

Dr. Ratn Rat
4th Sem

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT
TEST -2 EXAMINATION, APRIL 2019
B.Tech(BT) IV Semester

Course Code: 10B11PH212

MAX. MARKS: 25

Course Name: Biophysical Techniques

Course Credits: 04

MAX. TIME: 1.5 Hrs.

Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means.

Q.1. Write short notes on:

[CO:1-5][1 x 5=5]

- (i) Frank Condon Principle with diagram
- (ii) Biological Chromophores
- (iii) Why routine UV spectra collected in the range 200-700 nm only?
- (iv) Invariance of emission wavelength with respect to excitation wavelength
- (v) Fluorescence lifetime

Q.2. What do you understand by selection rules in UV spectroscopy? Why sometimes forbidden transitions are also possible?

[CO:2-4]2.5

Q.3. What is quantum yield of fluorescence and how to measure quantum yield?

[CO:2-4]2.5

Q.4. Discuss the necessary conditions for IR absorbance. What are the different vibrational modes, discuss them with the help of diagrams?

[CO:3-5]3

Q.5. Discuss the mechanical model of stretching vibrations and deduce the following: [CO:3-5]4

- (i) Frequency
- (ii) Wavenumber

Q.6.

[CO:1-5]2

(a) For what kinetic energy of a neutron will the associated de-Broglie wavelength be 1.40×10^{-10} m?

(b) Also find the de-Broglie wavelength of a neutron, in thermal equilibrium with matter, having an average kinetic energy of $3/2 \times kT$ at 300K.

Q.7. 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:3-5]2

Q.8. Consider the spectrum below, answer the following with reasons

[CO:3-5]4

- (i) Is the spectrum a line spectrum or band spectrum
- (ii) What is its λ_{\max} ?
- (iii) If the concentration of the solution was 45 ppm, what is the molar extinction coefficient at λ_{\max} ? and also at 450 nm?

(iv) How will the spectra look if a higher concentration of the same measured?

(v) How will the spectra look if 1 mm sample cell is used instead of 1 cm cell?

(vi) Is the substance in spectrum "b" is same as the substance in spectrum "a"?

