

Exam.Code:1034

Sub. Code: 7576

2122

M. E. (Bio-Technology)

Third Semester

ME-BIO-301 (a): Nano-Biotechnology and Nano-Devices

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Unit.

x-x-x

- I. Attempt the following:-
- The IC₅₀ value of niclosamide for A549 cells is 10nM and PLA- nanosomide nanoformulation is 2 nM, what do you interpret from the following information?
 - Mention one characteristic about the nanoparticles that can be measured in TEM and not DLS.
 - What is SPR and how is it beneficial in nanotechnology?
 - Define nucleation. How does it regulate the quality of the synthesized products?
 - Give one example and application of a 2D material.
 - What are VLPs and how are they synthesized?
 - Mention any two applications of surface functionalized nanoparticles.
 - Why do nanoparticles agglomerate with time and how can it be prevented?
 - Nanorobots are defined as _____.
 - Who coined the term nanotechnology (10x1)

UNIT - I

- II. a) "Recent advances in nanobiotechnology have resulted in significant impact on human healthcare." Justify this statement by taking examples from drug delivery, nano-diagnostics and therapeutics.
- b) Differentiate between top down and bottom up approach of nanomaterial synthesis. Give two examples of each type. (6,4)
- III. a) What are nanofluidic devices? Enlist different advantages of using them over traditional techniques. Draw a labeled diagram of MEMS system for performing RT-PCR.
- b) Write a short note on electron- beam lithography. (7,3)

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(2)

- IV. Elaborate on the tools and techniques by which one can study the cellular response to the nanostructured surfaces. (10)

UNIT - II

- V. Write a short note on:-
a) SERS active nanoparticles
b) carbon nanotubes
c) nature inspired nanomaterials
d) virus based nanoparticles (4x2½)
- VI. a) Explain the techniques for fabrication and construction of three-dimensional scaffolds for tissue engineering.
b) Mention all the properties that make nanoparticles better than traditional dyes for labeling? What are modifications that can be done in nanoparticles to make them more suitable for labeling purposes? (5,5)
- VII. a) Elaborate on the reason for nanoparticle agglomeration in a solution. How can the dispersions be made more stable? Which technique is used to check the stability? Explain its principle.
b) What is green synthesis of nanoparticles? Discuss the mechanism, advantages and disadvantages in detail. (5,5)