Reg. No.																

Question Paper Code	14318

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

Eighth Semester

Mechanical Engineering

20MEEL803 - SMART 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.	Internet technology supports manufacturing industries by enabling _____ a) Offline inspection b) Real-time connectivity and monitoring c) Manual scheduling d) Paper-based design	1	K1	CO1
2.	Scheduling in manufacturing refers to _____ a) Machine lubrication b) Allocation of jobs over time c) Material selection d) Casting operation	1	K1	CO1
3.	Fuzzy Logic is best suited for _____ a) Exact numerical decisions b) Uncertainty and approximate reasoning c) Purely mechanical operations d) Deterministic control only	1	K1	CO1
4.	Intelligent CAD uses AI techniques like _____ a) Only mechanics b) Expert systems and neural networks c) Manual drafting d) Casting methods	1	K1	CO2
5.	Product and process design integration results in _____ a) Increased errors b) Concurrent engineering c) Manual manufacturing d) Reduced automation	1	K1	CO2
6.	A major benefit of web-based manufacturing is _____ a) Increased isolation b) Global collaboration and reduced cost c) Manual dependency d) Offline production	1	K1	CO2
7.	Soft automation refers to _____ a) Manual work b) Programmable and flexible automation c) Fixed automation d) Casting only	1	K1	CO3
8.	Flexible handling methods include _____ a) Manual cranes b) AGVs and robots c) Paper-based control d) Offline inspection	1	K1	CO3
9.	Expert systems are widely applied in _____ a) Decision support systems b) Manual machining c) Casting only d) Offline production	1	K1	CO3
10.	Vision systems in manufacturing are mainly used for _____ a) Inspection and identification b) Networking c) Accounting d) Programming	1	K1	CO4

11.	Expert systems _____ the reasoning ability of human experts. What is the key function they perform? a) Explicate & Storage b) Replicate & Reasoning c) Replicate & Automation d) Explicate & Calculate	*1*	*K1*	*CO4*
12.	Knowledge _____ focuses on acquiring and structuring knowledge for use in systems. What is its primary function? a) Engineering & Storage b) Engineering & Representation c) Re-Engineering & Re-Design d) Re-Engineering & Re-Networking	*1*	*K1*	*CO4*
13.	A sensor is required to _____ metallic objects without physical contact. Which principle best explains the working of the appropriate sensor? a) Attract & Optical b) Detect & Eddy c) Detect & Pneumatic d) Attract & thermal	*1*	*K1*	*CO5*
14.	Pneumatic sensors _____ based on a specific type of signal transmission. What type of signal do they primarily use? a) Function & Air b) Operate & Electrical c) Operate & Optical d) Operate & Magnetic	*1*	*K1*	*CO5*
15.	Operations Technology (OT) is used in industries to _____ and _____ machines and processes. What is its primary function? a) Manage, Regulate, Process b) Manage, Regulate, Control c) Arrange, Regulate, Development d) Arrange, Regulate, Storage	*1*	*K1*	*CO6*
16.	Industries use integrated data systems to _____ equipment failures before they occur. What is this approach called? a) Anticipate, Inspection b) Procrastinate, Integration c) Anticipate, Maintenance d) Procrastinate, Checking	*1*	*K1*	*CO6*

PART – A (ii) (Short Answer Questions)
(6 × 3 = 18 Marks)

Answer ALL Questions

17.	What is the role of fuzzy logic for the control of parameters in a metal forming process?	*3*	*K2*	*CO1*
18.	What are the functions of intelligent process control techniques to improve product design?	*3*	*K2*	*CO2*
19.	Define AI-based scheduling model and its uses in a smart manufacturing.	*3*	*K2*	*CO3*
20.	What is mean by knowledge engineering? Write its uses in expert system for solving real-world problems.	*3*	*K2*	*CO4*
21.	Explain how magnetic sensors operate in a production environment.	*3*	*K2*	*CO5*
22.	Explain the role of different components in a vision system.	*3*	*K2*	*CO6*

PART - B (Descriptive Answer Questions)
(6 × 11 = 66 Marks)

Answer ALL Questions

23.	a)	Apply the concept and explain the need of Internet technology in Smart Manufacturing with real examples.	*11*	*K3*	*CO1*
		OR			
	b)	Choose with appropriate examples and brief about the Expert Systems and their applications in intelligent process control.	*11*	*K3*	*CO1*
24.	a)	Build and describe about Intelligent CAD systems and integration of product and process design.	*11*	*K3*	*CO2*
		OR			
	b)	With suitable examples and describe web-based applications of CAD, CAPP and assembly planning.	*11*	*K3*	*CO2*

25.	a)	Summarize with proper examples and explain components of manufacturing automation and Flexible handling methods.	*11*	*K3*	*CO3*
		OR			
	b)	Apply the concept of AI and brief about AI system architecture and data flow in manufacturing expert systems.	*11*	*K3*	*CO3*
26.	a)	Summarize the working of an expert system in factory monitoring.	*11*	*K3*	*CO4*
		OR			
	b)	Interpret the function of expert systems in the context of Manufacturing control.	*11*	*K3*	*CO4*
27.	a)	Outline the role of adaptive control systems and intelligent systems in machining processes.	*11*	*K3*	*CO5*
		OR			
	b)	Illustrate the working principle of pneumatic and capacitance sensors with suitable diagrams.	*11*	*K3*	*CO5*
28.	a)	Summarize the challenges in integrating operation technology with information technology.	*11*	*K3*	*CO6*
		OR			
	b)	Classify the various technologies used under operation with information technology, and show how they interact in smart manufacturing.	*11*	*K3*	*CO6*