

THE KAVERY ENGINEERING COLLEGE*(An Autonomous Institution)***M.E DEGREE END SEMESTER THEORY EXAMINATIONS, APRIL-MAY 2025****Second Semester****Product Design and Development****PD4291 / PPDT2422 - Designing with Advanced Materials****Regulations – 2021/2024****Duration : 3 Hrs****Maximum : 100 Marks****PART – A (ANSWER ALL QUESTIONS) (Marks 10*2=20)**

Q.No	Questions	BLT	CO	Marks
1.	What are the main phases of the reverse engineering process?	L1	1	2
2.	Differentiate between surface and solid model reconstruction.	L2	1	2
3.	What do you mean by alloy structure equivalency?	L1	2	2
4.	List out the common causes of part failure in engineering components.	L1	2	2
5.	Define microstructure analysis and mention its significance in material characteristic evaluation.	L2	3	2
6.	How does Energy Dispersive X-ray Spectroscopy (EDS) help in material characterization?	L2	3	2
7.	What is the role of statistical analysis in data processing?	L1	4	2
8.	What is the interference theory, and how does it apply to reliability engineering?	L1	4	2
9.	How does copyright law apply to reverse engineering?	L1	5	2
10.	Define patent and its role in protecting inventions.	L2	5	2

PART – B (ANSWER ALL QUESTIONS) (Marks 5*16 = 80)

Q.No	Questions	BLT	CO	Marks
11.	a i Explain the different phases involved in reverse engineering.	L2	1	8
	ii What is Computer-Aided Reverse Engineering (CARE)? How does it assist in the reverse engineering process? Justify.	L2	1	8
	Or			
	b i Explain the concept of reverse engineering with a suitable example.	L2	1	8
	ii Discuss the role of prototyping in the reverse engineering process. What are the various prototyping techniques used?	L2	1	8
12.	a i How does mechanical strength influence the durability of a component? Discuss with examples.	L2	2	8
	ii What is fatigue failure? Explain the stages of fatigue failure with an S-N curve.	L2	2	8
	Or			
	b i Explain the process of part failure analysis and its importance in failure prevention.	L2	2	8
	ii Define creep and stress rupture. How do they affect the life of materials used in high-temperature applications?	L2	2	8

13.	a	Discuss the working principle of the Scanning Electron Microscope (SEM) device and also explain how it is helpful in material characterization.	L2	3	16
		Or			
	b	Discuss the working principle of Energy Dispersive X-ray Spectroscopy (EDS) setup and also explain how it is helpful in in material characterization.	L2	3	16
14.	a	i Apply Weibull analysis in predicting part failure and product lifespan and discuss with example.	L3	4	8
		ii Illustrate the methods of data conformity and acceptance in engineering studies with suitable examples.	L3	4	8
		Or			
	b	i Discuss the role of statistical analysis in data processing and its applications in engineering.	L3	4	8
		ii Explain the methodology of performance evaluation and its role in improving product quality.	L3	4	8
15.	a	Explain the differences between patents, copyrights, and trade secrets with examples. How do they protect intellectual property in engineering?	L2	5	16
		Or			
	b	Discuss the applications of reverse engineering in the automotive industry. Provide examples of how manufacturers benefit from this approach.	L2	5	16