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NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA
(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: VI - THEORY EXAMINATION (2022-2023)

Subject: Nanobiotechnology

Time: 3 Hours

Max. Marks: 100

General Instructions:

IMP: Verify that you have received the question paper with the correct course, code, branch etc.

1. This Question paper comprises of **three Sections -A, B, & C**. It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.
2. Maximum marks for each question are indicated on right -hand side of each question.
3. Illustrate your answers with neat sketches wherever necessary.
4. Assume suitable data if necessary.
5. Preferably, write the answers in sequential order.
6. No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.

SECTION A

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1. Attempt all parts:-

- 1-a. Who first used the term nanotechnology and when? (CO1) 1
- (a) Richard Feynman, 1959
- (b) Norio Taniguchi, 1974
- (c) Eric Drexler, 1986
- (d) Sumio Iijima, 1991
- 1-b. The polymeric nanoparticles come under _____ dimensional nanomaterials. (CO1) 1
- (a) Zero
- (b) One
- (c) Two
- (d) Three
- 1-c. What is a buckyball? (CO2) 1
- (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)
- 1-d. A single layer of graphene sheet rolled-up into a cylinder with diameters in the range 1-2nm is _____.(CO2) 1
- (a) SWCNT.
- (b) TEM.
- (c) Quantum dot.
- (d) PNA.
- 1-e. In which year does the scanning tunneling microscopy was invented? (CO3) 1
- (a) 1999
- (b) 2003
- (c) 1981
- (d) 1943
- 1-f. Which of the following techniques are used in Transmission Electron Microscopy (TEM) for examining cellular structure? (CO3) 1
- (a) Negative-Staining
- (b) Shadow Casting
- (c) Ultrathin Sectioning
- (d) Negative-Staining, Shadow Casting, Ultrathin Sectioning, Freeze-Etching
- 1-g. Which of the following tissue is a highly hydrated tissue most similar in structure to a hydrogel? (CO4) 1
- (a) Liver
- (b) Cartilage
- (c) Neuron
- (d) Bone
- 1-h. A metal used in orthopaedics has a composition of 65% Fe, 12% Ni, 19% Cr, 3% Mo, 1% Mn. What is it? (CO4) 1
- (a) Ti6—A14—V alloy
- (b) 316 L stainless steel
- (c) F-25 Co—Cr alloy
- (d) F90 Co—Cr alloy
- 1-i. Self-assembled closed colloidal structures composed of lipid bilayers are called as _____.(CO5) 1

- (a) dendrimers.
- (b) liposomes.
- (c) micelles.
- (d) polymers

- 1-j. Tiny semiconductor nanoparticles with fascinating light-emitting properties are called as _____.(CO5) 1
- (a) nanoparticles.
 - (b) nanopores.
 - (c) buckyballs.
 - (d) quantum dots.

2. Attempt all parts:-

- 2.a. Explain the process micro fabrication. (CO1) 2
- 2.b. What is the peak wavelength of silver nanoparticles characterization? Discuss in short. (CO2) 2
- 2.c. Write the name of two techniques to synthesize metal nanoparticles. (CO3) 2
- 2.d. Write down the different applications of polymer. (CO4) 2
- 2.e. Define the term quantum dots. (CO5) 2

SECTION B

30

3. Answer any five of the following:-

- 3-a. Describe the processes of microfabrication involved in IC. How to make a memory chip? (CO1) 6
- 3-b. Give a detail description about the overview of nanoparticles. (CO1) 6
- 3-c. Describe the various process involved in the metal nanoparticles synthesis. (CO2) 6
- 3-d. Explain the concept and process of synthesis of gold nanorods. (CO2) 6
- 3.e. Give a detail note on Debye-Scherrer formula for size determination of NPs. (CO3) 6
- 3.f. Explain the term nanoimaging agents. Enlist various nanochemicals with their applications. (CO4) 6
- 3.g. Describe various approaches for the improvement of cancer detecting treatment by applying nanotechnology. (CO5) 6

SECTION C

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4. Answer any one of the following:-

- 4-a. Give a detailed description of nanomaterials that are being used in foods. (CO1) 10
- 4-b. What do you understand by lithography in nanotechnology? Discuss the concept, principle and applications of lithography in nanotechnology. (CO1) 10

5. Answer any one of the following:-

- 5-a. What are the applications of gold nanoparticles? Explain in detail. (CO2) 10
- 5-b. Explain CVD method for CNT synthesis. (CO2) 10

6. Answer any one of the following:-

- 6-a. What is scanning Probe Microscopy (SPM)? Explain in detail. (CO3) 10
- 6-b. Explain principle, instrumentation and working of XRD with neat labelled diagram. (CO3) 10

7. Answer any one of the following:-

- 7-a. What is the criteria for selection of biomedical materials and their evaluation? Discuss in detail. (CO4) 10
- 7-b. Explain the concept of biomaterials? How biomaterials play an important role in orthopaedic implants? (CO4) 10

8. Answer any one of the following:-

- 8-a. Explain microwave-assisted synthesis of carbon dots. (CO5) 10
- 8-b. Give a detailed note on the application of brain tumor treatment through nanobiotechnological approach. (CO5) 10