

Seat No. \_\_\_\_\_

No. of Printed Pages: 03

[48]

**SARDAR PATEL UNIVERSITY**  
**M.Sc. Biomedical Science (Semester-III) Examination**  
**Monday, Date: 04/01/2021**  
**Time: 11:00am to 01:00pm**

**Course Code & Title: PT03CBMC23 – Nanotechnology and its Applications in Biomedical Science**

**Total Marks: 70**

**Note: Figures on the right indicate marks for the question.**

**Q-1 [A] Answer the following Multiple Choice Questions. All are compulsory [08]**

- 1) Nanoscience and Nanotechnology deals with the size of devices or materials in the range from \_\_\_\_\_ nm.  
a) 1-10                      b) 50-100                      c) 1-100                      d) 100-500
- 2) DNA double helix nanowire possesses \_\_\_\_\_.  
a) 0D structure & 1D confinement                      b) 1D structure & 2D confinement  
c) 2D structure & 1D confinement                      d) 0D structure & 3D confinement
- 3) Which of the following methods is not useful for the fabrication of CNTs?  
a) Laser ablation      b) Sol-Gel                      c) Arc Discharge      d) CVD
- 4) \_\_\_\_\_ of the following synthesis processes required surfactant molecules.  
a) Colloidal                      b) Microemulsion      c) L-B film                      d) All of above
- 5) The reaction of the herceptin drug with cancers cell surface protein HER2 in breast is an exothermic reaction and can be detected using \_\_\_\_\_ transducer.  
a) Magnetic                      b) Piezoelectric                      c) Calorimetric                      d) All of above
- 6) \_\_\_\_\_ consists of a nano-sized crystal of a magnetic iron mineral, which is enveloped by a lipid bilayer membrane.  
a) Genome                      b) Polysome                      c) Chromosome                      d) Magnetosome
- 7) \_\_\_\_\_ drugs help to slow heart beat and thereby lower the blood pressure.  
a) Diuretic      b) betablocker      c) Calcium channel blockers      d) Rehnin inhibitors
- 8) \_\_\_\_\_ type of devices are used for low concentration synthesis and detection.  
a) lab-on-chip      b) Nanolithography      c) 3D printing                      d) None of these

**Q-1 [B] Answer the following. All are compulsory [16]**

- 1 High energy ball milling is \_\_\_\_\_ approach for synthesis of nanomaterial.
- 2 Surface to volume ratio \_\_\_\_\_ with size reduced from micrometer to nanometer in any material.      a) increase b) decreases
- 3 Hybridization of graphene is \_\_\_\_\_.
- 4 \_\_\_\_\_ technique produce plasma plume during CNTs synthesis.
- 5 The spaces between nano-ridges form a natural photonic crystal that can generate constructive and destructive interference in butterfly wing. a) True b) False
- 6 \_\_\_\_\_ are self-assembled supramolecular structures consisting of amphiphilic macromolecules.

[1]

[P.T.O.]

- 7 Xerogel is porous material. a) True b) False
- 8 \_\_\_\_\_ synthesis is done at high pressure and temperature in aqueous medium.
- 9 Suspension of \_\_\_\_\_ nanoparticles is used in therapies associated with targeted drug delivery.
- 10 \_\_\_\_\_ are nanosized artificial vesicles of spherical shape that can be produced from natural phospholipids and cholesterol.
- 11 \_\_\_\_\_ microorganism is usually found in silver mines and is capable of accumulating silver inside or outside of their cell walls.  
a) *Pseudomonas stutzeri* b) *Klebsilla pneumonia*
- 12 The kidney is a unique organ for targeting of nanoparticles due to its innate ability to rapidly clear particles that are smaller than \_\_\_\_\_ nm in diameter.  
a) 50nm b) 10nm c) 12nm d) 100nm
- 13 \_\_\_\_\_ transducer is the one that converts change in pressure to an electrical field, which helps to study antigen-antibody interaction.
- 14 Ultra small super paramagnetic iron oxide (USPIO), have been approved for using them in detection of liver and spleen diseases. a) True b) False
- 15 The pulse oximeter is optical sensor to measure blood oxygen saturation level and beats per minute. a) True b) False
- 16 Solid Lipid Nanoparticles (SLN) can be synthesized by sonochemical method.  
a) True b) False

**Q-2 Attempt any Seven the following [14]**

- 1) Give examples of various types of nanomaterials according to dimensionality and electronic confinement.
- 2) Give the classification of various synthesis methods for nanomaterials.
- 3) Draw the schematic of Arc discharge set up used for synthesis of CNTs.
- 4) Explain the role of capping agent in colloidal synthesis.
- 5) What is aerogel? How it differs from hydrogel?
- 6) What is biomedical sensor? Enlist various components of biosensors.
- 7) What is blood brain barrier?
- 8) Explain mechanism for amperometric measurement of blood sugar concentration.
- 9) What is smart tattoo?

**Q-3 Describe the process of self assembly with factors affecting the self assembly processes. [08]**

**OR**

**Q-3 With suitable example; Explain how human femoral bone is natural nanocomposites material. [08]**

**Q-4 Discuss in detail biological synthesis of nanoparticles using microorganisms. [08]**

**OR**

**Q-4 Describe the microemulsion technique used for synthesis of biodegradable and biocompatible nanomaterials. [08]**

Q-5 What are chronic diseases? Explain how nanotechnology is useful in diagnosis of any one chronic disease. [08]

OR

Q-5 Explain the applications of nanotechnology for cancer therapy. [08]

Q-6 Write a short note on small scale drug delivery systems. [08]

OR

Q-6 What is nanonephrology? How nanoparticles are used in kidney diseases? [08]

————— X —————

