Direct Numerical control, Combined DNC/CNC System, Adaptive control system.
Introduction to NC Part programming,Manual Part Programming, Computer assisted part programming APT language, G&M codes and examples.

UNIT V
Introduction:Fundamentals of Rapid Prototyping, Advantages and Limitations of Rapid Prototyping, Commonly used Terms, Classification of RP process, Rapid Prototyping Process Chain: Fundamental Automated Processes, Process Chain.

Practical:

1. Understanding CAD software and its uses and application in design of farm machinery.
2. Description of the machinery scheduling problem in harvesting and transport system.
3. Development of 2D drawings
4. Development of part drawings for various components in the form of orthographic and isometric.
5. Generation of various 3D Models through pad,shaft ,shell sweep
6. Exercise on Feature based and Boolean based modeling
7. Assembly Modeling.
8. Demonstration on CNC machine
9. Exercise on G&M codes
10. Demonstration onRapid Prototyping machine

Suggested Readings
1. Martenson, E. Micheal, Geometric Modelling, John Wiley & Sons, 1995.
2. Grover Mikell P. 2003. *Automation, Production Systems and Computer Integrated Manufacturing*. Prentice-Hall of India.
3. Radhakrishnan P, Subramanyan S &Raju V. 2003. *CAD/CAM/CIM*. New Age International.
4. Rao PN. 2002. *CAD/CAM Principles and Applications*. Tata McGraw Hill.
5. Zeid Ibrahim.1998. *CAD/CAM Theory and Practice*. Tata McGraw Hill.
6. Rapid prototyping: Principles and Applications - Chua C.K., Leong K.F. and LIM C.S, World Scientificpublications , Third Edition, 2010.
7. Rapid Manufacturing – D.T. Pham and S.S. Dimov, Springer , 2001