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



**UNIVERSITY**

(Karunya Institute of Technology & Sciences)

(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

**End Semester Examination – April / May – 2017**

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
| **Code :** | **14PH2012** | **Duration :** | **3hrs** |
| **Sub. Name :** | **SPECTROSCOPY** | **Max. marks :** | **100** |

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Q. No** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | What are the different parts of an electromagnetic spectrum? | CO1 | 10 |
| b. | Explain the application of different regions of an electromagnetic spectra in different types of spectroscopy. | CO1 | 10 |
| (OR) | | | | |
| 2. | a. | What is Zeeman effect? | CO2 | 3 |
| b. | Using total angular momentum (J), explain the theory behind Zeeman Effect. | CO2 | 17 |
| 3. | a. | Explain the X-ray photoelectron spectroscopy in detail. | CO2 | 14 |
|  | b. | What are the applications of XPS? | CO2 | 4 |
|  | c. | Give the expansion for UPES. | CO2 | 2 |
| (OR) | | | | |
| 4. | a. | X-rays of wavelength 1.392 Å are reflected from the face of an NaCl crystal. The first order reflection is observed at an angle of 14o. Calculate the lattice spacing (d). | CO2 | 5 |
|  | b. | Using Braggs law explain any one method for Powder X-ray diffraction. | CO2 | 15 |
| 5. | a. | What is Beer Lamberts law? | CO2 | 3 |
|  | b. | With a neat sketch explain the working principle and instrumentation part of UV-Visible Spectroscopy. | CO3 | 14 |
|  | c. | What are the applications of UV-Visible Spectroscopy? | CO3 | 3 |
| (OR) | | | | |
| 6. | a. | Explain the different vibrations of CO2 molecule with a neat sketch. | CO3 | 14 |
|  | b. | What you meant by mutual exclusion principle. Explain in with examples. | CO3 | 6 |
| 7. | a. | Describe the diatomic molecule as an Anharmonic Oscillator and explain the different types of transitions giving rise to fundamental absorption, first and second overtones. | CO3 | 20 |
| (OR) | | | | |
| 8. | a. | What is Raman Shift? | CO4 | 2 |
|  | b. | Write a note on Raman Spectrometer Instrumentation technique. | CO4 | 6 |
|  | c. | Write a note on quantum theory of Raman Effect. | CO4 | 12 |
|  | | **Compulsory:** |  |  |
| 9. | a. | Discuss the different types of energy levels in a diatomic molecule. | CO4 | 8 |
|  | b. | Explain the working principle of Resonance Raman Spectroscopy and discuss its advantages over conventional spectroscopy and its applications. | CO4 | 8 |
|  | c. | Give any two difference between Raman and Fluorescence Spectra. | CO4 | 4 |