

B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2025

Seventh Semester

Mechanical Engineering

20MUOE901 – INTRODUCTION TO DIGITAL MANUFACTURING

Regulations - 2020

Duration: 3 Hours

Max. Marks: 100

PART - A (MCQ) (10 × 1 = 10 Marks)

Answer ALL Questions

	<i>Marks</i>	<i>K- Level</i>	<i>CO</i>
1. Which of the following is NOT commonly used CAD software? (a) Solidworks (b) AutoCAD (c) CATIA (d) MATLAB	1	K1	CO1
2. Which of the following is a key benefit of using CAD software? (a) Reducing material waste (b) Enhancing design accuracy and visualization (c) Simplifying assembly line operations (d) Controlling inventory levels	1	K1	CO1
3. Which of the following is NOT a component of Industry 4.0? (a) Cyber-Physical Systems (CPS) (b) Cloud Computing (c) Lean Manufacturing (d) Internet of Things (IoT)	1	K1	CO2
4. Which of the following best describes the impact of accelerated technological change on businesses? (a) Decreased market competitiveness (b) Increased product lifecycle times (c) Greater need for continuous adaptation and innovation (d) Reduced demand for technology training	1	K1	CO2
5. 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
6. What is the main focus of the development phase in the proposed roadmap framework? (a) Ideation (b) Evaluation (c) Portfolio projection (d) Project prioritization	1	K1	CO3
7. 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
8. Big data analytics in manufacturing allows companies to (a) Create physical prototypes faster (b) Generate random data (c) Analyze and optimize production data (d) Ignore data trends	1	K1	CO4
9. 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
10. What is the main objective of control algorithms in digital manufacturing? (a) To control workforce scheduling (b) To automate part logistics and supply chains (c) To increase paper-based record keeping (d) To enhance manual quality control processes	1	K1	CO5

PART - B (12 × 2 = 24 Marks)

Answer ALL Questions

11. What is the key benefit of offline robot programming?	2	K1	CO1
12. List the application of CAE in product development.	2	K1	CO1
13. List two key components of Industry 4.0.	2	K1	CO2

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| 14. Distinguish between today's traditional factories and Industry 4.0 factories. | 2 | K2 | CO2 |
| 15. How does the Process Development Phase align with business goals? | 2 | K1 | CO3 |
| 16. Define roadmap. | 2 | K1 | CO3 |
| 17. Explain the role of artificial intelligence (AI) in quality control in manufacturing. | 2 | K2 | CO4 |
| 18. What is the purpose of digital twins in IoT-enhanced manufacturing? | 2 | K1 | CO4 |
| 19. How do control algorithms help in managing logistics challenges? | 2 | K1 | CO5 |
| 20. Write any two examples of digital transformation challenges in manufacturing. | 2 | K1 | CO5 |
| 21. State the main goal of the Process Development Phase. | 2 | K1 | CO3 |
| 22. Explain the main role of AI in automated visual inspection. | 2 | K2 | CO4 |

PART - C (6 × 11 = 66 Marks)

Answer ALL Questions

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| 23. a) Explain the concept of Computer-Aided Process Planning (CAPP) and how it integrates with other digital manufacturing systems. | 11 | K2 | CO1 |
| OR | | | |
| b) Explain the role of Computer-Aided Design (CAD) in digital manufacturing and describe its key features. | 11 | K2 | CO1 |
| 24. a) Discuss about the key components and design principles of Industry 4.0. | 11 | K2 | CO2 |
| OR | | | |
| b) Explain how the rapid pace of technological change is influencing digital manufacturing. Discuss the key technologies involved and their impact on the manufacturing process. | 11 | K2 | CO2 |
| 25. a) Discuss the role of stakeholder engagement in the Strategy Phase of a Technology Roadmap and how it contributes to successful roadmap implementation. | 11 | K2 | CO3 |
| OR | | | |
| b) Describe the key stages of the Process Development Phase in a Technology Roadmap. | 11 | K2 | CO3 |
| 26. a) Explain how the Additive Manufacturing impacting traditional manufacturing workflows and what are its long-term implications for supply chains and production flexibility? | 11 | K2 | CO4 |
| OR | | | |
| b) Explain the role of self-configuration methods in manufacturing systems. | 11 | K2 | CO4 |
| 27. a) Discuss how the algorithms can be applied to optimize logistics in manufacturing. Explain it. | 11 | K2 | CO5 |
| OR | | | |
| b) Explain the need for new and successful business models in the digital manufacturing industry. | 11 | K2 | CO5 |
| 28. a) Illustrate the importance of digital transformation in the manufacturing sector. | 11 | K2 | CO5 |
| OR | | | |
| b) Discuss the concept of smart part logistics and its impact on supply chain efficiency. | 11 | K2 | CO5 |