

4. Match the following characterization techniques with their applications CO2 [K₃]

Techniques	Applications
A. XRD	i. Measure nanoparticle size, grain size, size distribution, and morphology
B SEM	ii. Identify the elemental composition of materials
C. TEM	iii. Identification of crystalline nature of materials
D. EDX	iv. Analysis of morphology of samples

- a) D - i, C -ii A - iii B - iv b) B - i, C - ii, A- iii, D - iv
 c) C - i, D -ii A - iii B - iv d) D - i, B - ii, A - iii, C - iv

5. Which of the following system helps to locate the exact position of field information, such as soil type, pest occurrence, weed invasion, water holes, boundaries and obstructions. CO3 [K₂]

- a) Sensor Technologies b) Global positioning system
 c) Geographical information system d) Grid soil sampling

6. Which one of the following method cannot be used for production nanofibre. CO3 [K₂]

- a) Melt processing b) Chemical vapor deposition
 c) Electrospinning d) Interfacial polymerization

7. Assertion (A): Bio-imaging allows in vivo imaging of biological processes, including cellular signaling and interactions and the movement of molecules through membranes. Reason (R): It also offers precise tracking of metabolites that can be used as biomarkers for disease identification, progress and treatment response. CO4 [K₃]

- a) Both A and R are true and R is the correct explanation of A b) Both A and R are true but R is not a correct explanation of A
 c) A is true but R is false d) A is false but R is true

8. Which of the following nanomaterial is used in sunscreen lotion? CO4 [K₂]

- a) Silver b) Copper
 c) Titanium dioxide d) Gold

9. The essential characteristics of an ideal bio-implant materials are CO5 [K₂]

1. Non toxic
2. Temperature rsistance

3. Biocompatibility
4. Corrosion resistance

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|------------------------|--------------------|
| a) 1, 3 and 4 are only | b) 2 and 3 only |
| c) 1 and 4 only | d) 1, 2 and 3 only |

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|---|---------|-------------------|
| 10. Bio-barcode detection technology uses a nanoparticle | CO6 | [K ₂] |
| a) Silver | b) Zinc | |
| c) Platinum | d) Gold | |

PART B (10 x 2 = 20 Marks)

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|--|-----|-------------------|
| 11. Distinguish between nanoparticle and nanocluster | CO1 | [K ₃] |
| 12. Sketch the top-down and bottom-up approach of nanomaterial preparation | CO1 | [K ₃] |
| 13. What is the working principle of AFM? | CO2 | [K ₂] |
| 14. Provide any four applications of XRD | CO2 | [K ₂] |
| 15. What is the mode of action of nanofertilizers? | CO3 | [K ₂] |
| 16. What are the applications of nanofibre? | CO3 | [K ₃] |
| 17. Name the nanoscale devices for detection and diagnosis of cancer | CO4 | [K ₂] |
| 18. What are the nanomaterials used in food industry? | CO4 | [K ₂] |
| 19. Compare the zirconia and titanium dental implants | CO5 | [K ₃] |
| 20. What is a nano-immuno assay? | CO6 | [K ₂] |

PART C (6 x 5 = 30 Marks)

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|---|---|-----|-------------------|
| 21. Discuss the nanomaterials preparation by chemical vapor deposition (CVD) method with a neat sketch. | 5 | CO1 | [K ₂] |
| 22. Explain the working principle of scanning electron microscopy. | 5 | CO2 | [K ₂] |
| 23. Enumerate the advantages and disadvantages of AFM | 5 | CO2 | [K ₂] |
| 24. Describe the need of precision forming and their tools. | 5 | CO3 | [K ₃] |
| 25. Micelles have been widely used as drug delivery carriers for a series of different molecules. Justify the statement suitable example. | 5 | CO4 | [K ₃] |

26. Explain the bone substitute material for dental implant. 5 CO5 [K₂]

Answer any FOUR Questions

PART D (4 x 10 = 40 Marks)

27. Explain any one bottom-up approach method to prepare nanomaterials with neat sketch. 10 CO1 [K₂]

28. Write a detailed note on working principles and instrumentation of XRD with neat illustration. 10 CO2 [K₂]

29. The process that spins fibers of diameters ranging from 10 nm to several 100 nm. 10 CO3 [K₃]
Find the above mentioned process and explain in detail with neat sketch

30. Nanopolymers as food packaging materials play a crucial role in food technology. 10 CO4 [K₃]
Demonstrate the statement with suitable example.

31. Discuss the nano-immunosensor with neat sketch and their uses. 10 CO5 [K₂]
