

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -1 EXAMINATION- 2023

MSc-III Semester (BT)

Course Code (Credits): 20MS1BT312 (2)

Max. Marks: 15

Course Name: Emerging Technology

Course Instructors: Dr. Abhishek

Max. Time: 1 Hour

Note: (a) All questions are compulsory.

(b) Marks are indicated against each question in square brackets.

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

1. In the field of spectroscopy, two main techniques are applied in order to detect molecular vibrational motions: Infrared spectroscopy (IR) and Raman spectroscopy. Raman Spectroscopy has its unique properties which have been used very commonly and widely in Inorganic, Organic and Biological systems. Keep in mind the above statement, describe Raman Effect, also compare and contrast Raman spectra with IR spectra? The Raman shift positions of Stokes and anti-Stokes lines are equal but opposite Comment? Also Calculate the wavenumber (in cm^{-1}) of the radiation having a wavelength of 488 nm. [5].
2. The resolution of an optical microscope is defined as the shortest distance between two points on a specimen that can still be distinguished by the observer or camera system as separate entities. Describe a method for determination of resolving power of compound microscope. How do you compare the resolving power of two microscopes illuminating with two different light sources of wavelength 400 nm and 650 nm respectively? How does the resolving power of a compound microscope change when a refractive index of medium between the object and objective lens increase? [5]
3. Microscope is an Optical Instrument used to see objects which are too small to be seen by the naked eye, using layers of magnifying lenses. Describe the essential components (with neat and clean ray diagram) of a dark field microscope and its use in Biotechnology. Also write down, how dark field microscope differs from bright field microscope. A specimen is 38 μm long and it viewed under a microscope with a magnification of X 100. Calculate the length of the image produced in mm. [5]