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| 1.  | Title of the Course  | Principles of Spectroscopy |
| 2.  | Course Number  | CY5202                     |
| 3.  | Status of the Course   | Core                       |
| 4.  | Structure of Credits   | 3-0-0-3                    |
| 5.  | Offered To   | PG                         |
| 6.  | New Course/Modification to   | New                        |
| 7.  | To be Offered by   | Department of Chemistry    |
| 8.  | To take effect from  | July 2020                  |
| 9.  | Prerequisite   | Nil                        |
| 10. | Whether approved by the Department   | Yes                        |
| 11. | <b>Course Objective:</b> To introduce the theoretical aspects of molecular spectroscopy, and to connect the concepts of group theory with spectroscopy. To impart a candid understanding of the theoretical underpinnings of spectroscopy, an omnipotent branch of chemistry.  |                            |
| 12. | <b>Course Content:</b> Radiation and matter, Fermi's Golden Rule, Einsteins Coefficients, Spectral lineshapes; Rotational Spectroscopy: molecular rotors, degeneracies, Stark effect, selection rules, spin-orbit coupling, polyatomic molecules; Vibrational Spectroscopy: harmonic oscillator, selection rules, Morse oscillator, bond dissociation, normal modes and group theory; Raman Spectroscopy: Raman and Rayleigh scattering, polarizability, selection rules, rotational and vibrational Raman spectra, polyatomic molecules; Electronic Spectroscopy: Jablonski diagram, Franck-Condon principle, Electronic transition, selection rules, term symbols, Russel Saunders spin-orbit coupling, d-d and CT transitions; Emission Spectroscopy: fluorescence and phosphorescence, Stokes shift, quantum yield, Kasha's rule; Introduction to magnetic resonance spectroscopy. |                            |
| 13. | <b>Text book(s):</b><br>1. Hollas J M, <i>Modern Spectroscopy</i> , Wiley (2004).<br>2. Levine I N, <i>Molecular Spectroscopy</i> , Wiley-Blackwell (1975).  |                            |
| 14. | <b>Reference(s):</b><br>1. Barrow G M, <i>Introduction to Molecular Spectroscopy</i> , McGraw-Hill Inc. (1962).<br>2. Harris D C, and Bertolucci M D , <i>Symmetry and Spectroscopy</i> , Dover Publications (1989).<br>3. Long D A, <i>Raman Spectroscopy</i> , McGraw Hill Education (1977).<br>4. Slichter C P, <i>Principles of Magnetic Resonance</i> , Springer (1990).  |                            |