

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -1 EXAMINATION- 2026

B.Tech-VI Semester (BT)

Course Code (Credits):18B1WBT633 (3)

Max. Marks: 15

Course Name: NanoBiotechnology

Course Instructor: Dr. Abhishek Chaudhary

Max. Time: 1 Hour

Note: (a) All questions are compulsory.

(b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

(c) Use of calculators is not allowed

Q.No	Question	CO	Marks
Q1	<p>The fundamental of nanotechnology lies in the fact that properties of material change dramatically when size reduced to the nanometer scale. Materials reduced to the nanoscale can show different properties compared to what they exhibit on a macroscale, enabling unique applications.</p> <ol style="list-style-type: none"> 1. How does the surface area-to-volume (SA/V) ratio of nanoscale materials differ from that of macroscale materials, and why is this difference important at the nanoscale? 2. Mention any two unique properties exhibited by nanoparticles. 3. Explain the concept of biocompatibility in relation to nanomaterials. 	CO-1	2+1+2
Q2	<p>Protein elongation is the rapid, cyclical process of adding amino acids to a growing polypeptide chain, consisting of three main steps, if a protein molecule is elongated at a constant rate of 0.1 nm s^{-1}.</p> <ol style="list-style-type: none"> 1. Calculate the total length of the protein in micrometer after 2 hours from the start of elongation. 2. What will be the length of the protein (in cm) if the elongation rate increases to $10 \mu\text{m s}^{-1}$ for the same duration? 3. Comment on the implications of such a change in elongation rate at the nanoscale. 	CO-1	2+2+2
Q3	<p>Globular proteins are compact, roughly spherical, water-soluble proteins formed by folded polypeptide chains, where amino acid residues are arranged with hydrophobic residues in the core and hydrophilic residues on the surface. If the diameter of a protein molecule is 10 nm and the size of a single amino acid residue is 1 nm, calculate the total number of amino acid residues present in the protein molecule.</p>	CO-1	4