JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATIONS-2022

B.Tech-I Semester (BT/BI)

COURSE CODE (CREDITS): 18B11PH212 (4)

MAX. MARKS: 25

COURSE NAME: Bioinstrumentation Techniques

COURSE INSTRUCTORS: Dr. Ragini Raj Singh

MAX. TIME: 1 Hour 30 Min

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

Q1. TEM can be used to obtain high resolution images, compositional analysis and to record diffraction pattern. In each case what will the process and methodology to obtain and interpret the results.

(CO:2, 3, 4)   3

Q.2. There is the existence of different modes of imaging in AFM. Discuss all the modes in view of advantages and disadvantages with respect to the sample to be analyzed. You can take any sample of your choice as the basis of discussion.

(CO:2, 3, 4, 5)   3

Q.3. Interpret the force-distance curve in order to explain long range and short range forces to obtain AFM images.

(CO:2, 3, 4)   2

Q.4. In UVS not all transitions are observed, why this happen. Discuss this concept considering some set of rules. Also discuss why some times forbidden transitions will also be observed.

(CO: 3, 4)   3

Q.6. If you are given with your sample of interest how will you be able to find out its quantum yield and lifetime.

(CO:3, 4, 5)   2.5

Q.7. A photon and electron has got same De-Broglie wavelength. Which has greater total energy?

(CO:1, 2)   2

Q. 8. An electron of energy 20eV easy comes into collision with a hydrogen atom in its ground state. The atom is excited into a higher state and electron is scattered with a reduced velocity. The atom subsequently returns to it's ground state with the emission of photon of wavelength 1.216×10^{-7}m. Determine the velocity of the scattered electron.

(CO:1, 2, 3)   2

Q.9. The resolving power of a microscope is approx. equal to that of the wavelength of the source used. In an electron microscope electrons are used as the source. What K.E. of electrons is needed if the resolving power is required to be 10^{-11} m, which would enable us to see an atom.

(CO:2, 3)   2.5

Q.10. In a sample with an absorbance of 1 at a specific wavelength. What is the relative amount of light that was absorbed by the sample?

(CO:3, 4, 5)   2.5

Q.11. Copper (II) ions in aqueous ammonia produces blue solution. Copper (II) ions in aqueous HCl produces green solution. Based on this evidence, which of the following may be true.

(CO: 4, 5)   2.5

(1) The spectra of the two solutions have different λ_{max}.
(2) The ion being measured is the same in both solutions.
(3) The concentration of copper in both solutions is different.
(4) The slope of the calibration curves are the same.
(5) If the concentration of copper is same the absorbance of the two solutions must be the same at their λ_{max}.