[This question paper contains 2 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 9281 **J**

Unique Paper Code : 2233010014

Name of the Paper : DSE : Nanobiotechnology

Name of the Course : **B.Sc. Zoology Exam-2025**

Semester : VI (NEP-UGCF)

Duration : 3 Hours Maximum Marks : 90

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt any **FIVE QUESTIONS** in all and Question No. **1** is **COMPULSORY.**

1. (a) Define the following terms : (5×1=5)
   - (i) Nanorobots
   - (ii) Liposomes
   - (iii) Nanofiltration
   - (iv) Biodistribution
   - (v) Metal nanoparticles

   (b) Differentiate between : (5×3=15)
   - (i) Chemical synthesis *vs* Green synthesis
   - (ii) Pharmacokinetics *vs* Pharmacodynamics
   - (iii) Genotoxicity vs Carcinogenicity
   - (iv) Nanofibres vs Nanotubes
   - (v) DLS vs Zeta

   (c) Expand the following terms : (6×1=6)
   - (i) SEM
   - (ii) ADMET
   - (iii) DLS
   - (iv) RNS
   - (v) MWCNT
   - (vi) PEG

P.T.O.

(d) Mark True or False (4×1=4)

(i) Bulk materials have the same surface area-to-volume ratio as nanomaterials.

(ii) Ball milling is an example of a bottom-up approach in nanofabrication.

(iii) Passive targeting of nanoparticles relies on the use of specific ligands to bind target cells.

(iv) Biosensors cannot detect infectious diseases.

(v) Bioavailability refers to the fraction of the drug that reaches systemic circulation.

2. (a) Compare and contrast different drug delivery routes (oral, systemic, intranasal, ocular, and transdermal) involving nanocarriers. (10)

(b) Explain the Bottom-up and Top-down approaches of nanotechnology. (5)

3. (a) How are nanomaterials characterised? Explain in detail any two methods to characterize nanoparticles. (10)

(b) Explain how nanoparticle size, shape, and surface properties influence cellular toxicity. (5)

4. (a) Classify various types of nanocarriers. Explain the concept of multifunctional nanoparticles and their biomedical significance. (10)

(b) What are biosensors, describe its types? (5)

5. (a) Explain the nanoparticle-membrane interactions, entry of nanoparticles in the cell and intracellular environment for efficient intracellular uptake. (10)

(b) Describe lipid-based vaccines and viral vaccines. (5)

6. Write short notes on the following **(Any three)** : (3×5=15)

(i) Advances in nanobiotechnology

(ii) Enhanced Permeability and Retention (EPR) effect

(iii) Nanoremediation

(iv) Drug release: Controlled and sustained release

(100)