

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 : 15PH3013**  
**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.	Draw the $C_{3v}$ group table with suitable examples and explain the properties.	CO-1	20
(OR)				
2.	a.	What is the difference between point group and space group?	CO-1	6
	b.	What is a basis?. Explain the reducible representations with suitable examples.	CO-1	14
3.	a.	What is meant by conjugate?	CO-1	5
	b.	Explain the different types of symmetry elements and symmetry operations with suitable examples and neat sketch.	CO-1	15
(OR)				
4.	a.	Draw the $C_{2v}$ group table with $H_2O$ molecule as an example and explain the properties.	CO-1	20
5.	a.	Write a note on population of energy levels.	CO-2	3
	b.	What is Larmor Precession?	CO-2	3
	c.	Derive the frequency of Larmor Precession.	CO-2	14
(OR)				
6.	a.	How does the diamagnetic shielding result in the chemical shift? Discuss in detail in case of NMR.	CO-2	20
7.	a.	Define relaxation time	CO-2	2
	b.	Discuss the different types of Relaxation times associated with NMR	CO-2	8
	c.	Write a note on Fourier Transform Spectroscopy in N.M.R	CO-2	10
(OR)				
8.	a.	What is the significance of the Lande g-factor ( $g = 2$ ), in case of electron spin?	CO-3	3
	b.	What is Bohr Magneton?	CO-3	3
	c.	Describe the interaction between electron spin and the external applied magnetic field.	CO-3	14
<b><u>Compulsory:</u></b>				
9.	a.	What is the working principle behind Mossbauer Spectroscopy?	CO-4	10
	b.	Explain any one application of Mossbauer Spectroscopy in detail.	CO-4	10

ALL THE BEST