Reg. No.												

Question Paper Code	12283

B.E./B.Tech - DEGREE EXAMINATIONS, NOV/DEC 2023

Seventh Semester

Mechanical Engineering

20MEPW701 – 3D PRINTING AND SUSTAINABLE DESIGN WITH LABORATORY

(Regulations 2020)

Duration: 3 Hours Max. Marks: 100

PART - A (10 × 2 = 20 Marks)

Answer ALL Questions

		Marks, K-Level, CO
1.	Define Additive Manufacturing and provide its primary classifications.	*2,K1,CO1*
2.	State any four main applications of 3D printing in Industry 4.0.	*2,K1,CO1*
3.	What are the essential data requirements for effective rapid prototyping?	*2,K2,CO2*
4.	What is the significance of model slicing in additive manufacturing?	*2,K2,CO2*
5.	Differentiate between Indirect and Direct Selective Laser Sintering (SLS) processes.	*2,K1,CO3*
6.	List out any four benefits of Laminated Object Manufacturing (LOM).	*2,K1,CO3*
7.	What is a critical aspect to consider in assessing sustainable design?	*2,K1,CO4*
8.	Define sustainability in the context of design.	*2,K1,CO4*
9.	Distinguish between Remanufacturing and Demanufacturing.	*2,K2,CO5*
10.	What is meant by the term "Cleaner Production"?	*2,K1,CO5*

PART - B (5 × 13 = 65 Marks)

Answer ALL Questions

11.	a)	Discuss the need and development of, 3D printing technology, highlighting the key stages and developments that have led to its current state.	*13,K3,CO1*
		OR	
	b)	Explore the applications of 3D printing in disaster management scenarios, discussing its uses, benefits, and limitations in addressing crises and emergencies.	*13,K2,CO1*
12.	a)	Explain the importance of data formats and data interfacing in the context of additive manufacturing, emphasizing their role in the preparation of manufacturing-ready files.	*13,K3,CO2*
		OR	
	b)	Discuss the critical components of CAD model preparation required for data processing in rapid prototyping techniques.	*13,K2,CO2*

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create

13. a) Describe the methodology and application of Fused Deposition Modeling (FDM). *13,K3,CO3*

OR

b) Discuss the detailed working principles and variables associated with Binder Jetting and Material Jetting processes in additive manufacturing. *13,K3,CO3*

14. a) Explain the different Product Life Cycle Assessment Techniques in terms of their applicability and effectiveness in ensuring environmental friendliness. *13,K3,CO4*

OR

b) Elaborate on the pathways to achieve sustainability in design, emphasizing the main objectives and strategies employed. *13,K4,CO4*

15. a) Provide an overview of the khadi movement and its role as a precursor to the development of PSS thinking. Discuss how the movement contributed to sustainable and innovative approaches in product-service systems. *13,K4,CO5*

OR

b) Explore the opportunities and challenges associated with sustainable manufacturing in Industry 4.0. Analyze the role of innovative technology and Industry 4.0 concepts in fostering sustainability within manufacturing practices. *13,K4,CO5*

PART - C (1 × 15 = 15 Marks)

16. a) Describe and contrast Hybrid Additive Manufacturing techniques with Wire Arc Additive Manufacturing. Provide a case study that highlights the practical application of both techniques in the manufacturing industry, with their advantages. *15,K4,CO3*

OR

b) Discuss the approaches to improving productivity while maintaining sustainable manufacturing methods. Provide a case study illustrating how a process industry has successfully integrated productivity enhancement techniques with sustainable manufacturing practices. *15,K4,CO5*