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

Seventh Semester

Artificial Intelligence and Data Science

(Common to Computer Science and Engineering (AIML))

20ECOE907 – INDUSTRIAL NANOTECHNOLOGY

Regulations - 2020

Duration: 3 Hours   Max. Marks: 100

PART - A (MCQ) (10 × 1 = 10 Marks)
Answer ALL Questions

		Marks	K–Level	CO
1.	Which technology uses nanotechnology to block infrared radiation? (a) Nano-wire transistors (b) EMI shielding (c) Filters (d) Diodes	1	K1	CO1
2.	Optical switches utilizing nanotechnology primarily offer: (a) Slower switching speeds (b) Larger size (c) Faster data transmission (d) Higher power consumption	1	K2	CO1
3.	Nanotechnology can enhance propellants and explosives by (a) Reducing sensitivity (b) Increasing energy density (c) Decreasing stability (d) Slowing reaction times	1	K2	CO2
4.	Nanotechnology helps in the miniaturization of robots used in _____. (a) space exploration (b) autonomous systems (c) surveillance (d) weapons	1	K2	CO2
5.	What advantage does nanotechnology offer in fertigation practices? (a) Higher water usage (b) Increased nutrient loss (c) Reduced crop yield (d) Efficient nutrient delivery and absorption	1	K1	CO3
6.	_____ is a potential environmental benefit of using nanopesticides. (a) Increased chemical runoff (b) Higher soil toxicity (c) Slower pest control (d) Reduced pesticide usage and lower environmental contamination	1	K2	CO3
7.	What is the main advantage of using nanotechnology in the food industry? (a) Increased processing time (b) Improved food safety and quality (c) Higher production costs (d) Reduced nutritional value	1	K1	CO4
8.	Nanopackaging contributes to food security by (a) Reducing food waste and spoilage (b) Increasing food prices (c) Decreasing food quality (d) Making food products less nutritious	1	K2	CO4
9.	_____ nanoparticles are most commonly used for photocatalytic water purification. (a) Gold (b) Silver (c) Titanium dioxide (TiO_2) (d) Zinc hydroxide (ZnOH)	1	K1	CO5
10.	What makes nanoparticles particularly challenging from a health perspective? (a) Large particle size (b) High reactivity due to large surface area (c) High solubility in water (d) Easily visible to the naked eye	1	K1	CO6

PART - B (12 × 2 = 24 Marks)
Answer ALL Questions

		Marks	K–Level	CO
11.	Summarize the primary advantages of nano electrical devices.	2	K2	CO1
12.	List out the impact of nanotechnology on display technologies.	2	K1	CO1
13.	Use nanotechnology principles to explain how small satellites performance is enhanced.	2	K2	CO2
14.	How does nanotechnology improve the effectiveness of camouflage?	2	K1	CO2
15.	Explain how nanofertilizers are applied in agriculture to reduce environmental impact.	2	K2	CO3
16.	Identify the impact of nano seed science.	2	K2	CO3
17.	What is the role of electrochemical nanosensors in food analysis?	2	K1	CO4
18.	Explain the antimicrobial properties of nanopackaging.	2	K2	CO4

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create   **13900**

19. Elucidate the potential risks of releasing nanomaterials into the environment.	2	K2 CO5
20. Summarize the challenges of using nanotechnology in industrial wastewater treatment.	2	K2 CO5
21. Explain how nanoparticle size influences toxicity.	2	K2 CO6
22. List the significance of nanomaterial monitoring in industrial hygiene.	2	K1 CO6

PART - C (6 × 11 = 66 Marks)
Answer ALL Questions

23.	a)	Demonstrate the future prospects of quantum computers and their potential impact on the electronics industry.	11	K3 CO1
		OR		
	b)	Elucidate the role of nanocoatings in enhancing the efficiency and extending the lifespan of electrical components.	11	K3 CO1
24.	a)	Illustrate the various military applications of nanotechnology.	11	K3 CO2
		OR		
	b)	Enumerate the impact of nanotechnology on nuclear and biological weapons.	11	K3 CO2
25.	a)	Illustrate the concept of precision farming and how nanotechnology enhances its implementation.	11	K3 CO3
		OR		
	b)	Exemplify the working principle of smart delivery systems in agriculture.	11	K3 CO3
26.	a)	Apply the concepts of nanotechnology to exemplify how intelligent packaging ensures food quality and safety.	11	K3 CO4
		OR		
	b)	Use the concepts of nanotechnology to explain how it contributes to food safety and biosecurity.	11	K3 CO4
27.	a)	Illustrate in-situ and ex-situ nanotechnology based methods for groundwater remediation.	11	K3 CO5
		OR		
	b)	Emphasize the various applications of nanotechnology in wastewater treatment and their environmental benefits.	11	K3 CO5
28.	a)	Elucidate the current state of regulation regarding nanoparticle exposure in occupational environments and propose improvements for better health protection.	11	K3 CO6
		OR		
	b)	Demonstrate the impact of long-term exposure to nanoparticles on the respiratory and cardiovascular systems.	11	K3 CO6