



**NAVACHANA  
UNIVERSITY**  
a UGC recognized University

School: *School of Science*  
 Program/s:  
 Year: 4<sup>th</sup> Semester: 7<sup>th</sup>  
 Examination: End Semester Examination  
 Examination year: December - 2022

Course Code: **BM411** Course Name: **Nanobiology**  
 Date: 06/12/2022  
 Time: 08:30 pm to 10:30 pm

Total Marks: 40  
 Total Pages:

**Instructions:**

- Write each answer on a new page.  
 → Abbreviation: **NPs: Nanoparticles**

Q. No.	Details	Marks	COs*	BTL#
Q.1	<p><b>Answer the following.</b></p> <ol style="list-style-type: none"> <li>Which one of the following used in solar cells?               <ol style="list-style-type: none"> <li>Carbon nanotubes</li> <li>Nanorods</li> <li>Nanobots</li> <li>All of the above</li> </ol> </li> <li>Which one of the following is true according to quantum confinement theory in context to NPs?               <ol style="list-style-type: none"> <li>Energy gap in semiconductor is proportional to the inverse of the square root of the size</li> <li>Energy gap in semiconductor is proportional to the inverse of the size</li> <li>Energy gap in semiconductor is proportional to the square of size</li> <li>Energy gap in semiconductor is proportional to the inverse of the square of size</li> </ol> </li> <li>Which one of the following is the best suitable for delivering NPs mediated gene therapy?               <ol style="list-style-type: none"> <li>Viral Vector</li> <li>Liposomes</li> <li>Polymeric NPs</li> <li>CNTs</li> </ol> </li> <li>State the application of "Smart Dust".</li> </ol>	4	CO1, CO2, CO3, CO4, CO5	BT1, BT2, BT3, BT4
Q.2	<p><b>Fill in the blanks.</b></p> <ol style="list-style-type: none"> <li>The nanostructures are categorized into _____ types according to their dimensions?</li> <li>The method for synthesizing NPs that includes chemical solution deposition is known as _____.</li> <li>_____ amino acid lowers the toxicity of gold nanoparticle.</li> </ol>	6	CO1, CO2, CO3, CO4, CO5	BT1, BT2, BT3, BT4

	<p>4. _____ is the nanoscale folding of DNA to create arbitrary two and three dimensional shapes at the nanoscale.</p> <p>5. _____ is the application of nanoscience to produce devices and products.</p> <p>6. _____ type of surface modification helps in increasing the stability of NPs.</p>			
<p><b>Q.3</b></p>	<p><b>Do as directed.</b></p> <ol style="list-style-type: none"> <li>1. A researcher is trying to conjugate a 10 KDa peptide the Ag nanoparticles using charge dependent binding of the protein at pH 8.0. I am finding issues with prolonged stability of the conjugates. So what can be the probable solution to maintain stability of the nanoparticle protein conjugation?</li> <li>2. Discuss the deciding factors of using the tag or probe in case of the nanoparticle applicative studies.</li> <li>3. Discuss the strategy to prevent the agglomeration of gold nanoparticles while determining the size and zeta potential.</li> <li>4. Semiconductors upon reducing to nanoscale, they become pure conductors. True/False.</li> <li>5. Researcher has prepared a gold nanoparticle with drug molecule encapsulated into it. What will be the method to measure a drug release profile for a drug encapsulated in a nanoparticle?</li> </ol>	<p><b>10</b></p>	<p>CO1, CO2, CO3, CO4, CO5</p>	<p>BT1, BT2, BT3, BT4</p>
<p><b>Q.4</b></p>	<p><b>Answer <u>any five</u> from the following in detail.</b></p> <ol style="list-style-type: none"> <li>1. According to you what are the major barriers which stop nanoparticles formulations from entering into mainstream treatment of lethal diseases in spite of success at lab scale?</li> <li>2. Discuss the challenges related to activity, selectivity and stability of NPs in the field of nanotechnology stating appropriate examples.</li> <li>3. Define nanotechnology. What are the probable mechanisms by which nanoparticle can act as antimicrobial drug? – Describe mechanism with example.</li> <li>4. Describe the SEM and TEM methods in detail to characterize the NPs. Discuss very brief if these methods can be applicable to study either chemical or biological NPs or both.</li> <li>5. Discuss in detail the dynamic light scattering analysis. (all possible analysis and interpretation with probable graphs and charts).</li> <li>6. Describe any one application of nanotechnology in detail.</li> <li>7. Discuss the chemical method for preparation of NPs and factors responsible for tuning the size and shape of NPs.</li> </ol>	<p><b>20</b></p>	<p>CO1, CO2, CO3, CO4, CO5</p>	<p>BT1, BT2, BT3, BT4</p>