

6.1 COMPUTER AIDED MANUFACTURING

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RATIONALE

Manufacturing of this century belongs to computerized equipment & machine tools to manufacture a variety of components with high quality, high precision & low cost at a faster rate. Computer Aided Designing (CAD), Computer Aided Manufacturing (CAM), Numerical Control Machine Tools, Computer Aided Process Planning (CAPP), Automated Guided Vehicles (AGVs) & Flexible Manufacturing Systems-all are the part of Computer Integrated Manufacturing (CIM) which help to achieve the desired goals in manufacturing. After studying the subject, the students will be able to know about these integrated techniques which help a manufacturer to achieve his goal with in stipulated time.

DETAILED CONTENTS

1. Introduction (6 hrs)
Fundamental of manufacturing, CAD-CAM Meaning, Activities of a CAD/CAM system, Manufacturing components of CAD/CAM integration, system approach in manufacturing, Introduction of Automation and Computer Integrated manufacturing, Concept of CIM.
2. Automation (8 hrs)
Automation in manufacturing, Basic concepts of automation, Hard automation, Soft automation, comparison of manual operation, hard automation and flexible (Soft) automation, Trends in manufacturing automation, composition of work force in conventional and automated manufacturing system.
3. Computer System for CAD/CAM/CIM/FMS (6 hrs)
Selection of a computer, CAD/CAM Hardware, CAD/CAM system components, computer languages and CIM/FMS, software selection.
4. NC Production System (10 hrs)
Introduction to Numerical Control, NC machine Tools, NC control unit, Tooling for NC machine, NC part Programming, Computer automated part programming, CNC/DNC and adaptive control, Components of a DNC system, Categories of adaptive control-adaptive control with optimization (ACO), adaptive control with constraints (ACC), Geometric adaptive control (GAC), benefits of adaptive control.
5. Computer Aided Process Planning (CAPP) (10 hrs)

Concepts of group Technology, approaches to process planning-manual approach, variant process planning, Generative process planning; economic regions for different process planning system, role of process planning in computer integrated manufacturing, integrated process planning system, advantages of CAPP.

6. Flexible Manufacturing System (FMS) (8 hrs)

Introduction to FMS, manufacturing flexibility, FMS elements, FMS data Files, Software for FMS, Design aspects of flexible manufacturing, Sequencing & Scheduling in FMS, Computer aided Scheduling.

RECOMMENDED BOOKS

1. "Computer Aided Manufacturing" By Surinder Kumar, Aditya Shah; Satya Parkashan, New Delhi
2. "Numerical Control & Computer Aided Manufacturing" By T.K. Kundra, P.N. Rao & N.K.Tewari; Tata McGraw Hills Pub. Co. New Delhi.
3. "System Approach to Computer Integrated Design & Manufacturing" By N.Singh; John Willey & Sons Inc.
4. "Computer Integrated Manufacturing Hand Book" By Teicholz, Orr; McGraw Hill Book Co.

SUGGESTED DISTRIBUTION OF MARKS

| Topic No. | Time Allotted (Hrs) | Marks Allotted (%) |
|--------------|---------------------|--------------------|
| 1 | 06 | 12 |
| 2 | 08 | 18 |
| 3 | 06 | 12 |
| 4 | 10 | 18 |
| 5 | 10 | 20 |
| 6 | 08 | 20 |
| Total | 48 | 100 |

INDUSTRIAL TRAINING

(During summer vacation after IV Semester)

It is needless to emphasize further the importance of Industrial Training of students during their 3 years of studies at Polytechnics. It is industrial training, which provides an opportunity to students to experience the environment and culture of industrial production units and commercial activities undertaken in field organizations. It prepares student for their future role as diploma engineers in the world of work and enables them to integrate theory with practice. Polytechnics have been arranging industrial training of students of various durations to meet the above objectives.

This document includes guided and supervised industrial training of a minimum of 6 weeks duration to be organised during the semester break starting after second year i.e. after IV Semester examinations. The concerned HODs along with other teachers will guide and help students in arranging appropriate training places relevant to their specific branch. It is suggested that a training schedule may be drawn for each student before starting of the training in consultation with the training providers. Students should also be briefed in advance about the organizational setup, product range, manufacturing process, important machines and materials used in the training organization.

Equally important with the guidance is supervision of students training in the industry/organization by the teachers. A minimum of one visit per week by the teacher is recommended. Students should be encouraged to write daily report in their diary to enable them to write final report and its presentation later on.

An internal assessment of 50 and external assessment of 50 marks have been provided in the study and evaluation scheme of V Semester. Evaluation of professional industrial training report through viva-voce/presentation aims at assessing students understanding of materials, industrial process, practices in industry/field organization and their ability to engage in activities related to problem solving in industrial setup as well as understanding of application of knowledge and skills learnt in real life situations. The formative and summative evaluation may comprise of weightage to performance in testing, general behaviour, quality of report and presentation during viva-voce examination. It is recommended that such evaluations may be carried out by a team comprising of concerned HOD, teachers and representative from industry.