SCHEME OF COURSE WORK

Course Details:

Course Title	**: Computer Aided Manufacturing**		
Course Code	**: 15ME2111**	**L T P C**	**: 3 0 0 3**
Program:	**: M.Tech.**		
Specialization:	**: CAD/CAM**		
Semester	**: II**		

Course Outcomes (COs):

At the end of the course, the student will be able to

1	Explain NC, CNC and DNC machines
2	Discuss the different features of NC machine tools
3	Develop NC part program for various machining operations
4	Develop APT part program for various machining operations
5	Describe the application of adaptive control in CNC machine and quality control

Program Outcomes (POs)

At the end of the program, the students in CAD/CAM will be able to

1. acquire fundamentals in the areas of computer aided design and manufacturing
2. apply innovative skills and analyze computer aided design and manufacturing problems critically
3. identify, formulate and solve design and manufacturing problems
4. carry out research related to design and manufacturing
5. use existing and recent CAD/CAM software
6. collaborate with educational institutions, industry and R&D organizations in multidisciplinary teams
7. apply project and finance management principles in engineering projects
8. prepare technical reports and communicate effectively
9. engage in independent and life-long learning and pursue professional practice in their specialized areas of CAD/CAM
10. exhibit accountability to society while adhering to ethical practices
11. act independently and take corrective measures where necessary

Course Outcome versus **Program Outcomes:**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-1	S	M	M	M					M			
CO-2		M	M	M					M			
CO-3	M	M	M	M	S		M		M			
CO-4	M		M						M			
CO-5	M		M						M			

S - Strongly correlated, *M* - *Moderately* correlated, *Blank* - *No correlation*

Assessment Methods: Assignment / Quiz / Seminar / Case Study / Mid-Test / End Exam

Teaching-Learning and Evaluation

Week	TOPIC / CONTENTS	Course Outcomes	Sample questions	TEACHING-LEARNING STRATEGY	Assessment Method & Schedule
1	Introduction: Basic concepts in manufacturing systems, coordinate systems, advantages of NC systems	CO1	(i)Differentiate between NC, CNC and DNC. (ii)Explain different types of feedback devices in CNC machine. (iii) Differentiate between open loop and closed loop control system. (iv)Explain the basis for designating the coordinate axes in CNC machine tools	Lectures , CNC videos, PPT, Seminar	Seminar-I (week 2-8)
2	classification of NC systems, Point to point and contouring system, incremental and absolute system, open loop and closed system				
3	CNC, DNC, feedback devices				
4	Features of NC machine tools: fundamentals of machining, design considerations of NC machine tools	CO2	(i)Explain the design criteria to be used in designing CNC machine tools. (ii)Describe the methods to improve machine accuracy in CNC. (iii) Explain any four types of mode in CNC lathe.	Lectures, PPT, Seminar	
5	methods of improving machine accuracy, increasing productivity with NC machines, machining center, turning center, mode selection	CO2			
6	cutter radius compensation, tool length compensation, NC part programming: Part program instruction formats	CO2, CO3	(i) Discuss about tool length compensation and cutter compensation in CNC.	Lectures, PPT, Seminar	
7	Information codes: Preparatory function, Miscellaneous functions, Tool code and		(i)Explain the function of		

	tool length offset, Interpolations	CO3	preparatory functions in CNC part program. (ii)Write a part program for milling operation with one example.	Lectures, PPT, Seminar	
8	Canned cycles, Manual part programming for drilling, milling, Programming examples				
9	Mid-Test 1	CO-1, CO-2, CO3			Mid-Test 1 (Week 9)
10	Manual part programming for turning operations, Programming examples	CO3	(i)Write a part program for step turning operation with one example. (ii) Write a part program for Circular turning operation with one example. (iii) Write a part program for threading operation with one example.	Lectures, PPT, Seminar	
11	Manual part programming for turning operations, Programming examples				Seminar-II (week 11-17)
12	APT programming: APT language structure, APT geometry: Definition of point, line, circle, plane, patterns and matrices.	CO4	(i)Explain the basic structure of APT language. (ii)Discuss the different types of motion commands. (iii)Differentiate between GOTO and GO\TO statement. (iv) (ii)Write APT part program for milling operation with one example.	Lectures, PPT, Seminar	
13	APT motion commands: point-to-point motion commands, continuous path motion commands. Post processor commands, Macro subroutines				
14	APT programming examples				

15	Adaptive control systems: Introduction, sources of variability in machining, benefits of adaptive control, adaptive control with optimization for a milling machine	CO5	(i) Explain the sources of variability in machining. (ii) Explain adaptive control with optimization for a milling machine. (iii) Describe the working principle of machine vision.	Lectures, PPT, Seminar	
16	adaptive control with constraints for lathe Computer aided quality control: Terminology in quality control, computer in QC, contact inspection methods,				
17	Noncontact inspection methods	CO5			
18	Mid-Test 2	CO3, CO4, CO5			Mid-Test 2 (Week 18)
19/20	END EXAM	All Cos			