

Reg.No. \_\_\_\_\_



# Karunya UNIVERSITY

(Karunya Institute of Technology & Sciences)  
(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

## End Semester Examination – Nov/Dec – 2016

Code : **14PH2012**  
Sub. Name : **Spectroscopy**

Semester : **2016-17 ODD**  
Duration : **3hrs**  
Max. marks : **100**

### ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)

Q. No.	Sub Div.	Questions	Course Outcome	Marks
1.	a.	What is spectroscopy?	CO-1	3
	b.	What is the difference between absorption and emission spectra?	CO-1	3
	c.	Explain the different regions of an electromagnetic spectra and discuss its applications in different types of spectroscopy.	CO-1	14
(OR)				
2.	a.	Define an unit cell.	CO-2	3
	b.	Give an example of a material for each type of crystal system.	CO-2	3
	c.	Explain the seven types of crystal systems and fourteen Bravais lattices with a neat sketch.	CO-2	14
3.	a.	Explain the different types of vibrations in H <sub>2</sub> O molecule with a neat sketch.	CO-3	14
	b.	Will the H <sub>2</sub> O molecule obey the mutual exclusion principle?. Justify.	CO-3	6
(OR)				
4.	a.	How does the vibrating diatomic molecule HCl behaves like a simple harmonic oscillator?. Explain using Schrodinger Equation.	CO-3	18
	b.	Which type of spectroscopy could be used to study a HCl molecule?	CO-3	2
5.	a.	Discuss the basic working principle behind FTIR spectroscopy.	CO-3	10
	b.	Write a note on instrumentation part of FTIR spectroscopy.	CO-3	5
	c.	Write a note on applications of FTIR spectroscopy	CO-3	5
(OR)				
6.	a.	Draw the common planes of a cubic unit cell, (100) (110) and (111).	CO-2	6
	b.	Explain the Debye-Scherrer method of X-ray diffraction	CO-2	14
7.	a.	A substance shows Raman line at 4568 Å when the exciting line is 4332 Å. Find the stokes and antistokes line when the exciting line is 4036 Å.	CO-4	10
	b.	When the photons of wavelength 4358 Å is incident on a molecule, it gives Raman lines at 4447 Å. Find out the Raman Shift in cm <sup>-1</sup> .	CO-4	4
	c.	What you meant by (i) Stokes line (ii) Anti-stokes line and (iii) Raman Shift	CO-4	6
(OR)				
8.	a.	Give the difference between Raman and Rayleigh Scattering.	CO-4	3
	b.	Explain the classical theory of Raman Effect.	CO-4	14
	c.	What are the drawbacks of classical theory?	CO-4	3
<b><u>Compulsory:</u></b>				
9.	a.	Discuss the different types of energy levels in a diatomic molecule.	CO-4	8
	b.	What is RRS?. Explain its working principle.	CO-4	6
	c.	Give the advantage of RRS over conventional raman spectroscopy and discuss its applications.	CO-4	6

ALL THE BEST