CAD/CAM

Course Code: 13ME1138

Course Educational Objectives:
To make the student understand
- Basic understanding of modern trends in design and manufacturing using CAD/CAM
- Advanced aspects of enabling computer aided technologies used in design
- Fundamental theories and technologies in computer aided manufacturing

Course Outcomes:
The student will be able to
- Explain different types of modeling techniques
- Perform various geometrical transformations
- Explain numerical control in manufacturing
- Explain the concept of group technology, adaptive control and FMS
- Write NC part program for simple machining operations

UNIT-I (14 Lectures)
Introduction to CAD/CAM: Product cycle, design process, application of computers for design, benefits of CAD, CAD / CAM hardware: Design workstation, graphics terminal, input devices, output devices, CPU, storage devices.

COMPUTER GRAPHICS:
Coordinate systems, database structures for graphic modeling, two dimensional and three dimensional transformations – scaling, rotation, reflection, rotation about an axis, concatenation
UNIT-II (12 Lectures)

GEOMETRIC MODELLING:
Requirements, geometric models, geometric construction methods, wireframe model, wireframe entities, parametric curve representation method, parametric representation of synthetic curves, hermite cubic splines, Bezier curves, B-splines, rational curves

SURFACE AND SOLID MODELLING:
Surface model, surface entities, surface representation, Parametric representation of surfaces, plane surface, ruled surface, surface of revolution, tabulated cylinder, Hermite Bi-cubic surface, Bezier surface, B-Spline surface, COONs surface, solid modeling, solid representation, boundary representation (B-rep), constructive solid geometry (CSG).

UNIT-III (12 Lectures)

NUMERICAL CONTROL:
Basic components of NC system, NC procedure, coordinate systems, NC motion control systems, applications, adaptive control

CNC PROGRAMMING:
Part programming fundamentals, manual part programming, preparatory functions, miscellaneous functions, canned cycles, computer aided part programming, APT language structure, geometry commands, motion commands and post processor commands.

UNIT-IV (10 Lectures)

GROUP TECHNOLOGY:
Introduction, part families, parts classification and coding, features of parts classification and coding system, OPITZ, MICLASS, Product Flow Analysis, composite part concept, machine cell design and applications.

COMPUTER AIDED PROCESS PLANNING:
Introduction, retrieval CAPP system, generative CAPP systems, benefits of CAPP.
UNIT-V

FLEXIBLE MANUFACTURING SYSTEMS:
Introduction, types of FMS, components, FMS layout configurations, computer control system, human resources, applications and benefits.

CIM: Integration, CIM implementation, benefits of CIM, introduction to lean manufacturing.

TEXT BOOKS:

REFERENCES: