

GANPAT UNIVERSITY									
FACULTY OF ENGINEERING & TECHNOLOGY									
Programme		Diploma Engineering			Branch		Mechanical Engineering		
Semester		VI			Version		1.0.0.0		
Effective from Academic Year			2020-21		Effective for the batch Admitted in			July 2018	
Subject code		1ME2601		Subject Name		COMPUTER AIDED MANUFACTURING			
Teaching scheme					Examination scheme (Marks)				
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	2	0	5	Theory	40	60	100
Hours	3	0	4	0	7	Practical	60	40	100

Pre-requisites:
None

Course Learning Outcomes:
<p>After learning this course, the student would be able to:</p> <p>CO1. Identify different axes, machine zero, home position, controls and features of CNC machines.</p> <p>CO2. Select, mount and set cutting tools and tool holders on CNC.</p> <p>CO3. Prepare part programmes using ISO format for given simple components with and without use of MACRO, CANNED CYCLE and SUBROUTINE using ISO format.</p> <p>CO4. Interface software application for auto part programming.</p> <p>CO5. Students will select layouts of FMS for industrial applications.</p> <p>Make the job as per given manufacturing drawing. The practical should be carried out in such a manner that students are able to acquire different learning outcomes in cognitive, psychomotor and affective domain to demonstrate learning course outcomes.</p>

Course Content				
Name of UNIT	Unit Content	Unit Learning Outcomes	Marks	Hrs
UNIT – 1 (Fundamentals of CAM.)	1.1 CAM - concept and definition. 1.2 NC (Numerical Control), CNC (Computerized Numerical Control) and DNC (Direct Numerical Control) - concept, features and differences. 1.3 Advantages and limitations of CNC. 1.4 Selection criteria for CNC machines.	1a. Differentiate between NC, CNC and DNC. 1b. Identify parameters governing for selection of CNC machines.	10	6
UNIT – 2 (Constructional features of CNC machines.)	2.1 CNC machines: Types, classification, working. 2.2 Spindle drives and axes drives on CNC machines. 2.3 Machine structure- Requirements and reasons. 2.4 Elements of CNC machines - Types, sketch, working and importance of: i. Slide ways. ii. Re-circulating ball screw.	2a. Classify CNC machines. 2b. Identify role of main elements of CNC machines. 2c. Identify CNC axes. 2d. Preset tool on CNC machines.	10	9

	<ul style="list-style-type: none"> iii. Feedback devices (transducers, encoders). iv. Automatic tool changer (ATC). v. Automatic pallet changer (APC). <p>2.5 CNC axes and motion nomenclature.</p> <p>2.6 CNC tooling :</p> <ul style="list-style-type: none"> i. Tool pre-setting-concept and importance. ii. Qualified tools-definition need and advantages. iii.Tool holders- types and applications 	2e. Use qualified tools and tool holders on CNC machine		
UNIT – 3 (CNC Turning & Machining Centres.)	<p>3.1 CNC turning centres and CNC machining centres:</p> <ul style="list-style-type: none"> i. Types. ii. Features. iii. Axes nomenclature. iv. Specification. v. Work holding devices -types, working and applications. vi. Tool holding and changing devices - types, working and applications. 	<p>3a.List features of specified CNC turning and machining centre.</p> <p>3b.Identify various work holding and tool holding devices.</p>	10	8
UNIT – 4 (CNC part programming.)	<p>4.1 Definition and importance of various positions like machine zero, home position, work piece zero and programme zero.</p> <p>4.2 CNC part programming: programming format and structure of part programme.</p> <p>4.3 ISO G and M codes for turning and milling-meaning and applications of important codes.</p> <p>4.4 Simple part programming for turning using ISO format having straight turning, taper turning (linear interpolation) and convex/concave turning (circular interpolation).</p> <p>4.5 Simple part programming for milling using ISO format.</p> <p>4.6 Importance, types, applications and format for:</p> <ul style="list-style-type: none"> i. Canned cycles. ii. Macro. iii.Do loops. iv. Subroutine. <p>4.7 CNC turning and milling part programming using canned cycles, Do loops and Subroutine.</p> <p>4.8 Need and importance of various compensations:</p> <ul style="list-style-type: none"> i. Tool length compensation. ii. Pitch error compensation. iii. Tool radius compensation. iv. Tool offset. 	<p>4a. Interpret ISO format of CNC part programming with used codes.</p> <p>4b. Prepare part programme by using applicable codes like G& M etc.</p> <p>4c. Apply advanced CNC part programming features like canned cycle, do loop, subroutine etc.,</p> <p>4d. Describe procedure for Setting various compensations on CNC.</p> <p>4e. Prepare part programme considering various compensations.</p>	20	14

