

**PSG COLLEGE OF ARTS & SCIENCE**  
(AUTONOMOUS)

**BSc DEGREE EXAMINATION MAY 2025**  
(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 Nanobiochemistry involves:
  - (i) The study of chemical reactions at a macro scale
  - (ii) The interaction between nanomaterials and biological molecules
  - (iii) Developing biochemical sensors for detecting pollutants
  - (iv) Research in synthetic biology
- 2 In which field Quantum dots are typically used
  - (i) Electronics and bio-imaging
  - (ii) Construction
  - (iii) Agriculture
  - (iv) Fuel cells
- 3 Which method is most commonly used for nanoparticle size determination in a colloidal solution?
  - (i) Transmission Electron Microscopy
  - (ii) Scanning Electron Microscopy
  - (iii) Atomic Force Microscopy
  - (iv) Dynamic Light Scattering
- 4 Electrospinning is used in nanomedicine primarily for which of the following?
  - (i) Fabricating nanoscale scaffolds for tissue engineering
  - (ii) Creating drug delivery systems
  - (iii) Producing nanorobots for immune system repair
  - (iv) Enhancing MRI imaging techniques
- 5 What is a primary challenge associated with developing medibots for internal medical applications?
  - (i) Difficulty in miniaturization
  - (ii) Complexity in navigation within the body
  - (iii) Lack of power sources
  - (iv) High cost of materials

**SECTION - B (15 Marks)**

Answer **ALL** Questions

**ALL** Questions Carry **EQUAL** Marks

(5 x 3 = 15)

- 6 a Define nanobiology and bring out its importance in modern science.  
OR  
b Narrate the strategies and benefits of molecular nanotechnology.
- 7 a Explain the structure and applications of nanodendrimers in nanotechnology.  
OR  
b What are quantum dots, and how are they used in nanotechnology?

**Cont...**

- 8 a Describe the role of FTIR Spectroscopy in the characterization of nanoparticles and how it helps in understanding the surface chemistry.  
OR  
b Outline the synthesis and application of liposomes in targeted drug delivery systems.
- 9 a Summarise the role of respirocytes in nanomedicine.  
OR  
b Bring out the advantages of nanomedicine over traditional medical treatments.
- 10 a Show how does nanotechnology contribute to the development of an artificial pancreas in managing diabetes?  
OR  
b Narrate the potential benefits and challenges of using nanomaterials for spinal cord repair and regeneration.

**SECTION -C (30 Marks)**

Answer ALL questions

ALL questions carry EQUAL Marks

(5 x 6 = 30)

- 11 a Discuss how does bio nanotechnology contribute to the development of biosensors? Provide examples of their applications.  
OR  
b Point out how does the dimensionality and size influence the physical and chemical properties of nanomaterials? Provide examples.
- 12 a Compare the role of MEMS (Micro-Electro-Mechanical Systems) and NEMS (Nano-Electro-Mechanical Systems) in modern technology.  
OR  
b Describe the structure, properties, and applications of carbon nanotubes in nanotechnology.
- 13 a How does Atomic Force Microscopy (AFM) differ from other microscopy techniques in nanoparticle characterization, and what are its key applications?  
OR  
b Describe the Dynamic Light Scattering (DLS) technique and explain its importance in determining nanoparticle size and distribution.
- 14 a Respirocytes can be utilized as emergency medicine or in extreme environments such as space exploration. Justify.  
OR  
b Analyze the impact of electrospun nanofiber scaffold properties on cell behavior and tissue formation.
- 15 a Discuss about the Bio-Barcode Assay and its application in cancer detection. How does this assay improve the sensitivity and specificity of cancer diagnostics?  
OR  
b Analyze how nanotechnology is used in creating biosensor chips for real-time health monitoring. Highlight the advantages of these chips.

Z-Z-Z

END