Subject code: 13PH0701
Subject name: Instrumental Methods of Analysis

Scope: This subject deals with the application of instrumental methods in qualitative and quantitative analysis of drugs. This subject is designed to impart fundamental knowledge on the principles and instrumentation of spectroscopic and chromatographic technique. This also emphasizes theoretical and practical knowledge of modern analytical instruments that are used for drug testing.

Objective: Upon completion of the course the student shall be able to
1. To understand the interaction of matter with electromagnetic radiations and its applications in drug analysis
2. To understand the chromatographic separation and analysis of drugs
3. Perform quantitative & qualitative analysis of drugs using various analytical instruments.

Teaching and assessment scheme:

<table>
<thead>
<tr>
<th>Teaching Scheme (Hours)</th>
<th>Credits</th>
<th>Theory/ Tutorial Marks</th>
<th>Practical Marks</th>
<th>Total Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theory</td>
<td>10</td>
<td>15</td>
<td>75</td>
<td>150</td>
</tr>
<tr>
<td>Tutorial</td>
<td>15</td>
<td>35</td>
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<tr>
<td>Practical</td>
<td>35</td>
<td>45</td>
<td>50</td>
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</tbody>
</table>

Theory syllabus:

Unit-1


Unit-2


Unit-3

Unit-4 8 Hours
**Gas chromatography:** Introduction, theory, instrumentation, derivatization, temperature programming, advantages, disadvantages and applications. High-performance liquid chromatography (HPLC)-Introduction, theory, instrumentation, advantages and applications.

Unit-5 7 Hours
**Ion-exchange chromatography:** Introduction, classification, ion exchange resins, properties, mechanism of the ion exchange process, factors affecting ion exchange, methodology and applications. **Gel chromatography:** Introduction, theory, instrumentation and applications. **Affinity chromatography:** Introduction, theory, instrumentation and applications.

Tutorials will be based on the above syllabus. Teaching hours: 15 Hours

**Practical syllabus:**
1. Determination of absorption maxima and effect of solvents on absorption maxima of organic compounds.
2. Estimation of dextrose by colourimetry.
3. Estimation of sulphanilamide by colourimetry.
4. Simultaneous estimation of ibuprofen and paracetamol by UV spectroscopy.
5. Assay of paracetamol by UV- Spectrophotometry.
7. Study of quenching of fluorescence.
8. Determination of sodium by flame photometry.
10. Determination of chlorides and sulphates by nephelo turbidometry.
12. Separation of sugars by thin-layer chromatography.
13. Separation of plant pigments by column chromatography.
14. Demonstration experiment on HPLC.
15. Demonstration experiment on Gas Chromatography.

**Recommended References (Latest edition):**
1. Instrumental Methods of Chemical Analysis by B.K Sharma.
2. Organic spectroscopy by Y.R Sharma.
4. Vogel’s Textbook of Quantitative Chemical Analysis by A.I. Vogel.
8. Quantitative Analysis of Drugs by D. C. Garrett.