

Model Question Paper

Semester V

MG5DSECHEA02- Applications of Nanostructures in Nanomedicine and Agriculture

Part A

Answer all questions

Multiple Choice Questions (1 *10 = 10 marks)

1. The primary objective of a drug delivery system is to:
 - A. Increase the cost of the drug
 - B. Deliver the drug to the desired site at an appropriate rate
 - C. Reduce the molecular weight of the drug
 - D. Eliminate drug metabolism completely
2. Which of the following is NOT a desirable characteristic of an ideal drug delivery system?
 - A. Controlled drug release
 - B. Site-specific delivery
 - C. Improved therapeutic efficacy
 - D. Increased systemic toxicity
3. Conventional drug delivery systems generally provide:
 - A. Precise site-specific delivery
 - B. Controlled release for several months
 - C. Immediate or relatively rapid drug release
 - D. Zero-order drug release in all cases
4. A major advantage of controlled drug delivery is:
 - A. Increased dosing frequency
 - B. Maintenance of drug concentration within the therapeutic range
 - C. Increased adverse effects
 - D. Reduced drug stability
5. PLGA is composed of:
 - A. Polyethylene and glycol
 - B. Poly(lactic acid) and poly(glycolic acid)
 - C. Polyvinyl alcohol and glycol
 - D. Polylactic acid and polyethylene
6. One major advantage of biodegradable polymers in drug delivery is that they:
 - A. Always remain permanently in the body
 - B. Can degrade into relatively harmless products

- C. Prevent all drug metabolism
 - D. Cannot release drugs in a controlled manner
7. Which polymer is widely used in microspheres and nanoparticles for controlled drug delivery?
- A. PLGA
 - B. PVC
 - C. Nylon-6
 - D. Melamine
8. Drug release from a polymeric matrix may occur by:
- A. Diffusion
 - B. Polymer degradation
 - C. Swelling
 - D. All of the above
9. Which of the following is commonly investigated as a metal-based nanomaterial for drug delivery?
- A. Gold nanoparticles
 - B. Sodium chloride crystals
 - C. Calcium carbonate powder only
 - D. Potassium metal
10. Which of the following is a natural polymer used in drug delivery?
- A. Chitosan
 - B. PLGA
 - C. PMMA
 - D. Polystyrene

Part B

Answer any 6 questions

Short Answer Questions

(6 *5 = 30 marks)

11. Explain the important properties of nanomaterials that make them useful in agriculture, with reference to size, surface area and reactivity.
12. Differentiate between macro- and micronutrient nano-fertilizers with suitable examples.
13. Discuss the advantages of nano-fertilizers in terms of controlled delivery, reduced environmental impact and improved efficacy.
14. Explain how nano-enabled immunity boosters could be applied to improve the resistance of crops against pathogens.

15. Analyze how nano-based biosensors provide advantages over conventional methods for early plant disease detection.
16. Evaluate the potential of silver and zinc oxide nanomaterials as alternatives to conventional antimicrobial agents in agriculture.
17. Describe the principle of photothermal therapy using nanoparticles for cancer treatment.
18. Explain how quantum dots can be applied for the detection and imaging of specific biological targets.
19. Discuss the factors that influence the design and selection of a drug delivery system.

Part C

Answer any 2 questions

Short Essay Questions

(2 * 15 = 30 marks)

20. Analyze how nano-fertilizers can reduce environmental pollution and improve fertilizer efficacy compared with conventional fertilizers. Discuss their potential contribution to sustainable agriculture.
21. Analyze the role of antimicrobial nanoparticles in plant disease management. Discuss the factors affecting their antimicrobial activity and their potential environmental and toxicity concerns.
22. Explain the role of magnetic nanoparticles in biomedical imaging. Discuss their properties, mechanism of imaging and potential applications in disease diagnosis.
23. Compare passive and active drug targeting with respect to their mechanisms, targeting specificity, advantages, limitations and applications.