GUJARAT TECHNOLOGICAL UNIVERSITY
DIPLOMA IN MECHANICAL ENGINEERING
SEMESTER- VI

Subject Name: **Computer Aided Design and Computer Aided Manufacturing (CAD/CAM)**
Subject Code: **2361901**

Sr. No.	Subject Content	Hrs.
1	**INTRODUCTION TO COMPUTER AIDED DRAFTING / DESIGN (CAD) AND COMPUTER AIDED MANUFACTURING (CAM).** 1.1 Know the objectives of learning this subject. 1.2 Need, Scope & importance of CAD/CAM in industries. 1.3 Need of attitude, knowledge & skill required for application of CAD/CAM. 1.4 History, concept and definitions of CAD and CAM. 1.5 Need, salient features, benefits and functional areas of CAD. 1.6 Design steps and reasons for implementing CAD system.	**2**
2	**HARDWARE AND SOFTWARE IN CAD SYSTEM.** 2.1 CAD workstation: Block diagram, concept, definition, classification and functions, configuration. 2.2 System requirements for modeling and analysis for AutoCAD, Pro/E, Solid edge, Inventor and other in current trend. 2.3 Graphics: Types and features of graphic terminals. 2.4 Input and output devices: types, configuration, applications and installation. 2.5 Familiarize with various cords and ports. 2.6 Graphic packages : Types, features, system requirements and applications ; GUI- concept ,meaning & features; Graphic standards such as GKS, PHIG, IGES. 2.7 2D and 3D geometric transformations. 2.8 Geometric modeling: Types, features, comparison and applications. 2.9 Animation concept, need and applications. 2.10 CAD/CAM interfacing-concept, standards, hardwares and protocols. **Note :** Geometric transformation example/s (application type) of 4-5 marks out of total 70.	**7**
3	**3D MODELING.** 3.1 Difference between 2D and 3D. 3.2 Axes nomenclature. 3.3 Surfaces-types and applications. 3.4 Solid modeling-methods and applications. 3.5 Feature based modeling-concept, meaning and applications. 3.6 Parametric modeling-concept, meaning and applications.	**13**

	3.7 Constraints- concept, meaning , common constraints and their utilities. 3.8 Dimensional relationships-concept, meaning and utility. 3.9 Model tree – concept, applications and benefits. 3.10 File types in various CAD softwares. 3.11 Features of various CAD softwares in context of 3D modeling,analysis, exchange of files ,etc. 3.11 3D surface and solid modeling- constructing, viewing, editing and modifying/redefining commands in various CAD softwares. . 3.12 Assembly modeling methods and commands in various CAD softwares (For 5 to 8 components only) . 3.13 Creating orthographic drawings in various CAD softwares. **Note :** 1. Various CAD softwares include AutoCAD + Pro/E or Solidedge. 2. 3D model making questions (application type) of 8-10 marks out of total 70.	
4	**COMPUTER AIDED MANUFACTURING.** 4.1 Computer Numerical Control (CNC): Introduction, types & classification, features, specifications, benefits and applications. 4.2 Salient constructional features of CNC machines differing from conventional machines (Such as ball screw, anti-friction slides, step/ servomotors, encoder, decoder, feedback system, etc.). 4.3 CNC tooling- types, working and applications. 4.4 Working of Automatic Tool Changer (ATC) and Automatic Pallet Changer (APC). 4.5 Types, standards and applications of qualified tools. 4.6 Work holding and loading devices.	**4**
5	**CNC PART PROGRAMMING.** 5.1 CNC axes, motion nomenclature and coordinate systems. 5.2 Various positions like machine zero, home position, work piece zero, programme zero . 5.3 Machine control systems-types and applications. 5.4 ISO G and M codes for turning and milling-meaning and applications of important codes. 5.5 Various compensations in CNC part programmes. 5.6 CNC part programming: Structure of part programme. 5.7 Simple part programming for turning using ISO format having straight turning, taper turning (linear interpolation) and convex/concave turning (circular interpolation). 5.8 Simple part programming for milling using ISO format including linear and circular interpolations. 5.9 Macros, fixed cycle, canned cycles, subroutines. 5.10 Interfacing softwares for auto part programming – concept, features and applications. **Note :** CNC part programme making questions (application type) of 12-14 marks out of total 70.	**11**

6	**RECENT TRENDS IN CAD/CAM.** 6.1 Adaptive control- Definition, meaning, block diagram, sources of variability, applications. 6.2 Direct Numerical Control (DNC)- Definition, meaning, block diagram and applications. 6.3 Flexible Manufacturing System (FMS)- concept , evaluation , main elements and their functions , layout and its importance , applications. 6.4 Robotics- definition of robot, classification and types of robot, elements of robot, applications. 6.5 Computer Integrated Manufacturing(CIM)- Concept, definition, areas covered, benefits.	**5**
	Total	**42**

Notes:

A. FOR STUDENTS.

a. It is advised that student download this copy of syllabus and plan to achieve the objectives of learning this subject.

B. FOR PAPER SETTER/MODERATOR.

a. Refer GTU syllabus and do not take reference of previous TEB question papers.
b. Ask the questions from each topic having marks weightage proportionate to hours allotted to that topic.
c. Optional questions must be asked from the same topic. That is weightage of compulsory attendance part of questions will be equal to proportionate to hours allotted to each topic.
d. Marks ratio of knowledge: comprehension: application types questions must be 30:30:40 respectively.
e. Submit solution / answer keys along with distribution of marks in each question for the paper being submitted.

Reference Books:

1. Automation, production system and computer integrated manufacturing — Nikell Groover, PHI Publi.
2. Mastering in Auto cad — George Ommura, (BPB publication)
3. CNC machines — Pabla & M. Adithan.
4. CAD/CAM/CIM — P. Radhakrishnan & S.Subramanayan (New Age International)
5. Computer Aided Manufacturing — Rao, Tiwari and Kundra, TMGH publi.
6. Mechatronics — HMT (Published by TMGH)
7. Computer aided design and manufacturing — Dr.Sadhusingh (KP)

Additional Reference:

1. Computer integrated design & Manufacturing	Bedwoth, Wolfe and Anderson, MGH(1) public
2. Numerical control and computer aided manufacturing	T.K.Kundra & P.A. Rao (TMH Publication)
3. Computer Integrated Manufacturing	S.K.Vajpayee , (PHI Publication)
4. Technology of computer aided design and Manufacturing	S. Kumar and A. K. Jha (Dhanpatrai & Sons)
5. Computer Numerical Control	Hans B. Keif, T. Fredric Waters Glencoe M. Publi