

**B.TECH DEGREE EXAMINATIONS: APRIL/MAY 2014**

(Regulation 2009)

Sixth Semester

**BIOTECHNOLOGY**

BTY204: Nanobiotechnology

**Time: Three Hours**

**Maximum Marks: 100**

**Answer all the Questions:-**

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

1. Nanotechnology rests on the technology that involves devices and systems
  - a) Less than 200 nm
  - b) Less than 100 nm
  - c) Less than 1000 nm
  - d) Less than 500 nm
2. What is a bucky ball?
  - a) A carbon molecule (C60)
  - b) Nickname for Mercedes-Benz's futuristic concept car (C111)
  - c) Plastic explosives nanoparticle (C4)
  - d) Concrete nanoparticle with a compressive strength of 20 nanonewtons (C20)
3. Nanoparticle properties are:
  - a) May be same as in bulk material
  - b) Little bit different form bulk material properties
  - c) Significantly different form bulk material properties
  - d) Exactly same as bulk material
4. Carbon nanotubes have the ability to sustain temperature as high as
  - a) 800° C
  - b) 2000° C
  - c) 3000° C
  - d) 4000° C
5. Nanostructured materials are formed by
  - a) Creating increased surface area per unit volume
  - b) Creating decreased surface area per unit volume
  - c) Keeping same surface area per unit volume
  - d) Keeping irregular surface area
6. Nanorobots
  - a) Do not exist yet
  - b) Exist in experimental form in laboratories
  - c) Are already used in nanomedicine to remove plaque from the walls of arteries
  - d) Will be used by NASA in the next unmanned mission to Mars

7. How does this protein (Bacteriorhodopsin consists of a bundle of  $\alpha$ -helical rods) allow salt-tolerant bacteria *Halobacterium halobium* to live in water with a high salt concentration?
  - a) Bacteriorhodopsin turns the cell purple
  - b) Bacteriorhodopsin forms salt crystals
  - c) Bacteriorhodopsin acts as a proton channel in the membrane
  - d) Bacteriorhodopsin acts as an O<sub>2</sub> carrier
8. Engineering Strain
  - a) It is defined as the ratio of the dimensional change to the original dimension
  - b) It is defined as the ratio to the original dimension to the dimensional change
  - c) It is defined as the ratio of the fraction of the dimensional change to the original dimension
  - d) Any of the above
9. Biochips are made up of
  - a) Semi-conducting molecules inserted into the protein frame work
  - b) Conducting molecules inserted into the protein frame work
  - c) Non-conducting molecules inserted into the protein frame work
  - d) Any of the above
10. Which of the following technology is used for micro array manufacturing?
  - a) Photolithography
  - b) Ink jetting
  - c) Contact printing
  - d) All of these

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

11. Define top down approach?
12. State any two significance of nanoscale in nanotechnology
13. Define the applications of nanopore.
14. What are the element(s) present in fullerene?
15. What are nanobiodevices?
16. What is dip-pen nanolithography?
17. Write the usefulness of PHA in nanobiotechnology.
18. Draw the structure of bacteriophage.
19. State the role of nanobiochip in diagnosis?
20. List out applications of nanotechnology in drug delivery.

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

21. a) What do you mean by Lithography? Discuss in detail on the importance of various fabrication techniques.
- (OR)**
- b) (i) Bottom up technique is more convenient for nanofabrication- Substantiate. (8)  
(ii) Enlist the physiochemical methods of obtaining nanobiosystems. (6)
22. a) Illustrate the possible mechanism for the formation of gold nanoparticles. What are the potential applications of gold nanoparticles?
- (OR)**
- b) Describe atleast three different methods for carbon nanotubes synthesis.
23. a) (i) How are the biological, self-assembled nanolayers exploited in the synthesis of nanomaterials? (8)  
(ii) Explain protein - based nanostructure formation. (6)
- (OR)**
- b) (i) What are peptides coupled nanoparticles? Describe the advantages of peptides coupled nanoparticles. (8)  
(ii) How is DNA used as template with nanomaterial for the fabrication of devices? (6)
24. a) (i) Give a detailed account on bacterial spores and S-layer proteins. (8)  
(ii) Give an account on nano luminescent tags. (6)
- (OR)**
- b) What are magnetosomes? Briefly describe the type of microorganisms that are responsible for the formation of magnetosome and the chemistry behind this reaction process.
25. a) (i) How is nanotechnology applied in cancer detection and diagnosis? (7)  
(ii) How is molecular biomimetics useful in the construction of a nano biosensor? (7)
- (OR)**
- b) Discuss about targeted drug delivery using nanoparticles.

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