

Program Code: ET201	
Subject Code: 1ET2010201	Subject Title: COMPUTER AIDED MANUFACTURING
Pre-requisite Subject	Zeal to learn the subject

Course Objective: To emphasize the knowledge on the quality improvement, automation, and advanced manufacturing techniques to create the highest-caliber products quickly, efficiently.

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture	Tutorial	Practical	Credit	Theory		Practical		Total
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
2	-	2	4	60	40	30	20	150

Subject Contents			
Sr. No	Topic	Total Hours	Weight (%)
1.	Fundamentals of Numerical Control: Need and future of NC Systems, Principles and Types of NC, Design Features of NC M/c Tools; Machining Centre;	04	16
2.	NC Part Programming: Manual, computer Assisted-APT, EXAPT, ADAPT and CAD based Part Programming	04	16
3.	Feedback Devices: Resolvers, Encoders, and Inductosyns	04	16
4.	Actuation Systems- Hydraulic, Pneumatic and Electromechanical	04	16
5.	Computer Control and Adaptive Control System-CNC, DNC and AC	04	16
6.	Flexible Manufacturing Systems: Concept and Classification, Types of Flexibility, pallets, fixtures, work handling systems, simulation and analysis in the design of FMS;	05	20

Review Presentation: The student is expected to spend minimum 2 hours per week (as mentioned in the teaching and evaluation scheme) to refer at least two peer reviewed journal papers related to this domain/subject. The student is expected to identify issues/challenges and emerging trends in the domain/subject. Student is supposed to explore various video lectures (E.g. NPTEL) available in the domain/subject. Student is required to make a review-presentation on the work carried out for the same.

Recommended sites for journal papers are (1) asmedigitalcollection.asme.org (2) springer.com (3) sciencedirect.com (5) ieeexplore.ieee.org (6) scholar.google.co.in or others of similar repute.

Course Outcome:

After successful completion of the course, student will be able to

1. understand the basic principles of part programming for CNC machining
2. select and apply appropriate operations, cutting parameters, cutting tools and software to machine a part
3. create and optimize a part program using programming concepts for practical applications
4. execute part program to produce quality part on CNC machine
5. understand the components and design of FMS

List of References:

1. CNC Programming, S.K.Sinha , Galgotia Publications
2. Automation, Production Systems and Computer Integrated Manufacturing , Groover M.P., Third Edition, Prentice-Hall, 2007
3. Parametric and feature based CAD/CAM, Shah J.J., Mäntylä M., 1995, John Wiley Sons Inc. Mechatronics, HMT, McGraw Hill Education
4. Introduction to Computer Numerical Control , James V. Valentino and Joseph Goldenberg, 5th ed, Prentice Hall, Englewood Cliff, New Jersey, 2012.
5. Computer control of Manufacturing Systems, Yoram Koren, , McGraw Hill, 2006
6. Numerical Control and Computer Aided Manufacturing , T.K. Kundra, P.N.Rao, N.K. Tewari, Tata McGraw Hill Publishing Company Ltd.
7. CNC Machining and Programming: An Introduction ,David Gibbs and Thomas Crandall, , Industrial Press Inc., 2003

List of Experiments:

1. CNC machines hardware and their axis designations.
2. Manual part programming for CNC lathe without canned cycles
3. Manual part programming for CNC lathe for multipass turning and facing
4. Manual part programming for CNC lathe for undercutting, multi-pass threading and grooving
5. Manual part programming for profile milling with cutter radius compensation
6. Manual part programming for pocket milling with repeat count
7. Manual part programming for mirroring using sub program
8. Manual part program using macros
9. Automatic part programming using high end CAD/CAM softwares