



**B.TECH DEGREE EXAMINATIONS: APRIL 2018**

(Regulation 2014)

Eighth Semester

**BIOTECHNOLOGY**

U14BTE301: Nanobiotechnology

**COURSE OUTCOMES**

- CO1:** Understand the basics of nanobiotechnology and synthesis of nanomaterials  
**CO2:** Apply the knowledge on characterization of nanoparticles with different techniques  
**CO3:** Understand the different nanomaterials applications  
**CO4:** Know the interactions of nanomolecules in biosystem towards applications  
**CO5:** Discuss the applications of nanotechnology in biotechnology

**Time: Three Hours**

**Maximum Marks: 100**

**Answer all the Questions:-**

**PART A (10 x 1 = 10 Marks)**

1. Match the following nanoscale materials category with examples

CO1 [K<sub>3</sub>]

List I	List II
A. Zero dimension	i. Very thin surface coating
B. One dimension	ii. Nanodots
C. Two dimension	iii. Nanoparticles
D. Three dimension	iv. Nanowires

- |    | A   | B  | C   | D   |
|----|-----|----|-----|-----|
| a) | ii  | i  | iv  | iii |
| b) | iii | iv | ii  | I   |
| c) | ii  | iv | iii | I   |
| d) | iii | i  | ii  | Iv  |

2. The total surface area or the number of surface atom increases

CO1 [K<sub>2</sub>]

- |   |                                    |
|---|------------------------------------|
| a) With increasing size of particles        | b) With reducing size of particles |
| c) With drastic change in size of particles | d) With no changes                 |

3. Which of the following are provided with SIMS instrument? CO2 [K<sub>4</sub>]
1. Mass analyzer
  2. Temperature probe
  3. pH probe
  4. Ion detection system

- a) 1,3 b) 1,4  
 c) 1,2 d) 2,3

4. Which one of the following technique is used for determination of crystal structure of the particles? CO2 [K<sub>1</sub>]

- a) AFM b) SEM  
 c) XRD d) FTIR

5. Assertion (A): Quantum dots can be used in the fabrication of artificial “dust” set up to emit at a specific frequency of infrared light. CO3 [K<sub>4</sub>]

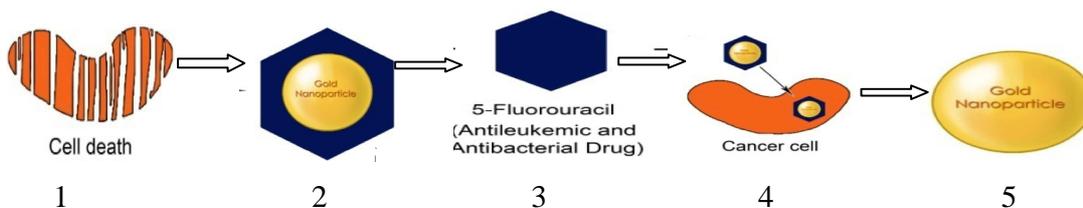
Reason (R): Artificial dust could be used in any number of security-related applications.

- a) Both (A) and (R) are true and (R) is the correct reason for (A). b) Both (A) and (R) are true but (R) is not the correct reason for (A).  
 c) (A) is true but (R) is false d) (A) is false but (R) is true.

6. Which one of the material cannot be used for quantum wire preparation? CO3 [K<sub>2</sub>]

- a) Silicon b) Gallium nitride  
 c) Indium phosphide d) Silver nitrate

7. Find the sequence of gold nanoparticles mediated drug delivery against leukemia cancer. CO4 [K<sub>4</sub>]



- a) 2-3-4-1-5 b) 1-3-2-4-5  
 c) 5-3-2-4-1 d) 4-1-3-2-5

8. .... nanoparticles can potentially stabilize and protect DNA, RNA, and other conjugates in solution and exhibits additional benefits over multistep methods that require separate approaches to delivery and stabilization. CO4 [K<sub>2</sub>]

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

9. Assertion (A): Gold nanoparticle modified DNA has been used to develop a microcantilever-based DNA biosensor to detect DNA even at very lower concentration through a hybridization reaction. CO5 [K<sub>4</sub>]

Reason (R): This reaction leads to the attachment of gold nanoparticles, and acts as a nucleating agent for the growth of silver particles when exposed to a photographic developing solution.

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

10. Which one is not the content of gene chip? CO5 [K<sub>3</sub>]

- a) Microarray      b) Segment of a chip  
c) pH controller      d) Part of one DNA strand

**PART B (10 x 2 = 20 Marks)**

**(Answer not more than 40 words)**

11. Distinguish nanoparticle and nanocrystal CO1 [K<sub>4</sub>]  
12. What are the properties of nanoscale materials? CO1 [K<sub>2</sub>]  
13. Write about the functioning of AFM? CO2 [K<sub>3</sub>]  
14. What are the applications of SEM? CO2 [K<sub>1</sub>]  
15. List out the types of nanopores CO3 [K<sub>1</sub>]  
16. Write any two applications of quantum wire CO3 [K<sub>2</sub>]  
17. What are the applications of magnetosomes. CO4 [K<sub>2</sub>]  
18. What a is polymer nanofiber? CO4 [K<sub>1</sub>]  
19. Distinguish nanobiosensor and nanobiochip CO5 [K<sub>4</sub>]  
20. Define bioimaging? CO5 [K<sub>1</sub>]

**Answer any FIVE Questions:-**

**PART C (5 x 14 = 70 Marks)**

**(Answer not more than 300 words)**

**Q.No. 21 is Compulsory**

21. Nanotechnology is the creation of useful materials, devices and systems through the manipulation of matter. Justify this statement with any two examples of nanodevices. CO1 [K<sub>4</sub>]

- |  |     |                   |
|--|-----|-------------------|
| 22. Discuss in detail any three methods for the synthesis of nanomaterials.  | CO1 | [K <sub>2</sub> ] |
| 23. Write a detailed note on working principle and applications of TEM   | CO2 | [K <sub>3</sub> ] |
| 24. Crystalline materials are characterized by the orderly periodic arrangements of atoms. Justify what technique you will use for crystalline structure determination and explain the working principle and applications. | CO2 | [K <sub>4</sub> ] |
| 25. Discuss the fullerene synthesis methods, properties and its potential applications.  | CO3 | [K <sub>3</sub> ] |
| 26. DNA molecules can be used for the assembly of devices and computational elements, for the assembly of interconnects, or as the device element itself. Justify this statement with examples.                            | CO4 | [K <sub>5</sub> ] |
| 27. Discuss in detail the microarray technique to measure the expression levels of large numbers of genes or to genotype multiple regions of a genome.   | CO5 | [K <sub>3</sub> ] |

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