

PRODUCT DESIGN FOR MANUFACTURE–EI 2
Semester I (Production Engineering) SUB CODE: MEPR107-A
Teaching Scheme (Credits and Hours)

Teaching Scheme				Total Credit	Evaluation Scheme					Total Marks
L	T	P	Total		THEORY		IE	CIA	PR. / VIVO	
Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	
3	0	2	5	4	3	70	30	20	30	150

LEARNING OBJECTIVES:

The objective of this course is

- To learn various concepts related to product design
- To have practical purview of various product development

LESSON PLANNING

SR.NO	CHAPTER NO	DATE/WEEK	%WEIGTAGE
1	1,2	1 st 2 nd 3 rd	20
2	3	4 th 5 th 6 th	20
3	4	7 th 8 th 9 th	20
4	5	10 th 11 th 12 th	20
5	6	13 th 14 th 15 th	20

Total hours (Theory): 45, Total hours (Practical): 30, Total hours: 75

DETAILED SYLLABUS

Chap . No.	Topic
1	Engineering materials: metals and their properties, uses, processing methods, design data and applications, selection criteria
2	Manufacturing and processing limitations, comparative studies; plastics and composites, types, classifications, properties, processing techniques and limitation, selection of plastics for specific applications, finishing and surface coating of different materials. Processing of polymers and ceramics, surface modification of materials.
3	stages of product design: An overview of three stages of product design, generating and evaluating conceptual alternatives from manufacturing point of view, selection of material and processes, evaluating part configuration for manufacturability, evaluating parametric design for manufacturability Design for manufacture, influence of materials process and tooling on the design of components manufactured by metal casting, forming and joining, forging, sheet metal design of components
4	Elements of cost of a product: Costing methods, cost reduction and cost control activities. Economic analysis, Break even analysis Charts. Value engineering in product design, creativity aspects and techniques. Procedures of value analysis – cost reduction, material and process selection Various manufacturing processes, degree of accuracy and finish obtainable, process capability studies Methods of improving tolerances. plastics, rubber and ceramics for product design Recent developments in casting, machining, forming and finishing

	Product design for manual assembly, product design for high- speed automatic assembly and product design for robot assembly.
5	Ergonomics: Ergonomics and automated systems, expert systems for ergonomic design, anthropomorphic data and its application in ergonomic design, limitations of anthropomorphic data, use of computerized database
6	Aesthetic Concepts : Concepts of Unity, concept of order with variety, concept of purpose, style and environment, aesthetic expression, style – components of style, house style, Observing style in capital goods

LIST OF PRACTICALS

Sr. No.	Practical Content
1	PARAMETRIC DESIGN FOR MANUFACTURABILITY FOR A GIVEN COMPONENT
2	MATERIAL SELECTION BASED ON DFM
3	FORMULATION OF DESIGN PROBLEM BASED ON EMBODIEMENT CONSIDERATION
4	FAILURE MODES & EFFECTS ANALYSIS FOR AN EXISTING PRODUCT
5	TOLERANCE ANALYSIS FOR ROBUST DESIGN
6	CONFIGURATION DESIGN FOR A NEW PRODUCT
7	CONCEPT DESIGN FOR A NEW PRODUCT
8	PRODUCT DESIGN FOR MANUAL ASSEMBLY
9	PRODUCT DESIGN FOR HIGH- SPEED AUTOMATIC ASSEMBLY
10	PRODUCT DESIGN FOR ROBOT ASSEMBLY.

INSTRUCTIONAL METHOD AND PEDAGOGY (Continuous Internal Assessment (CIA) Scheme)

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed
- Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & equal weightage should be given to all units while conducting teaching & examination.
- Attendance is compulsory in lectures and Tutorial.
- Viva Voce will be conducted at the end of the semester of 30 Marks.
- One internal exam of 30 marks is conducted as a part of Mid semester evaluation.

STUDENTS LEARNING OUTCOMES:

At the end of the course

The students will gain an experience in product design for various processes like casting, forging etc

Reference Books:

1. Dieter, G.E, Engineering Design: A materials and Processing Approach, McGraw Hill, 1991
2. Ashby, M.F., Materials selection in mechanical design, Pergamon press, 1992
3. Oswald, P.F and Begeman, M., Manufacturing Process, John Willy, 1987
4. Levy, S. and Dubois, L.H, Plastics production design Engineering Handbook, Methuen Inc, 1985
5. Product Design by Kevin otto, Kristin wood