University of Rajasthan Jaipur

SYLLABUS

M. Sc. Pharmaceutical Chemistry

(Annual Scheme)

M.Sc. (Previous) Examination 2019

M.Sc. (Final) Examination 2020
<table>
<thead>
<tr>
<th>Paper</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
<th>Hours Marks</th>
<th>Max Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>PHC-10</td>
<td>Pharmacology</td>
<td>3</td>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td>1.2</td>
<td>PHC-11</td>
<td>Chemical Engineering</td>
<td>3</td>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td>1.3</td>
<td>PHC-12</td>
<td>Paper-III</td>
<td>2</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>1.4</td>
<td>PHC-13</td>
<td>Paper-IV</td>
<td>2</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>1.5</td>
<td>PHC-14</td>
<td>Paper-V</td>
<td>2</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>1.6</td>
<td>PHC-15</td>
<td>Paper-VI</td>
<td>2</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

**Total Marks:** 700

---

<table>
<thead>
<tr>
<th>Paper</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
<th>Hours Marks</th>
<th>Max Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1</td>
<td>PHC-6</td>
<td>Pharmacology</td>
<td>3</td>
<td>90</td>
<td>100</td>
</tr>
<tr>
<td>2.2</td>
<td>PHC-7</td>
<td>Paper-VI</td>
<td>2</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>2.3</td>
<td>PHC-8</td>
<td>Paper-VII</td>
<td>2</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>2.4</td>
<td>PHC-9</td>
<td>Paper-VIII</td>
<td>2</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>2.5</td>
<td>PHC-10</td>
<td>Paper-IX</td>
<td>2</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

**Total Marks:** 700

---

<table>
<thead>
<tr>
<th>Paper</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
<th>Hours Marks</th>
<th>Max Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1</td>
<td>PHC-1</td>
<td>Pharmacology</td>
<td>3</td>
<td>90</td>
<td>100</td>
</tr>
<tr>
<td>3.2</td>
<td>PHC-2</td>
<td>Paper-V</td>
<td>2</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>3.3</td>
<td>PHC-3</td>
<td>Paper-IV</td>
<td>2</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>3.4</td>
<td>PHC-4</td>
<td>Paper-VI</td>
<td>2</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>3.5</td>
<td>PHC-5</td>
<td>Paper-VII</td>
<td>2</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

**Total Marks:** 700

---

<table>
<thead>
<tr>
<th>Paper</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
<th>Hours Marks</th>
<th>Max Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.1</td>
<td>PHC-6</td>
<td>Pharmacology</td>
<td>3</td>
<td>90</td>
<td>100</td>
</tr>
<tr>
<td>4.2</td>
<td>PHC-7</td>
<td>Paper-VI</td>
<td>2</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>4.3</td>
<td>PHC-8</td>
<td>Paper-VII</td>
<td>2</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>4.4</td>
<td>PHC-9</td>
<td>Paper-VIII</td>
<td>2</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>4.5</td>
<td>PHC-10</td>
<td>Paper-IX</td>
<td>2</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

**Total Marks:** 700
first year and second year respectively. The external assessment at the end of first year and second year will be of 14 hours duration spread over 2 days. The total marks allotted to practical is 200 each.

In theory each course has been subdivided into 5 units. There will be ten questions-two from each unit. The students are to attempt any five questions selecting at least one question from each unit.

2. The number of papers and the maximum marks for each paper/practical shall be shown in the syllabus for the subject concerned. It will be necessary for a candidate to pass in the theory part as well as in practical part (wherever prescribed) of a subject/paper separately.

3. A candidate for a pass at each of the Previous and the Final Examinations shall be required to obtain (i) at least 36% marks in the aggregate of all the papers prescribed for the examination and (ii) at least 36% marks in Practical(s) wherever prescribed at the examination, provided that if a candidate fails to secure at least 25% marks in each individual paper at the examination and also in the dissertation/report/field work, wherever prescribed, he shall be deemed to have failed at the examination notwithstanding his having obtained the minimum percentage of marks required in the aggregate for the examination. No division will be awarded at the previous examination. Division shall be awarded at the end of the Final Examination on the combined marks obtained at the Previous and the Final Examination taken together, as noted below:

First Division 60%
Second Division 48%

All the rest will be declared to have passed the examination.

