Course Code (Credits): 21MS2MB312 (3)   Max. Marks: 25
Course Name: Biosensor: Principle and Applications
Course Instructors: Dr. Abhishek   Max. Time: 1 Hour And 30 Minutes

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

1. Q1. The quantum yield for the decomposition of a compound X is 0.2. In an experiment 0.001 moles of the compound X are decomposed. Calculate the number of photons absorbed by the compound and calculate the number of emitted photon [4]

2. Diabetes management is really important for healthy life, in the same line researcher developed various sensors to monitor glucose level, detail out the different generation of glucose sensor (electrochemical) and also write down the limitations of each generations. Detail out the detection mechanism also [6]

3. 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) (i) What are the collective names given to the peaks in the spectrum at positive and at negative Raman shift? (ii) Explain how the peaks at positive and negative Raman shift arise. (iii) Why are the peaks at negative Raman shift weaker than that at positive Raman shift? [5]
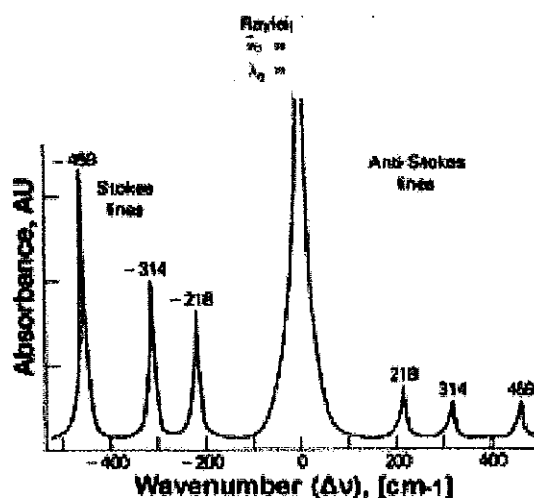
4. The number of photon emitted by a compound (R-6G) is 6.0×10^{18} but in the presence of quenching agent the number of emitted photon from the same compound is 1.5×10^{16}. What would be the concentration of quenching agent? Value of quenching constant is $8LMol^{-1}$ [5]

5. A student decides to use a fluorophores and excitation source of 400 nm for the designing of fluorescence biosensor. After excitation he observed two emitted light at 450 nm and 700 nm respectively. Calculate the stokes shift this system. [2.5]

6. Generally the intensity of fluorescence is proportional to the concentration of fluorophore in a reasonable concentration range beyond this concentration proportionality no more satisfied, explain with suitable example. [2.5]