JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT
MAKE-UP EXAMINATION-NOV-2025
MSc-III Semester (BT)

Course Code (Credits): 20MS1BT312 (2) Max. Marks: 25

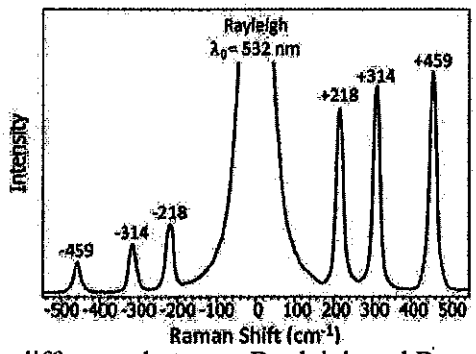
Course Name: Emerging Technology

Course Instructors: Dr. Abhishek Chaudhary Max. Time: 1.5 Hour

Note: (a)All questions are compulsory. Calculator use is permitted

(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

Q.No	Question	Marks
Q1	The Raman spectrum of CCl_4 is shown below. The very intense peak in the middle of the spectrum is Rayleigh scattering from the laser.  a. Explain the difference between Rayleigh and Raman scattering b. What are the collective names given to the peaks in the spectrum at positive and at negative Raman shift and why? c. Explain how the peaks at positive and negative Raman shift arise. d. Why are the peaks at negative Raman shift weaker than that at positive Raman shift?	2+2+ 2+2
Q2	I. A student chooses to develop a fluorescence biosensor using fluorophores and an excitation source with a wavelength of 350 nm. He noticed two light emissions at 425 nm and 550 nm, respectively, following stimulation. Determine the Stokes shift for this system. What are the most likely reason for the Stokes shift, justify your answer. II. In general, fluorescence intensity is proportional to fluorophore concentration within a tolerable concentration range; above this concentration, proportionality is no longer satisfied; explain in detail with an appropriate example. III. The initial absorption band peak for a 3.7 x 10^{-3} M naphthalene solution in hexane is located at 301 nm. The transmitted intensity was found to be 0.9 of its initial value when light at this wavelength traveled through 1 cm of this solution. Calculate the molar absorption coefficient.	3+3+3

120

Q3	I. Define resolving power of microscope. How is the resolving power of a compound microscope affected if (a) wavelength of light used is decreased, and (b) the diameter of its objective lens is increased? Justify your answers. I. If the magnifying power of the two lenses used in microscope (eyepiece and objective lenses) are 2.5X and 15X, then what would be the magnifying power of microscope?	**3+2**
Q4	Define quenching and differentiate between static and dynamic quenching using suitable example.	**2**