4. If a candidate clears any papers/practicals/dissertation prescribed at the Previous and/or Final Examinations after a continuous period of three years, then for the purpose of working out his division the minimum pass marks only viz. 25% (36% in the case of practical) shall be taken into account in respect of such paper(s)/practical(s)/dissertation are cleared after the expiry of the aforesaid period of three years; provided that in case where a candidate requires more than 25% marks in order to reach the minimum aggregate as many marks out of those actually secured by him will be taken into account as would enable him to make up the deficiency in the requisite minimum aggregate.

5. That Thesis/Dissertation/Survey Report/Field work shall be typed and submitted in triplicate so as to reach the office of the Registrar atleast 3 weeks before the commencement of the theory examinations. Only such candidates shall be permitted to offer Dissertation/Field Work/Survey Report/Thesis if provided in the scheme of examination in lieu of a paper as have secured atleast 55% marks in the aggregate of all the papers prescribed for the previous examination in the case of annual scheme irrespective of the number of papers in which a candidate actually appeared at the examination.

6. In case of any clarifications or ambiguities the rules for university M.Sc. Chemistry annual scheme will be followed.

**M.Sc. PHARMACEUTICAL CHEMISTRY**

(2 Years Programme, Annual Scheme)
M.Sc. 1 Year (Previous)

**PHC-I : Instrumental Techniques for Chemical Analysis**

**Time : 3 hours**

**Max Marks : 100**

**Unit-I**

Ultraviolet-visible Spectroscopy: Introduction, energy of electronic excitations, absorption laws, chromophores and auxochromes, solvent effects on UV absorption, conjugated dienes, the Woodruff Fieser rules for dienes, enones, UV spectra of polyenes, polyynes, benzenoids, polynuclear aromatic hydrocarbons and heterocycles.

IR Spectroscopy: Introduction, force constants, stretching and bending modes, and their energy, absorption by various functional groups, fingerprint region, overtones, combination tones, Fermi resonance, factors influencing vibration frequencies, variation in the carbonyl frequencies, introduction to FTIR spectroscopy.

**Unit-II**

Nuclear Magnetic Resonance Spectroscopy: Introduction, equivalent and non-equivalent protons, chemical shifts, factors affecting chemical shifts, spin-spin coupling, splitting patterns (AX, AB, AMX, ABX), spin decoupling, deuterium labelling, chemical exchange, coupling constants (geminal, vicinal, long-range), NOE, shift reagents.
Section 1: Basic Concepts of Programming

Unit A: Introduction to Programming
- Basic programming concepts
- Variables and data types
- Control structures (if, else, for, while)
- Functions and subroutines

Unit B: Algorithms and Data Structures
- Algorithms for solving problems
- Data structures (arrays, linked lists, stacks, queues)
- Sorting and searching algorithms

Unit C: Software Development and Practice
- Software development life cycle
- Debugging and testing
- Version control

Section 2: Applications of Programming

Unit A: Software Engineering
- Object-oriented programming
- Design patterns
- Software architecture and design patterns

Unit B: Web Applications
- Client-side scripting (HTML, CSS, JavaScript)
- Server-side technologies (PHP, Python, Java)
- Database connectivity (SQL, NoSQL)

Section 3: Programming Languages

Unit A: Introduction to Programming Languages
- History of programming languages
- Categories of programming languages
- Common programming languages (Python, Java, C++)

Unit B: Advanced Programming Techniques
- Object-oriented programming concepts
- Functional programming concepts
- Parallel and distributed programming

