Program : **Diploma in Mechanical Engineering / Manufacturing Technology**	
Course Code : **6022A**	Course Title: **Computer Aided Design and Manufacturing**
Semester : **6**	Credits: **4**
Course Category: **Open Elective**	
Periods per week: **4 (L:3, T:1, P:0)**	Periods per semester: **60**

Course Objectives:

- To impart the concept of CAD and geometric modelling
- To impart the concept of computer aided manufacturing
- To familiarize students with the technology involved in NC, CNC and DNC system
- To explain CNC components and part programming

CoursePrerequisites:

Topic	Course Code	Course Name	Semester
Basic science		MathematicsI	1
Concept of projections		EngineeringGraphics	1
Basics of manufacturing and machine tools		Manufacturing technology	2
		Machine tools	3

CourseOutcomes

On completion of the course, the student will be able to:

COn	Description	Duration (Hours)	Cognitive Level
CO1	Explain the concept of CAD and geometric modeling	15	Understanding
CO2	Comprehend the concept of CAM	14	Understanding
CO3	Describe the technology involved in NC, DNC and CNC system	15	Understanding
CO4	Apply part programming in CNC system	14	Applying

	Series Test	2	

CO-PO Mapping:

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2						
CO2	2						
CO3	2						
CO4		3					

3-Strongly mapped, 2-Moderately mapped, 1-Weakly mapped

Course Outline

Module Outcomes	Description	Duration (Hours)	Cognitive Level
CO1	**Explain the concept of CAD and geometric modeling**		
M1.01	Define CAD and list its benefits	1	Understanding
M1.02	Classify CAD system	1	Understanding
M1.03	Recognize CAD hardware and secondary storage devices	8	Understanding
M1.04	Explain geometric modeling techniques	5	Understanding
Contents: CAD - CAD activities –benefits of CAD - CAD hardware -Input/output devices - CRT - raster scan & direct view storage tube – LCD –LED- plasma panel - mouse - digitizer - image scanner - drum plotter - flat bed plotter - laser printer - Identify Secondary storagedevices - hard disk - floppy disk - CD - DVD – Flash memory - CAD system - PC based CAD system – workstation based CAD system - graphics workstation - configuration –specification - CAD software packages - computer networking – purposes - topology – Geometric modelling techniques -wire frame –surface – solid modelling			
CO2	**Comprehend the concept of CAM**		
M2.01	Define CAM	2	Understanding
M2.02	Classify CAPP and its advantages	3	Understanding
M2.03	Describe product development cycle	5	Understanding

M2.04	Explain 3D printing	4	Understanding
	Series Test– I	1	

Contents:

Define CAM-functions-benefits-CAD/CAM-Process planning-master date–CAPP - structure - Classification - Variant - generative - advantages - production planning –Master production schedule (MPS)-capacity planning-Guidelines for Design of Manufacture/assembly – Product development cycle - sequential engineering – concurrent engineering- Rapid prototyping -concept-applications.

CO3	**Describe the technology involved in NC, DNC and CNC system**		
M3.01	Explain numerical control system and its components	5	Understanding
M3.02	Describe working principle of CNC system	4	Understanding
M3.03	Differentiate between NC and CNC system	3	Understanding
M3.04	Classify turning centers and machining centers	3	Understanding

Contents:

Numerical control – components –development of NC - DNC –CNC- Adaptive Control Systems – CNC - working principle –features –advantages – Differentiate NC and CNC – turning centres-Classification-horizontal-vertical-machining centres-horizontal spindle-vertical spindle –universal machines-machine axis conventions

CO4	**Apply part programming in CNC system**		
M4.01	Recognize different drives and feedback devices	4	Understanding
M4.02	Explain part programming	3	Understanding
M4.03	Demonstrate part program for lathe and milling machine	7	Applying
	Series Test– II	1	

Contents:

Drives-spindle drive-hydraulic drive systems–direct current motors-stepping motors -servo motors -AC drive spindles – slide ways - linear motion bearing – recirculation ball screw -ATC - tool magazine -feedback devices - encoders –linear and rotary transducers - in-process probing - NC part programming -manual programming - sequence number –pre paratory functions and G codes-miscellaneous functions- M codes

Coordinate system - types of motion control - point-to-point - paraxial and contouring-NC dimensioning.-Reference points-machine zero-work zero-tool zero - tool offsets - Part program -tool information - speed - feed data - interpolation - macro subroutines - mirror images – thread cutting – sample programs for lathe and milling – CNC codes from CAD models - post processing - conversational programming – APT programming

Text / Reference:

T/R	BookTitle/Author
T1	CAD/CAM/CIM – R. Radhakrishnan. S, Subramanian, V. Raju – New AgeInternationalPvt Ltd
T2	M.P.Groover,E.M.Zimmers,Jr.CAD/CAM;ComputerAidedDesignandManufacturing,PrenticeHall of India, 1987
R1	IbrahimZeid, CAD/ CAM Theoryand Practice,McGraw Hill,2007
R2	ChrisMcMahonandJimmieBrowne“CAD/CAMPrinciples","PracticeandManufacturingmanagement“SecondEdition,PearsonEducation,1999.

Online Resources

Sl No	WebsiteLink
1	https://www.autodesk.in/solutions/cad-cam
2	https://www.webopedia.com/TERM/C/CAD_CAM.html