

| BS Chemistry Semester-IV  |   |             |                      |             |   |
|---|---|-------------|----------------------|-------------|---|
| Programme   | BS Chemistry  | Course Code | Chem-202             | Credit Hour | 1 |
| Course Title  | Physical Chemistry Lab  |             | Course Type          | Major       |   |
| Course Introduction   |   |             |                      |             |   |
| <p>This course covers various experimental techniques for analyzing chemical reactions, including polarimetry, spectrophotometry, and kinetics studies.</p> <p>Here is a brief description of course outlines:</p> <p>Determination of angle of rotation of an optically active substance.</p> <p>Determination of percentage composition of a binary solution of glucose/sucrose by polarimetry.</p> <p>Determination of specific rotation of given optically active substance.</p> <p>Study of kinetics of inversion of cane sugar using polarimetric method.</p> <p>Determination of concentration of colored substance by spectrophotometry.</p> <p>Study of kinetics of iodination of acetone using UV Visible Spectrophotometry.</p> <p>Kinetics of the reaction between methyl orange and peroxodisulphate ions in presence of bromide ions.</p> <p>Investigation of the kinetics of hydrolysis of ethyl acetate in the presence of an acid.</p> <p>Determination of the relative strength of acids (HCl and H<sub>2</sub>SO<sub>4</sub>) by studying the hydrolysis of an ester.</p> <p>Determination of the eutectic point of a binary mixture (Naphthalene and diphenyl, urea and phenol, benzoic acid and naphthalene) system.</p> |   |             |                      |             |   |
| Learning Outcomes   |   |             |                      |             |   |
| <p>On the completion of the course, the students will be able:</p> <ol style="list-style-type: none"> <li>1. to accurately determine the optical rotation and specific rotation of optically active substances,</li> <li>2. analyze the kinetics of reactions using polarimetry and spectrophotometry,</li> <li>3. Evaluate the relative strengths of acids and the eutectic points of binary mixtures through practical experimentation.</li> </ol>  |   |             |                      |             |   |
| Course Content  |   |             | Assignments/Readings |             |   |
| <b>Week 1</b>   | Determination of angle of rotation of an optically active substance.                            |             |                      |             |   |
|   | Continued   |             |                      |             |   |
| <b>Week 2</b>   | Continued   |             |                      |             |   |
|   | Determination of percentage composition of a binary solution of glucose/sucrose by polarimetry. |             |                      |             |   |
| <b>Week 3</b>   | Continued   |             |                      |             |   |
|   | Continued   |             |                      |             |   |
| <b>Week 4</b>   | Determination of specific rotation of given optically active substance.                         |             |                      |             |   |
|   | Continued   |             |                      |             |   |
| <b>Week 5</b>   | Continued   |             |                      |             |   |
|   | Study of kinetics of inversion of cane sugar using polarimetric method.                         |             |                      |             |   |

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| <b>Week 6</b>  | Continued   |  |
|  | Determination of concentration of colored substance by spectrophotometry.   |  |
| <b>Week 7</b>  | Continued   |  |
|  | Continued   |  |
| <b>Week 8</b>  | <b>Mid Term Examinations</b>  |  |
|  |   |  |
| <b>Week 9</b>  | Study of kinetics of iodination of acetone using UV Visible Spectrophotometry.  |  |
|  | Continued   |  |
| <b>Week 10</b>   | Kinetics of the reaction between methyl orange and peroxodisulphate ions in presence of bromide ions.                                     |  |
|  | Continued   |  |
| <b>Week 11</b>   | Continued   |  |
|  | Investigation of the kinetics of hydrolysis of ethyl acetate in the presence of an acid.  |  |
| <b>Week 12</b>   | Continued   |  |
|  | Continued   |  |
| <b>Week 13</b>   | Determination of the relative strength of acids (HCl and H <sub>2</sub> SO <sub>4</sub> ) by studying the hydrolysis of an ester.         |  |
|  | Continued   |  |
| <b>Week 14</b>   | Continued   |  |
|  | Determination of the eutectic point of a binary mixture (Naphthalene and diphenyl, urea and phenol, benzoic acid and naphthalene) system. |  |
| <b>Week 15</b>   | Continued   |  |
|  | Continued   |  |
| <b>Week 16</b>   | <b>Final Term Examinations</b>  |  |
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| <b>Textbooks and Reading Material</b>  |   |  |
| <ol style="list-style-type: none"> <li>1. Garland, C. W., Nibler, J. W., Shoemaker, D. P., Experiments in Physical Chemistry, 6th ed., WCB McGraw-Hill, 1996.</li> <li>2. Singh, A., Advanced Experimental Physical Chemistry, Campus Books International, 2007.</li> <li>3. Daniels F., Experimental Physical Chemistry, 7th ed., McGraw-Hill College, 1970.</li> <li>4. Matthews, G. P., Experimental Physical Chemistry, Oxford University Press, 1986.</li> <li>5. Bhatti, H. N. &amp; Farooqi, Z. H., Experimental Physical Chemistry for Graduate and Postgraduate Students, Revised ed., Caravan Book House, Lahore, 2014.</li> </ol> |   |  |

| <b>Teaching Learning Strategies</b>  |
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| <ol style="list-style-type: none"><li>1. Lectures</li><li>2. Group Discussion</li><li>3. Laboratory work</li><li>4. Seminar/ Workshop</li></ol>  |
| <b>Assignments: Types and Number with Calendar</b>   |
| <ol style="list-style-type: none"><li>1. Lab activities and practical performance from week 1 to week 16.</li><li>2. Literature review based assignment relevant to the course will also be given during the course.</li></ol> |