

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION DECEMBER 2024
(Fifth Semester)

Branch – BIOCHEMISTRY

NANOBIOLOGY

Time: Three Hours

Maximum: 50 Marks

SECTION-A (5 Marks)

Answer ALL questions

ALL questions carry EQUAL marks

(5 x 1 = 5)

- 1 Which of the following is a key characteristic of a nanosystem?
(i) Independent of size (ii) Exhibits size-dependent properties
(iii) Stable only at the macro level (iv) Stable at excited state
- 2 What is a buckyball?
(i) A spherical molecule made up of carbon atoms
(ii) A type of nanowire used in electronics
(iii) A device for imaging nanoscale materials
(iv) A type of soft lithography
- 3 Zeta Potential is used to measure which property of nanoparticles?
(i) Shape (ii) Magnetic properties
(iii) Surface charge (iv) Optical absorption
- 4 What is the function of a clottocyte in nanomedicine?
(i) Oxygen transport (ii) Fighting infections
(iii) Drug delivery (iv) Blood clotting
- 5 Biosensor chips work on the principle of converting a biological interaction into which type of signal?
(i) Mechanical (ii) Electrical
(iii) Optical (iv) Chemical

SECTION - B (15 Marks)

Answer ALL Questions

ALL Questions Carry EQUAL Marks

(5 x 3 = 15)

- 6 a What is a nanosystem? Describe dimensionality and size-dependent phenomena in nanosystems.
OR
b Bring out the major challenges associated with the use of nanomaterials in biological systems?
- 7 a Describe the discovery and applications of buckyballs (fullerenes).
OR
b Elaborate the properties and applications of carbon nanotubes in molecular nanotechnology.
- 8 a Sol-gel technique is one of the chemical method for the nanoparticle synthesis. Explain.
OR
b Discuss the mode of operation of UV-Vis spectroscopy and explain its applications in nanoscience.

Cont...

- 9 a Describe the function of clottocytes and their role in the human body. How can they be applied in medical emergencies?
OR
b How can nanorobots assist the immune system, and what are their potential applications?
- 10 a Give the concept of nano pharmacology and its impact on modern pharmacology.
OR
b Narrate the potential applications and benefits of medibots.

SECTION -C (30 Marks)

Answer ALL questions

ALL questions carry EQUAL Marks

(5 x 6 = 30)

- 11 a Summarise the bottom-up and top-down approaches in molecular nanotechnology. How do they differ, and what are their respective advantages and disadvantages?
OR
b Examine the advantages and challenges of utilizing molecular self-assembly in nanotechnology.
- 12 a Elucidate how Dip-Pen Nanolithography (DPN) works and highlight its importance in nanofabrication.
OR
b Discuss the working principles of Atomic Force Microscopy (AFM) and its applications in nanotechnology research.
- 13 a Explain the working principle of Scanning Electron Microscopy (SEM) and its applications in nanoparticle characterization.
OR
b Justify the advantages of liposomes over other delivery systems in drug delivery.
- 14 a Explain electrospinning and its role in tissue engineering.
OR
b Compare and contrast the mechanisms of action of microbivores and the human immune system in pathogen destruction. In what ways might microbivores enhance immune responses?
- 15 a Outline the principle and applications of biosensor chips in nanobiology. How do they contribute to diagnostics and monitoring of biological processes?
OR
b Discover the role and advantages of nanocapsules in drug delivery systems. How do they improve the pharmacokinetics and biodistribution of therapeutic agents?

Z-Z-Z

END