JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -1 EXAMINATION- MARCH-2023

Course Code (Credits): 11B1WBT840 (3) Max. Marks: 15

Course Name: NanoBiotechnology

Course Instructors: Dr.Abhishek Max. Time: 1 Hour

Note: *All questions are compulsory. Marks are indicated against each question in square brackets.*

1. Nanomaterials have been in use since ancient times, since the 4th century AD. The Lycurgus cup represents a short-lived technology developed by Roman glass workers. But the lack of tools to characterize these structures made them less significant for a long time. Lycurgus Cup, which changes color depending on the location of the light source, is one of the best examples of ancient nanotechnology. How would you justify the colour change of this cup based on light source position [2]

2. One of the characteristics of nanosized objects is that the surface area to volume ratio is much greater than bulk sized objects. On the same concept, a student split a sphere of diameter 8.0 mm into smaller sphere of diameter 2 mm. Then what would be the surface area of sphere in above two cases, keeping volume constant in both the cases. [3]

3. Nanoscience is a horizontal integrating interdisciplinary science that cuts across all verticals of science and engineering discipline and in the same line nanotechnology are horizontal enabling convergent technologies which cross all vertical industrial sectors. Justify it using appropriate example. [3]

4. The number molecule or elements in chemistry is important because it connect macroscopic properties with microscopic properties. To established this connections calculate the number of molecule present in 0.5 mole, 0.25 mole and 0.1 m mole of $Zncl_2$ solution [3]

5. Radial Immunodiffusion is a quantitative immunodiffusion technique used to detect the concentration of antigen by measuring the diameter of the precipitin ring formed by the interaction of the antigen and the antibody at optimal concentration. If the optimize concentration of antibody is 0.25 nM then how would you prepare exactly 300ml of 0.25nM antibody solution from a 10 mM and 10 μM antibody stoke solutions? [4]