SCHEME OF COURSE WORK

Course Details:

Course Title	**: PRODUCT DESIGN AND DEVELOPMENT**		
Course Code	**: 15ME2107**	**L T P C**	**: 3 0 0 3**
Program:	**: M.Tech.**		
Specialization:	**: CAD-CAM**		
Semester	**: FIRST**		
Prerequisites	**: MANUFACTURING TECHNOLOGY**		
Courses to which it is a prerequisite	**: ADVANCED MANUFACTURING TECHNOLOGY**		

Course Outcomes (COs):

The student will be able to

1. examine the characteristics used for product design and development.
2. recognize the customer requirements in product design.
3. apply structural approach to concept generation, selection and testing.
4. identify various aspects of design such as industrial design, design for manufacture and product architecture.
5. explain various principles and technologies used for the preparation of prototype.

Program Outcomes (POs):

A postgraduates of CAD/CAM will have the

1. Ability to apply fundamental principles in the areas of computer aided design and manufacturing
2. Ability to apply creative and innovative skills to analyze computer aided design and manufacturing problems
3. Ability to identify, formulate and solve design and manufacturing problems
4. Ability to carry out the research related to design and manufacturing
5. Familiarity with existing and recent CAD/CAM software
6. Ability to collaborate with educational institutions, industry and R&D organizations in multidisciplinary teams
7. Ability to apply project and finance management skills to manage projects
8. Ability to prepare technical reports and communicate effectively
9. Awareness of the need for and ability to engage in lifelong learning
10. Ethical attitude and accountability to the society
11. Ability to conduct a thorough survey and analyze critically to plan, design and implement new thoughts into action

Course Outcome versus **Program Outcomes:**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO-1	M	M	M	S	S	S	M				M
CO-2		S		S		S	M	M	M	M	
CO-3	M	S	S	M		S	S				S
CO-4	S	M	S	S		S			S		M
CO-5	S	S	S	S	S	S	M	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	CO	Sample questions	Teaching – Learning Strategy	Assessment Method & Schedule
1	Characteristics of successful product development, design and development of products, duration, and cost of product development, the challenges of product development	**1**	What are the various challenges for product development?	▫ Lecture ▫ Demonstration	
2	Development Processes and Organizations: A generic development process, concept development: the front-end process, adopting the generic product development process	**1**	Explain about generic development process with an example?	▫ Lecture ▫ Discussion	
3	The AMF development process, product development organizations, the AMF organization	**1**	Write about AMF development process?	▫ Lecture ▫ Discussion	**Seminar 1 (Week 3)**
4	Product planning: The product planning process, identify opportunities, evaluate and prioritize projects, allocate resources and plan timing	**1**	How do you identify opportunities in product planning process?	▫ Lecture ▫ Discussion ▫ Problem solving	
5	Complete pre project planning, reflect all the results and the process	**2**	What do you project planning?	▫ Lecture ▫ Discussion ▫ Problem solving	
6	Identifying customer needs: Gather raw data from customers, interpret raw data in terms of customer needs	**2**	What are the various steps to identify customer needs?	▫ Lecture ▫ Discussion	
7	Organize the needs into a hierarchy, establish the relative importance of the needs and reflect on the results and the process	**2**	What are the various types of needs?	▫ Lecture ▫ Discussion	**Assignment 1 (Week 7 - 9)**
8	Concept Generation: The activities of concept generation clarify the problem, search externally, search internally, explore systematically, reflect on the results and the process	**3**	Explain the activities of concept generation?	▫ Lecture ▫ Discussion	
9	**Mid-Test 1**				**Mid-Test 1 (Week 9)**
10	Concept selection: Overview of methodology, concept screening and concept scoring	**3**	Differentiate between concept screening and concept scoring?	▫ Lecture ▫ Discussion	
11	Concept testing: Define the purpose of concept test, choose a survey population, choose a survey format, communicate the concept, measure customer response, interpret the result, reflect on the results and the process	**3**	Define the purpose of concept testing?	▫ Lecture ▫ Discussion	
12	Product architecture: implications of the architecture, establishing the architecture, variety and supply chain considerations, platform planning, related system level design issues	**4**	What do you mean by platform planning?	▫ Lecture ▫ Discussion	**Seminar 2 (Week 12)**
13	Assessing the need for industrial design, the impact of industrial design, industrial design process, managing the industrial design process, assessing the quality of industrial design	**4**	Explain the importance of industrial design process?	▫ Lecture ▫ Discussion	
14	Design for manufacturing: Definition, estimation of manufacturing cost, reducing the cost of components, assembly, supporting production, impact of DFM on other factors	**5**	How do you reduce the cost of components? Explain?	▫ Lecture ▫ Discussion	
15	Prototyping: Prototyping basics, principles of prototyping, technologies, planning for prototypes	**5**	What are the basic principles of prototyping?	▫ Lecture ▫ Discussion	
16	Product development economics: Elements of economic analysis, base case financial mode, sensitive analysis	**5**	Explain the elements of economic analysis?	▫ Lecture ▫ Discussion	**Assignment 2 (Week 16 - 18)**
17	Project trade-offs, influence of qualitative factors on project success, qualitative analysis	**5**	What are the various qualitative factors that influence project success?	▫ Lecture ▫ Discussion	
18	**Mid-Test 2**				**Mid-Test 2 (Week 9)**
19/20	**END EXAM**				**END EXAM**

TEXT BOOKS:

1. A K Chitale and R C Gupta , " *Product Design and Manufacturing*", PHI, New Delhi, 2003
2. Karl.T.Ulrich and Steven D Eppinger, "*Product Design and Development*", MGH International, 2002

REFERENCES:

1. George E Deiter, " Engineering Design", McGraw-Hill International, 2002
2. Boothroyd G, "Product design for Manufacture and Assembly", 1e, Marcel Dekker Inc, New York, 1994