Section 4: Programming Projects

Unit A: Project Planning and Implementation
- Project management tools
- Agile methodology
- Software quality assurance

Unit B: Case Studies
- Case studies of successful projects
- Case studies of failed projects
- Lessons learned from real-world projects
The study of colloids and the formulation of micelles and critical
micelle concentrations, electrical phenomena, and the Donnan
osmotic pressure. Introduction to adsorption and reaction kinetics
and the principle of adsorption equilibria. Examination of the
adsorption process and the determination of surface tension
and interfacial properties. Examination of the adsorption
process and the determination of surface tension and interfacial
properties. Examination of the adsorption process and the
determination of surface tension and interfacial properties.

The growth of Ernest Orlando Lawrence’s research on the energy of
adsorption at the Lawrence Berkeley Laboratory.

Adsorption at the Lawrence Berkeley Laboratory.

The growth of Ernest Orlando Lawrence’s research on the energy of
adsorption at the Lawrence Berkeley Laboratory.

The growth of Ernest Orlando Lawrence’s research on the energy of
adsorption at the Lawrence Berkeley Laboratory.

The growth of Ernest Orlando Lawrence’s research on the energy of
adsorption at the Lawrence Berkeley Laboratory.
preparation of organic compounds of medicinal interest

2. Preparation of mixed products by distillation and
functional groups

3. Preparation of organic compounds by hydrolysis
and the use of other methods

4. Preparation of organic compounds by condensation
and the use of other methods

5. Preparation of organic compounds by polymerization
and the use of other methods

6. Preparation of organic compounds by fermentation
and the use of other methods

7. Preparation of organic compounds by synthesis
and the use of other methods

8. Preparation of organic compounds by anaerobic
and aerobic processes

9. Preparation of organic compounds by fermentation
and the use of other methods

10. Preparation of organic compounds by condensation
and the use of other methods

11. Preparation of organic compounds by polymerization
and the use of other methods

12. Preparation of organic compounds by fermentation
and the use of other methods

13. Preparation of organic compounds by synthesis
and the use of other methods

14. Preparation of organic compounds by anaerobic
and aerobic processes

15. Preparation of organic compounds by fermentation
and the use of other methods

16. Preparation of organic compounds by condensation
and the use of other methods

17. Preparation of organic compounds by polymerization
and the use of other methods

18. Preparation of organic compounds by fermentation
and the use of other methods

19. Preparation of organic compounds by condensation
and the use of other methods

20. Preparation of organic compounds by polymerization
and the use of other methods
Emulsion, simple syrup, aqueous iodine, strangle iodine, calamine lotion, borohlycerine, tannic acid glycerine, phenol glycerine, peppermint water, rose water, non-staining iodine ointment cum methyl salicylate, formulation of ointment, stability studies of tablets.
capsules, syrups.
5. Perform one of the following experiments:
1) Quantitative applications of IR spectroscopy.
2) Identification of isomers using proton NMR.
3) Determination of specific rotation of ibuprofen and determination of percentage in the unknown sample.
4) Volumetric determination of ibuprofen in the given tablet.
5) Spectrophotometric determination of aspirin content in the soluble aspirin tablet.
6) Spectrophotometric determination of paracetamol in the tablet.
7) Extraction and spectrophotometric determination of oxyphenylbutazone
8) Analysis of ampicillin trihydrate.
9) Determination of Vitamin B1 in given tablet.
10) Determination of Vitamin B2 in given tablet.
11) Determination of ephedrine hydrochloride in given syrup.
12) Determination of tetracycline in the given capsule.
13) Determination of phenobarbitone in the given cough syrup.
14) Extraction of cholesterol from gall stones and its analysis.
15) To perform I.P. monograph of tablet.
16) To perform I.P. monograph of hard gelatine capsule.
17) Evaluation of injections.
18) Determination of chloramphenicol in given capsule.

6. Viva-voce
7. Laboratory Record

Dy. Registrar
(Academic)
University of Rajasthan
JAIPUR