

Duration: 3 Hours

Max. Marks: 100

PART - A (MCQ) (20 × 1 = 20 Marks)

Answer ALL Questions

	<i>Marks</i>	<i>K- Level</i>	<i>CO</i>
1. Nano-wire transistors are important in the development of (a) Medical diagnostic tools (b) Quantum computers (c) Conductive coatings for EMI shielding (d) Optical data transmission	1	K1	CO1
2. Which of the following applications of nanotechnology helps in blocking infrared (IR) radiation? (a) Nanosensors (b) EMI shielding (c) IR-blocking filters (d) Nano-wire transistors	1	K1	CO1
3. Electromagnetic Interference shielding using nanotechnology is particularly useful in: (a) Preventing data loss in sensitive electronic devices (b) Enhancing display color accuracy (c) Creating IR-blocking filters (d) Developing nano-wire transistors	1	K1	CO1
4. Which nanotechnology application is used to enhance camouflage for military vehicles and personnel? (a) Distributed nanosensors that adapt to environmental changes (b) Lead-free solder for more durable electronic circuits (c) Conductive additives for better communication systems (d) Quantum computing systems for faster data processing	1	K1	CO2
5. In the context of soldier systems, implanted nanotechnology devices are used to: (a) Store larger amounts of memory for strategic planning (b) Detect and neutralize chemical and biological threats (c) Provide real-time health monitoring and communication capabilities (d) Enhance the stealth of military vehicles	1	K1	CO2
6. In military settings, small satellites enhanced by nanotechnology can be primarily used for: (a) Conducting high-risk physical reconnaissance missions (b) Monitoring and collecting data for secure communication (c) Enhancing the destructive potential of nuclear weapons (d) Increasing the energy efficiency of soldier systems	1	K1	CO2
7. What is the primary benefit of using nanofertilizers like nano-urea in agriculture? (a) They increase soil acidity for improved crop yield (b) They reduce nutrient runoff, leading to more efficient nutrient uptake by plants (c) They eliminate the need for water in fertilization (d) They prevent pests from attacking plant roots	1	K1	CO3
8. In nanoseed science, nanotechnology is used to: (a) Increase the natural resistance of seeds to pests and diseases (b) Make seeds resistant to drought by removing their water requirements (c) Remove the need for sunlight for seed germination (d) Increase the weight of seeds for mechanical planting	1	K1	CO3

9. Nanofertigation is a method that combines nanotechnology with: 1 K1 CO3
 (a) Seed modification
 (b) Precision irrigation to deliver fertilizers directly to plant roots
 (c) Enhancing soil pH levels for better crop growth
 (d) Increasing pest resistance naturally in plants
10. Nanopackaging is primarily used in the food industry to: 1 K1 CO4
 (a) Increase the flavor of packaged food products
 (b) Extend the shelf life of food by preventing contamination and spoilage
 (c) Reduce the need for refrigeration in food storage
 (d) Enhance the visual appearance of packaging materials
11. Electrochemical sensors in food analysis are primarily used to: 1 K1 CO4
 (a) Monitor temperature changes in food packaging
 (b) Detect contaminants and assess food quality accurately
 (c) Increase the nutritional content of packaged foods
 (d) Improve the texture of processed foods
12. In smart packaging, what role do nano sensors play in ensuring food safety? 1 K1 CO4
 (a) They add nutritional supplements to food during storage
 (b) They monitor environmental factors such as temperature, pH, and freshness indicators
 (c) They automatically seal the package to prevent air exposure
 (d) They improve the visual appeal of food packaging with color-changing effects
13. Nanotechnology can aid in the remediation of pollution in industrial and wastewater treatment by: 1 K1 CO5
 (a) Reducing the overall energy consumption of treatment processes
 (b) Enhancing the ability to filter and remove toxic substances from water and air
 (c) Eliminating the need for chemicals in wastewater treatment
 (d) Increasing the temperature of wastewater for faster purification
14. In nanotechnology-based air purification, which pollutant is most effectively broken down by photocatalysis? 1 K1 CO5
 (a) Particulate matter (PM) (b) Nitrogen oxides (NO_x)
 (c) Volatile organic compounds (VOCs) (d) Carbon monoxide (CO)
15. Nano catalysts are used in industrial wastewater treatment for: 1 K1 CO5
 (a) Physical filtration (b) Bioremediation enhancement
 (c) Advanced oxidation processes (d) Chemical neutralization
16. What challenge is associated with the use of nanotechnology in wastewater treatment? 1 K2 CO5
 (a) Low removal efficiency (b) Energy intensive processes
 (c) Nanoparticle toxicity (d) Lack of selectivity for pollutants
17. Which route of exposure is of most concern in occupational settings with nanoparticles? 1 K1 CO6
 (a) Ingestion (b) Inhalation (c) Dermal exposure (d) Injection
18. The toxicity of nanoparticles in occupational settings is a concern because: 1 K2 CO6
 (a) They can enhance the strength of materials used in manufacturing
 (b) They may accumulate in the body over time and cause harm to respiratory and other bodily systems
 (c) They improve the effectiveness of air filtration systems
 (d) They prevent exposure to other chemicals in the workplace
19. What is a primary health concern associated with inhaling nanosized particles? 1 K1 CO6
 (a) They cause rapid weight gain in workers
 (b) They can enter the bloodstream and cause respiratory problems or cardiovascular issues
 (c) They can cause a temporary increase in skin hydration
 (d) They provide health benefits by enhancing lung function

