Enrollment No: _____ Exam Seat No:_____

C.U.SHAH UNIVERSITY
Winter Examination-2015

Subject Name : Chemistry - VI

Subject Code :4SC03CHE2 **Branch :** B.Sc.(Chemistry)

Semester : 3 **Date :**8/12/2015 **Time :** 2:30 **To** 5:30 **Marks : 70**

Instructions:

(1) Use of Programmable calculator & any other electronic instrument is prohibited.
(2) Instructions written on main answer book are strictly to be obeyed.
(3) Draw neat diagrams and figures (if necessary) at right places.
(4) Assume suitable data if needed.

Q-1 **Attempt the following questions:** **(14)**

a) Arrange the following radiations in their increasing order of energy: IR, UV, Microwave, Cosmic **(1)**

b) Which spectroscopic techniques are used for vibrational studies of molecules on surfaces? **(1)**

c) Why the range of electromagnetic radiation between 190-100 nm is called vacuum UV? **(1)**

d) Write the mathematical expression for Beer-Lambert law. **(1)**

e) What is HOMO and LUMO? **(1)**

f) What is the primary application of UV-Visible spectroscopy? **(1)**

g) What is B-band and E-band in UV-Visible spectroscopy? **(1)**

h) What is the basic function of Fourier Transform? **(1)**

i) What is the characteristic absorption band in the IR Spectra of organic compound containing carbonyl and acetylene group? **(1)**

j) What is resonance energy transfer in fluorescence spectroscopy? **(1)**

k) How can we determine the extent of energy transfer in FRET? **(1)**

l) What is quenching of fluorescence? **(1)**

m) What is the basic difference between singlet ground state and singlet exited state in terms of electron spin and pairing? **(1)**

n) Define triplet state. **(1)**

Attempt any four questions from Q-2 to Q-8

Q-2 **Attempt all questions** **(14)**

a) What is spectroscopy? Explain different types of spectroscopic techniques. **(7)**

b) What are the different characteristics of rotational spectroscopy? Classify different molecular rotors based upon their moment of inertia. **(7)**

Q-3 **Attempt all questions** **(14)**

a) Explain the theory of spectroscopy. What is Excitation and Relaxation process in spectroscopy? **(7)**

	b)	What is Raman effect? Explain different process involved during collision between a vibrating molecule or lattice and an incident photon.	**(7)**
Q-4		**Attempt all questions**	**(14)**
	a)	Write a note on electronic transition in UV-Visible Spectroscopy.	**(7)**
	b)	Explain the different parameters responsible for shifting of the band in UV-Visible Spectroscopy.	**(7)**
Q-5		**Attempt all questions**	**(14)**
	a)	Write notes on following terms: (i) Auxochrome, (ii) Chromophore, (iii) Bathochrome, (iv) Hypsochrome, (v) Hyperchrome and (vi) Hypochrome.	**(6)**
	b)	What is fluorescence? Draw and explain the Jablonski diagram.	**(8)**
Q-6		**Attempt all questions**	**(14)**
	a)	What are the differences between IR and Raman spectroscopy?	**(7)**
	b)	Write a note on theory and basic principle of IR spectroscopy.	**(7)**
Q-7		**Attempt all questions**	**(14)**
	a)	Write a note on coupled interaction and Fermi resonance in IR spectroscopy.	**(7)**
	b)	Explain with block diagram, the instrumental setup of Fourier Transform Infrared spectrometer.	**(7)**
Q-8		**Attempt all questions**	**(14)**
	a)	Explain different types of fluorescence and quenching of fluorescence.	**(6)**
	b)	Write notes on fluorescence anisotropy, fluorescence lifetime and quantum yields.	**(8)**