Reg. No.																

Question Paper Code	14384

B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2026

Seventh Semester

Mechanical Engineering

20MUOE901 - INTRODUCTION TO DIGITAL MANUFACTURING

Regulations - 2020

Duration: 3 Hours Max. Marks: 100

PART – A (i) (MCQ)
(16 × 1 = 16 Marks)
Answer ALL Questions

		Marks	*K – Level*	*CO*
1.	Which of the following is NOT commonly used CAD software? a) Solidworks b) AutoCAD c) CATIA d) MATLAB	*1*	*K1*	*CO1*
2.	What is the main goal of factory layout planning? a) To reduce product design time b) To enhance the efficiency of production processes c) To create digital models of products d) To simulate robotic movements	*1*	*K1*	*CO1*
3.	Which activity best represents digital transformation in industries? a) Increasing manual interventions b) Avoiding digital tools c) Streamlining and automating tasks d) Emphasizing analog workflows	*1*	*K2*	*CO1*
4.	Which of the following is NOT a component of Industry 4.0? a) Cyber-Physical Systems b) Cloud Computing c) Lean Manufacturing d) Internet of Things	*1*	*K1*	*CO2*
5.	Which design principle of Industry 4.0 emphasizes the use of data to make decisions at the local level? a) Centralized control b) Decentralized decision-making c) Manual data entry d) Linear production processes	*1*	*K1*	*CO2*
6.	Which technology combination helps Industry 4.0 create digital twins of physical assets? a) Virtual Reality only b) IoT and sensor technologies c) Traditional CAD software d) Manual monitoring systems	*1*	*K2*	*CO2*
7.	According to the proposed framework, what occurs in the second phase of the roadmap process? a) Defining strategies and key technologies b) Generating ideas c) Developing new products and processes d) Evaluating project prioritization	*1*	*K1*	*CO3*
8.	What is the role of scheduling in the roadmap process? a) Identifying key technologies b) Visualizing the future c) Prioritizing projects d) Mapping out timelines for technological progress	*1*	*K1*	*CO3*
9.	On what basis are new products and processes prioritized in the roadmap framework? a) Random selection b) Benefits and added values c) Geographic alignment d) Budget constraints only	*1*	*K2*	*CO3*

10.	Which technology enables machines to automatically adapt to changes in production without human intervention? a) Additive manufacturing b) Self-configuration c) Virtual reality d) Augmented reality	*1*	*K1*	*CO4*
11.	Virtual reality (VR) in manufacturing is primarily used for: a) Real-time machine diagnostics b) 3D printing of parts c) Simulation of processes and training d) Connecting devices to the internet	*1*	*K1*	*CO4*
12.	In big data analytics, what is the purpose of data mining? a) Simulation of machines b) Discovering hidden patterns c) Process monitoring d) Robot learning	*1*	*K2*	*CO4*
13.	Which of the following is a significant challenge in digital manufacturing transformation? a) Decreasing production time b) Digital transformation challenges c) Simplifying manual processes d) Lowering raw material costs	*1*	*K1*	*CO5*
14.	In the context of digital manufacturing, what role do external organizations play? a) They replace traditional manufacturers b) They assist with logistical challenges c) They support digital manufacturing needs d) They control internal company policies	*1*	*K1*	*CO5*
15.	Why are new business models necessary in digital manufacturing industries? a) To maintain traditional practices b) To increase manual intervention c) To adapt to technological advancements d) To minimize automation investment	*1*	*K2*	*CO5*
16.	What is the major objective of smart supply chains in digital manufacturing? a) Increasing physical inventory levels b) Control algorithms for smart part logistics c) Reducing customer interaction d) Eliminating automation systems	*1*	*K2*	*CO5*

PART – A (ii) (Short Answer Questions)
(8 × 3 = 24 Marks)

Answer ALL Questions

17.	Explain the different types of factory layouts used in industrial manufacturing systems.	*3*	*K2*	*CO1*
18.	Apply the concept of offline robot programming to explain its benefits in improving industrial automation efficiency.	*3*	*K3*	*CO1*
19.	Explain the concept and significance of Industry 4.0 in modern manufacturing systems.	*3*	*K2*	*CO2*
20.	Illustrate the application of any two key components of Industry 4.0 in modern manufacturing systems.	*3*	*K3*	*CO2*
21.	Apply the principles of resource planning to develop an effective Technology Roadmap.	*3*	*K3*	*CO3*
22.	Illustrate the use of AR in product assembly processes and explain its key advantages.	*3*	*K3*	*CO4*
23.	Demonstrate the role of digital twins in IoT-enhanced manufacturing processes.	*3*	*K3*	*CO4*
24.	Explain any one new business model that has emerged due to digital manufacturing and describe its advantages.	*3*	*K2*	*CO5*

PART - B (Descriptive Answer Questions)
(5 × 12 = 60 Marks)

Answer ALL Questions

25.	a)	Utilize the concept of Computer-Aided Process Planning (CAPP) and demonstrate how it integrates with other digital manufacturing systems for efficient production planning.	*12*	*K3*	*CO1*
		OR			
	b)	Apply the key drivers of digital transformation in manufacturing to analyze their impact on industrial productivity and efficiency.	*12*	*K3*	*CO1*

26.	a)	Analyze the key components and design principles of Industry 4.0 and their application in smart manufacturing environments.	*12*	*K3*	*CO2*
		OR			
	b)	Apply the concepts of Industry 4.0 to predict future trends and their role in industrial evolution.	*12*	*K3*	*CO2*
27.	a)	Apply stakeholder engagement strategies during the Strategy Phase of a Technology Roadmap to ensure successful roadmap implementation.	*12*	*K3*	*CO3*
		OR			
	b)	Apply prototyping, customer feedback, and iterative development methods in the New Product and Process Development phase of a Technology Roadmap.	*12*	*K3*	*CO3*
28.	a)	Analyze the impact of Additive Manufacturing (AM) on traditional manufacturing workflows and apply its concepts to improve supply chain flexibility and production efficiency.	*12*	*K3*	*CO4*
		OR			
	b)	Apply Augmented Reality (AR) technologies in manufacturing processes to enhance productivity and worker training.	*12*	*K3*	*CO4*
29.	a)	Analyze the application of algorithms in optimizing logistics operations within manufacturing systems.	*12*	*K3*	*CO5*
		OR			
	b)	Develop digital transformation technologies to examine their impact on manufacturing operations and process efficiency.	*12*	*K3*	*CO5*