	4.9 Simple part programming using various compensations.			
UNIT – 5 (Recent trends in CAM.)	5.1 Interfacing standards for CAD/CAM - Types and applications 5.2 Adaptive control- definition, meaning, block diagram, sources of variability and applications. 5.3 Flexible Manufacturing System (FMS) - concept, evaluation, main elements and their functions, layout and its importance, applications. 5.4 Computer Integrated Manufacturing (CIM) - Concept, definition, areas covered, benefits. 5.5 Robotics- definition, terminology, classification and types, elements and applications. 5.6 Rapid prototyping - Concept and application	5a. Select suitable standard for CAD/CAM interfacing. 5b. List source of variability for adaptive control. 5c. Interpret different FMS layouts. 5d. Correlate areas of CIM. 5e. Identify types and elements of robots. 5f. Describe concept of Rapid prototyping	10	8
			Total	60
				45

List of Practical			
No.	Unit	Name of Practical	
1	II	Demonstrate constructional features of CNC.	
2	IV	CNC turning part programming.	
3	IV	CNC machining centre part programming.	
4	III	Demonstration of CAD/CAM integration.	
5	ALL	Industrial visit.	
List of Instruments/Equipment/Trainer Board			
1	CNC Turning Centre (Tutor or Productive)- Minimum diameter 25 mm, Length 120 mm with ATC. (Approximate)		
2	CNC Machining Centre (Tutor or Productive)- X axis travel - 225 mm, Y axis travel - 150 mm, Z axis travel - 115 mm, With ATC. (Approximate)		
3	Simulation software likes: CNC Simulator Pro, Swansoft CNC, etc.		
4	Latest version of CAD/CAM integration software like MASTER CAM, NX CAM, SolidCAM Etc.		
List of Text Books			
No	Title of Books	Authors	Publication
1	Computer Aided Manufacturing	Rao P N, Tiwari N K, Kundra T	Tata McGraw Hill
List of Reference Books			
No	Title of Reference Books	Authors	Publication
1	CNC Machines.	Pabla B.S., Adithan M.	New Age International, New Delhi, 2014 (reprint).
2	Introduction to NC/CNC Machines.	Vishal S.	S.K.Kataria & Sons. 2012.
3	Computer Numerical Control- Turning and Machining centres	Quesada Robert	Prentice Hall 2014.
5	CAD/CAM.	Sareen Kuldeep	S.Chand 2012.
Link of Learning Web Resource			
1	http://www.nptel.ac.in		
2	http://www.youtube.com/watch?v=M3eX2PKM1RI		

3	http://www.mtabindia.com
4	http://www.youtube.com/watch?v=hJFLcvtiNQI
5	http://www.youtube.com/watch?v=BIM1AyxYkw
6	http://www.swansoftcncsimulator.com

PO & CO Mapping							
Sr. No.	Name of PO	Description	Co1	Co2	Co3	Co4	Co5
1	PO 1	Acquire fundamental knowledge of mathematics, science, and mechanical engineering.	Moderate	Substantial	Substantial	Moderate	Slight
2	PO 2	Design and conduct experiments, as well as analyze and interpret data.	Slight	Substantial	Moderate	Slight	None
3	PO 3	Use the techniques, skills, and modern engineering tools necessary for engineering practice	Substantial	Moderate	Substantial	Moderate	None
4	PO 4	Function in multi-disciplinary teams and identify, formulate, and solve engineering problems.	None	Slight	Slight	Slight	Moderate
5	PO 5	Clear understanding of his duties and responsibilities as a mechanical engineer.	None	Slight	Substantial	Moderate	Slight
6	PO 6	Develop effective communication skill and provide leadership for professional development.	None	None	Moderate	Slight	Moderate
7	PO 7	Engage in life-long learning in mechanical engineering field and comprehend issues related to environment and sustainable development.	None	Slight	Slight	Slight	Moderate
8	PO 8	Graduate will demonstrate knowledge of professional and ethical responsibilities.	Slight	Moderate	Substantial	Slight	Moderate
9	PO 9	Incorporate economics and business practice including project and risk management.	None	Slight	Substantial	Slight	None
10	PO 10	Graduated are able to share their knowledge to the industries as well as society.	Moderate	Moderate	Moderate	Substantial	Moderate
11	PO 11	Graduated will be able to apply their skill and knowledge for the sustainable development of nation.	None	None	Moderate	Moderate	Slight
12	PO 12	Graduated are able to learn to work with the team and also with the inter discipliners.	Slight	Substantial	Substantial	Moderate	Slight