SCHEME OF COURSE WORK

Course Details:

Course Title	**:Advanced Tool Design**			
Course Code	**:13ME2105**	**L T P C**	**:4 - - 3**	
Program:	**: M.Tech.**			
Specialization:	**: CAD/CAM**			
Semester	**:I**			
Prerequisites	**:Material science and Manufacturing technology**			
Courses to which it is a prerequisite	**:**			

Course Outcomes (COs): At the end of the course, the student will be able to

CO 1	Describe tool design methods and die and punch manufacturing techniques
CO 2	Select material for cutting tools and gages; classify various cutting tools and gages and identify their nomenclature
CO 3	Describe the principles of clamping, drill jigs and computer aided jig design
CO 4	Design fixtures for milling, boring, lathe, grinding, welding; identify fixtures and cutting tools for NC machine tools
CO 5	Explain the principles of dies and moulds design

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**
CO-1			M	M							M
CO-2											M
CO-3	S	S	M								
CO-4	S	S	M								
CO-5			M								

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

Assessment Methods:	Assignment / Seminar / Mid-Test / End Exam

Teaching-Learning and Evaluation

Week	TOPIC / CONTENTS	Course Outcomes	Sample questions	TEACHING-LEARNING STRATEGY	Assessment Method & Schedule
1	Tool design methods: tentative design solutions, finished design, drafting and design techniques in tooling drawings	CO-1	Explain various drafting and design techniques.	▫ Lecture ▫ Demonstration	Assignment (Week 2 - 4)
2	Punch and die manufacturing techniques	CO-1	Discuss considerations in punch and die design	Lecture / Discussion	Mid-Test 1 (Week 9)
3	Tooling materials: Introduction, properties of tool materials, metal cutting tools, single point cutting tools,	CO-2	What is ment by tool steel? What are the characteristics of oxide cutting tools?	▫ Lecture ▫ Problem solving	Seminar – 1 (Week 2 - 6)
4	Milling cutters, drills and drilling, reamer classification, taps, tap classification, the selection of carbide cutting tools, various heat treatments	CO-2	Why is chip formation in miling more complicated than in single point turning?	Lecture / Discussion	
5	Gages and gage design**:** Fixed gages, gage tolerances, the selection of material for gages.	CO-2	Design a form gauge to check the angle of the workpiece shown in figure.	Lecture / Discussion Demonstration	
6	Design of jigs: Principles of clamping, drill jigs, chip formation in drilling,	CO-3	What are the common methods of locating from circular surface?	Lecture / Discussion Demonstration Problem solving	
7	General considerations in the design of drill jigs, drill jigs and modern manufacturing	CO-3	What are the general considerations in the design of drill jigs?	Lecture Demonstration Problem solving	
8	computer aided jig design	CO-3	Explain computer aided jig design.	▫ Lecture Demonstration	
9	**Mid-Test 1**				
10	Design of fixtures: Types of fixtures, vice fixtures, milling fixtures, boring fixtures,	CO-4	Design a milling fixture to machine the link connecting rod shown in figure.	▫ Lecture/Discussin ▫ Demonstration	Mid-Test 2 (Week 18)
11	Broaching fixtures, lathe fixtures, grinding fixtures	CO-4	Design a grinding fixture to surface grind the workpiece shown in figure.	Lecture / Discussion Problem solving	Case Study (Week 10 - 14)

12	Computer aided fixture design, welding fixtures, fixture design for NC machine tools	CO-4	Design a universal N/C fixture to hold the workpiece shown in figure.	Lecture / Discussion Demonstration	Seminar – 2 (Week 12 - 16)
13	Cutting tools for numerical control, tool holding methods for numerical control.	CO-4	How are lathe chicks used as holding fixtures in N/C machine tools?	Lecture / Discussion	
14	Design of dies and moulds: Die-design fundamentals, blanking and piercing die construction	CO-5	Determince the proper die clearance for theb workpeice shown in Figure.	Lecture / Discussion Problem solving Demonstration	
15	Pilots, strippers and pressure pads, presswork materials, bending dies, forming dies, drawing operations	CO-5	What are the various types of neding dies?	Lecture / Discussion Demonstration	
16	Mould design: Splits in mould, split locking, two-cavity and multi-cavity moulds	CO-5	What are the various types of moulds and write general considerations in mould design	Lecture / Discussion Demonstration	
17	Design details of injection moulds	CO-5	Comment on design considerations in design of injection moulds.	Lecture / Discussion	
18	**Mid-Test 2**				
19/20	**END EXAM**				