GUJARAT UNIVERSITY
B.E. SEM VIII (MECHANICAL)
M-804 COMPUTER AIDED MANUFACTURING (CAM)

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| PRODUCTION AND OPERATIONS MANAGEMENT        | M-804| 04 02           | Sessional 1.5 Hrs  
|                                              |      | Theory 50       | University 3 Hrs 100 |
|                                              |      | Pract 25        | TW 25              |
|                                              |      | Total 200       |                    |

1 **Introduction:**
Rationale for CAD/CAM, Computer aided Manufacturing, The CAM hierarchy, elements of CAM-Database, Production Management, Manufacturing control, NC/CNC, Product Design & Development, benefits, limitations and applications

2 **Computer aided production & operation management:**
Basic concepts of Computer Aided Forecasting and Computer Aided Plant Layout

**Material Requirement Planning Systems:** basics, input -product tree structure, Master Production Schedule and Inventory Status File, structure, output report, working of system, benefits and limitations, Pegging, Cycle counting, Updating and Time fence, Capacity Requirement Planning.

**Scheduling:** Single machine-Branch and bound method
Flow shop-Johnson's rule, and CDS heuristic
Job shop- Priority Dispatching rules, heuristic and Indexing method

**Group Technology:** Objectives, part families, similarities, design and Manufacturing attributes, two hurdles in implementing G. T., classification methods- visual inspection, product flow analysis and coding, need and types of structure, Opitz, MICLASS and CODE coding systems, G.T. machine cells and types, concept of composite part, benefits and limitations.

**Computer Aided Process Planning:** Variant and Generative CAPP, benefits, Machinability Data System, Computer Generated Time Standard forward and backward planning, implementation considerations, CAPP Systems-CAM-I CAPP, MUL TICAPP, APPAS and CADCAM, AUTOPLAN, GARI, CPPP and TIPPS.

**Computer Aided Quality Control:** Computer in Q.C., Contact inspection methods, non contact inspection such as optical and non optical methods, computer aided testing, benefits and limitations.

3 **Numerical control in machine tools:**
Types-Numerical, Direct Numerical, Computerized Numerical and Distributive Numerical, evolution of controller, adoptive control, tool conditioning monitoring, classification of NC/CNC machine tools, velocity control and position control, block diagrams for NC and CNC machines, factors considered for selecting components for NC/CNC machining, factors influencing selection of NC/CNC machine tools.
Construction and working of Main parts of NC/CNC machine tools:-Speed drives, feed drives, recirculating ball screw, linear motion guide, machine slides, spindle, bed, structure, linear and rotary transducers, chip conveyor, automatic tool changer, tools and tool holders, CNC systems and their specifications and advanced features, MCU types and functions, interpolators- functions, types, hardwares and softwares, NC tape, tape formats and various types of tape readers. CNC lathe, turning center, CNC milling machine and Machining centers.
NC coordinate systems, work piece zero systems, absolute and incremental programming, NC motion control (PTP, Straight cut and Contouring), open loop and closed loop systems, Component Drawing Instruction and its use.

**Manual part programming** :- Various types of programming formats, G codes, M codes and other codes, Canned cycles, radius compensation, programming exercises for drilling, milling and turning, subroutine, parametric subroutine.

**Computer assisted programming** :- Enlist languages, Automated programmed Tools (APT)-geometrical motion, auxiliary and post processor statements, APT programs for drilling, milling and turning, tool path generation and verification. CNC programming based on CAD/CAM

**software** :- The CAD/CAM approach to part programming- machining from 3D models.
4 **Flexible Manufacturing Systems**:-
Introduction, objectives of an ideal FMS, applications, classification, functional components, hardware components, FMC, pallets and fixtures, elements of an FMS- NC/CNC machines, three coordinate measuring machines, robots, conveyors, AGVs, ASRS and computers and their functions, FMS layouts, specifications, benefits, limitations, quantitative analysis, FMS planning and implementation issues.

5 **Computer Integrated Manufacturing**:-

6 **Robots**:-
Components, classifications, various types of physical configurations, specifications, basic motions, robot control, methods of programming the robot, economic considerations which can be used as a competitive weapon and selection and industrial applications of robots.

7 **CAD/CAM integration**:-
Introduction, activities involved in CAD/CAM integration such as 3D modeling, analysis and optimization, 2D drafting and drawing, database management, process planning, tool design, NC programming and inspection, case studies, brief description of commonly used software packages and their use in area of CAD/CAM/CAE.

**Term Work:** The term work shall be based on the topics mentioned above.

**Practical / Oral:** The candidate shall be examined on the basis of term-work.

**Books:**
1. Production & Operation Management-R. Paneerselvam- Prentic Hall
3. CAD,CAM,CIM- P. Radhakrishnan & S.Subranarayan- New Age International
4. CAD,CAM,CIM- Mikell P. Groover & EN. Zimmers- Prentic Hall
5. Computer Aided Manufacturing-Chang and Wysk-
7. Computer Aided Production Management-P.B. Mahapatra-
8. Computer Numerical Control Machines- P. Radhakrishnan-New Age International