20. Monitoring nanoparticles in the workplace is essential because: 1 K2 CO6
- (a) Nanoparticles are visually detectable without any specialized equipment
 - (b) Their small size and high reactivity make them difficult to control, posing significant health risks
 - (c) They are harmless and do not require special handling or safety measures
 - (d) They cause minimal health effects even with long-term exposure

PART - B (10 × 2 = 20 Marks)

Answer ALL Questions

21. Infer the involvement of nanotechnology in the data memory storage? 2 K2 CO1
22. Clarify Lead-free solder. 2 K2 CO1
23. Summarize the role of nanotechnology in space launchers. 2 K2 CO2
24. Identify some functions of mini-/micro robots in military operations. 2 K3 CO2
25. State and explain Smart delivery system. 2 K1 CO3
26. Summarize the the effect of nanotechnology in fertilizer. 2 K2 CO3
27. Explain the uses of nanotechnology in food industry. 2 K2 CO4
28. Elucidate how electrochemical sensors improve food industry. 2 K3 CO4
29. What are magnetic nanoparticles? 2 K1 CO5
30. Name some potential health risks associated with skin exposure to nano particles. 2 K1 CO6

PART - C (6 × 10 = 60 Marks)

Answer ALL Questions

31. a) Explain the nano electrical and electronic devices with examples. 10 K2 CO1
- OR**
- b) Describe in detail about nanoparticle coatings for electrical products. 10 K2 CO1
32. a) Discuss the role of nanotechnology in improving armor protection for soldiers. 10 K2 CO2
- OR**
- b) Explain the applications of nanotechnology in nuclear, chemical, and biological weapons. 10 K2 CO2
33. a) Enumerate nano-fertilizer and their potential in sustainable agriculture. 10 K2 CO3
- OR**
- b) Write a note on Nanopesticides. Explain how nanotechnology is used in the insecticide with example. 10 K2 CO3
34. a) Describe the concept of intelligent packaging and its importance in modern food systems. 10 K2 CO4
- OR**
- b) i) Discuss in detail about food safety and bio-security. 10 K2 CO4
35. a) Explain the effectiveness of nanotechnology in drinking water purification. Also, discuss the benefits and drawbacks of it. 10 K2 CO5
- OR**
- b) Describe the in-situ and ex-situ nanotechnology based methods for groundwater remediation. 10 K2 CO5
36. a) Discuss the impact of carbon nanotubes (CNTs) on respiratory health. 10 K2 CO6
- OR**
- b) Describe the current state of regulation regarding nanoparticle exposure in occupational environments and propose improvements for better health protection. 10 K2 CO6