

III B.Tech II Semester

15AME31 - CAD/CAM

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Course objective:

The objective of the this subject is to enable the students to understand and handle design problems in symmetric manner, gain practical experience in handling 2-D drafting and 3-D modeling software systems, apply CAD in real life applications, understand the concepts G and M codes and manual part programming and know the applications of CNC machines. Further the students will become familiar on principles of computer graphics, geometric modeling, NC and CNC machines, group technology and FMS.

UNIT I

Overview of CAD/CAM: Product cycle, CAD, CAM and CIM. CAD Tools, CAM Tools, Utilization in an Industrial Environment, Evaluation criteria. CAD standards, CAD data structure, Data base management systems.

Computer Graphics: Co-ordinate systems, Graphics package functions, 2D and 3D transformations, homogeneous transformations, clipping, hidden line / surface removal colour, shading.

Learning outcome & Suggested Student Activities:

After completion of this unit students are able to understand the basic concepts Automation, components of CAD/CAM, input and output components of CAD, Steps involved in computer aided design. To understand the geometric model of the component in CAD technology of computer graphics. The techniques of raster technology, scan conversion, clipping, removal of hidden lines and hidden surfaces, color, shading and texture.

UNIT II

Geometric Modeling: Representation techniques, Parametric and non parametric representation, various construction methods, wire frame modeling, synthetic curves and their representations, surface modeling, synthetics surfaces and their representations. Solid modelling, solid representation, fundamentals, introduction to boundary representations, constructive solid geometry, analytical solid modeling.

Learning outcome & suggested Student Activities:

Geometric Modeling constitutes the most important and complex part in most of CDA software Packages. Hence the students should focus on various requirements of information that are generated during geometric modeling stage, various types and its applications.

UNIT III

Numerical Control: NC, NC Modes, NC Elements, NC Machine tools and their structure, Machining centre, types and features. Controls in NC, CNC systems, DNC systems. Adaptive control machining systems, types of adaptive control.

CNC Part Programming: Fundamentals, NC word, NC Nodes, canned cycles, cutter radius compensation, length compensation, computed assisted part programming using APT: Geometry statements, motion statements, post process statements, auxiliary statements, macro statement program for simple components.

Learning outcomes & suggested Student Activities:

CNC has revolutionized the manufacturing automation. The flexibility of manufacturing achieved with the use of CNC and associated Technology. The students should aimed to understand the

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principle of NC, CNC, Machining Centre and various methods of part programming. The student is advised to visit manufacturing industry where the CNC machines are using and also interact with CNC programmer in industry.

UNIT IV

Group Technology & FMS: Part Family, Classification and Coding, advantages & limitations, Group technology machine cells, benefits. FMS: Introduction, components of FMS, material handling systems, Computer control systems, advantages.

Computer Aided Quality Control: Terminology in Quality control, Inspection and testing, Contact inspection methods - optical and non-optical, integration of CAQC with CAD and CIM

Learning outcome & Suggested Student Activities:

Understanding the need of GT as a means of bringing the benefits of mass production to relatively smaller production. Understanding the need of computers in process planning and QC .Understanding the definition and concept of FMS, and its elements etc.

UNIT V

Computer Aided Processes Planning: Retrieval type and Generative type, benefits Machinability data systems, Computer generated time standards.

Computer Integrated Production Planning: Capacity planning, shop floor control, MRP-I, MRP-II, CIMS benefits.

Trends In Manufacturing Systems: Concepts of Reconfigurable manufacturing, Sustainable manufacturing and lean manufacturing.

Learning outcomes & Suggested Student Activities:

Understanding the need of CAPP in Industrial point of view and students are able to understand time standards and production standards in manufacturing systems.

TEXT BOOKS: ,

1. CAD/CAM, A Zimmers&P.Groover, PE, PHI.
2. CAD/CAM-Principles and applications, P.N. Rao, TMH, 3rd edition, 2010.

REFERENCE BOOKS:

1. Automation, Production systems & Computer integrated Manufacturing, Groover, P.E.
2. CAD/CAM/CIM, Radhakrishnan and Subramaniam, New Age, 3rd edition, 2008.
3. Principles of Computer Aided Design and Manufacturing, Farid Amirouche, Pearson.
4. CAD/CAM Theory and Practice, R. Sivasubramaniam, TMH.
5. Computer Aided Design and Manufacturing, K.LalitNarayan , PHI, 2008.
6. Computer Aided Manufacturing, T.C. Chang, Pearson, 3rd edition, 2008

SUGGESTED LINKS:

- http://www.cadcamfunda.com/cam_computer_aided_manufacturing
- <http://wings.buffalo.edu/eng/mae/courses/460-564/Course-Notes/cnc-classnotes.pdf>

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