NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA
(An Autonomous Institute Affiliated to AKTU, Lucknow)
B.Tech
SEM: VI - THEORY EXAMINATION (2024 - 2025)
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   20

1. Attempt all parts:-

1-a. How many oxygen atoms lined up in a row would fit in a one nanometer space? 1
   (CO1, K1)

  (a) None an oxygen atom is bigger than 1 nm

  (b) One

  (c) Seven

  (d) Seventy

1-b. Which one of the following is an example for top-down approach? (CO1, K2) 1

  (a) Ball milling technique

  (b) Sol-gel process

  (c) Both

  (d) None

1-c. What is graphene? (CO2, K1) 1

  (a) A new material made from carbon nanotubes

  (b) A one-atom thick sheet of carbon

  (c) Thin film made from fullerenes

  (d) A software tool to measure and graphically represent nanoparticles

1-d. Which one of the following used in solar cells? (CO2, K2) 1

  (a) Carbon nanotubes

  (b) Nanorods

      (c)   Nanobots

      (d)   Cantilever

1-e.   Glutaraldehyde is a _____ (CO3, K1)   1

      (a)   metal

      (b)   fixative

      (c)   non-metal

      (d)   atomic species

1-f.   Which of the following techniques are used in Transmission Electron Negative-Staining (TEM) for examining cellular structure? (CO3, K1)   1

      (a)   Negative-Staining, Shadow Casting, Ultrathin Sectioning, Freeze-Etching

      (b)   Shadow Casting

      (c)   Ultrathin Sectioning

      (d)   Negative-Staining

1-g.   Nylon threads are made of: (CO4, K1)   1

      (a)   polyester polymer

      (b)   polyamide polymer

      (c)   polyethylene polymer

      (d)   polyvinyl polymer

1-h.   Which one of the following polymers is prepared by condensation polymerization? (CO4, K1)   1

      (a)   Teflon

      (b)   Rubber

      (c)   Styrene

      (d)   Nylon-6,6

1-i.   Which of the following is the physico-chemical component? (CO5, K2)   1

      (a)   Enzymes

      (b)   Anti-bodies

      (c)   Transducer

      (d)   Cells or tissues

1-j.   Which of these biosensors use the principle of heat released or absorbed by a reaction? (CO5, K1)   1

      (a)   Potentiometric biosensor

      (b)   Optical biosensors

      (c)   Piezo-electric biosensors

      (d)   Calorimetric biosensors

2. Attempt all parts:-

2.a.   Define Nanostructures. Give examples. (CO1, K1)   2

2.b.   What function do enzymes present in microorganisms during the synthesis of   2

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	nanoparticles by bacteria? (CO2, K2)	
2.c.	Write the name of two techniques to synthesize metal nanoparticles. (CO3, K1)	2
2.d.	Enlist the two names of natural polymers. (CO4, K1)	2
2.e.	What is nanoimaging agents? (CO5, K1)	2

SECTION-B   30

3. Answer any <u>five</u> of the following:-

3-a.	Explain the Bottom-up and Top-down approaches of nanotechnology. (CO1, K2)	6
3-b.	Describe the mechanical,electrical and optical properties of nanomaterials. (CO1, K3)	6
3-c.	Compare single wall carbon nanotube (SWCNT) and multi wall carbon nanotube (MWCNT). (CO2, K4)	6
3-d.	Why functionalization of CNTis so important?Justify with examples. (CO2, K3)	6
3-e.	Write a short note on drug delivery through albumin nanoparticles. (CO3, K2)	6
3-f.	Write short note on dental implants. Give examples? (CO4, K2)	6
3-g.	Explain the Imaging and detection process through nanoparticles. (CO5, K3)	6

SECTION-C   50

4. Answer any <u>one</u> of the following:-

4-a.	What do you understand by lithography in nanotechnology? Discuss the concept, principle and applications of lithography in nanotechnology. (CO1, K3)	10
4-b.	What are the micro fabrication process? How to differ from nanofabrication? Explain with examples. (CO1, K3)	10

5. Answer any <u>one</u> of the following:-

5-a.	How many methods of nanoparticles synthesis? Explain chemical methods of NPs in details. (CO2, K3)	10
5-b.	What is meant by Arc discharge method of CNTs. Explain with applications. (CO2, K2)	10

6. Answer any <u>one</u> of the following:-

6-a.	What is scanning Probe Microscopy (SPM)? Explain in detail. (CO3, K2)	10
6-b.	Explain FTIR spectroscopy with application. (CO3, K3)	10

7. Answer any <u>one</u> of the following:-

7-a.	Explain the concept of polymers and biomaterials? How polymers and biomaterials play an important role in pharmaceuticals and orthopedic implants? (CO4, K3)	10
7-b.	Write a short note on metals and its alloys. (CO4, K2)	10

8. Answer any <u>one</u> of the following:-

8-a.	Describe the detection, imaging and treatment of cancer disease through improved diagnostics nanodevices. (CO5, K3)	10
8-b.	Examine the concept behind the drug delivery tools. Illustrate various types of	10

drug delivery tools. (CO5, K3)

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