

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- April-2023

Course Code (Credits): 18B1WBT633 (3)

Max. Marks: 25

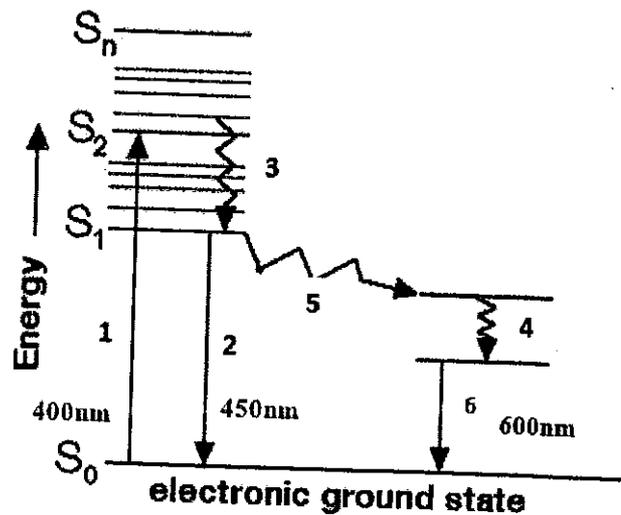
Course Name: Nano-Biotechnology

Course Instructors: Dr. Abhishek

Max. Time: 1.5 Hour

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

1. Transmission electron microscopy (TEM) and Scanning electron microscope both are high-resolution imaging technique in which a beam of electrons interacted with thin sample to produce magnified image. The electron beam is impacted by the sample's thickness/density, composition, and in some cases, crystallinity. What are the information you will gather from TEM and SEM microscopy and how both the imaging technique differ from each other. [4] [CO-3]
2. The SEM is a microscope that uses electrons instead of light to form an image. Since their development in the early 1950's, scanning electron microscopes have developed new areas of study in the medical and physical science communities. Diagrammatically illustrate the working principle of SEM and comment on its applications in medical and physical science. If you are using electron gun with two different filament of wavelength 100\AA and 10\AA for image analysis and to get better resolution. Which filament you will use and why? [5] [CO-3]
3. Consider the Jablonski diagram below, in which 06 processes are indicated: Identifying the listed processes from the Jablonski diagram and detail out each process. Also calculate the Stokes shift from the diagram. [6] [CO-3]



4. Nanoparticles synthesis refers to methods for creating nanoparticles. Nanoparticles can be derived from larger molecules, or synthesized by “bottom-up” methods that, for example, nucleate and grow particles from fine molecular distributions in liquid or vapor phase. Using Gold (Au) as an example, detail out the synthesis mechanism of nanoparticles using monophasic system and biphasic system. Also comparing and contrast the synthesis of nanoparticles in term of chemical and green methods. [5] [CO-2]
5. Rocket immunoelectrophoresis (also referred to as electroimmunoassay) is a simple, quick, and reproducible method for determining the concentration of a specific antigen in a sample mixture using antigen antibody interaction. If the required concentration of antibody is 0.5 nM then how would you prepare exactly 250ml of 0.5nM antibody solution from a 5.0 mM and 50 μ M antibodies stock solutions? [5] [CO-1]