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| 1.  | Title of the course  | Symmetry and Group Theory |
| 2.  | Course number  | CY509L                    |
| 3.  | Structure of credits   | 3-0-0-3                   |
| 4.  | Offered to   | PG                        |
| 5.  | New course/modification to   | Modification To CY5206/11 |
| 6.  | To be offered by   | Department of Chemistry   |
| 7.  | To take effect from  | July 2022                 |
| 8.  | Prerequisite   | Nil                       |
| 9.  | <b>Course Objective(s):</b> To introduce fundamental aspects and the basic mathematical framework of the group theory. Theoretical concepts will be utilized to explain many chemical, physical and spectroscopic behavior of molecules analyzing their molecular symmetries.  |                           |
| 10. | <b>Course Content:</b> Elements, symmetry operations, group, subgroup, symmetric group, isomorphism, homomorphism; Properties, notation and elements of groups, determination of point group, optical activity; Representations: transformation operators, equivalent, reducible and irreducible representations, reduction of a representation, projection operators; Great orthogonality theorem and its proof; Character tables: notations for character tables, direct product group, direct product representation; Representations and quantum mechanics: vanishing of integrals; Applications: bonding, structure and reactivity, molecular vibrations, Jahn-Teller theorem, magnetic dipole selection rules, Woodward-Hoffmann rule. |                           |
| 11. | <b>Textbook(s):</b><br>1. Bishop D M, <i>Group Theory and Chemistry</i> , Dover Publications (1993).<br>2. Cotton F A, <i>Chemical Applications of Group Theory</i> , Wiley (2008).  |                           |
| 12. | <b>Reference(s):</b><br>1. Carter R L, <i>Molecular Symmetry and Group Theory</i> , Wiley (2009).<br>2. Rakshit S C, <i>Atomic &amp; Molecular Symmetry Groups and Chemistry</i> , Sarat Book House (2014).<br>3. Tinkham M, <i>Group Theory and Quantum Mechanics</i> , Dover Publications (2003).  |                           |