### **FACULTY OF LIFE SCIENCES**

### SYLLABUS

### FOR

## **Interdisciplinary Course in Pharmaceutical Sciences (UG)**

Examinations: 2019-20



## GURU NANAK DEV UNIVERSITY AMRITSAR

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> (ii) Subject to change in the syllabi at any time. Please visit the University website time to time.

#### COURSE SCHEME

Sr. No	Course Code	Subject	Lecture (L)	Tutorial (T)	Practical (P)	Credit
1.	PHL001	Pharmaceutical Chemistry-I: Organic Chemistry	3	1	0	4
2.	PHL002	Pharm. Chem. XI: Pharmaceutical Analysis	3	1	0	4
3.	PHL003	Basics of Natural Drugs	3	1	0	4

#### Odd Semester PHL001: Pharmaceutical Chemistry-I: Organic Chemistry

Time: 3 Hrs.

4 Credits (3-1-0) Max. Marks : 100 Mid Semester Marks : 20 End Semester Marks : 80

#### Mid Semester Examination: 20% weightage End Semester Examination: 80% weightage

#### **Instructions for the Paper Setters:**

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

#### Section A

- **Structure and Properties:** Electronegativity. Dipole moment, Inductive and field effects. Covalent bonding. Hybridization, Multiple bonds. Bond lengths, bond angles and bond energies. Delocalized chemical bonding. Hyperconjugation. Tautomerism. Hydrogen bonding. Addition compounds. Organic acids.
- **Stereochemistry (Basic Concepts):** Optical activity, Chirality, Enantiomers, Diastereomers, Relative and absolute configuration. D/L and R/S nomenclature. Racemic mixture and resolution. Geometrical isomerism. E/Z system of nomenclature. Conformations in open chain systems.

#### Section B

- Aliphatic Nucleophilic Substitution: SN1, SN2, SNi and neighbouring groupmechanisms. Substitution at allylic, trigonal and vinylic carbon atoms. Effect of substrate structure, attacking nucleophile, and leaving group on reactivity. Hydrolysis of esters.
- **Elimination Reactions:** E1, E2, E1-CB, E2-CB mechanisms, Saytzeff and Hoffman rules. Pyrolytic eliminations, Cleavage of quaternary ammonium hydroxides.
- Addition to Carbon/Carbon and Carbon/Hetero Multiple Bonds: Electrophilic, nucleophilic and free radicals addition to carbon-carbon and Carbon/Hetero multiple bonds, orientation and stereochemistry.

#### Section C

- **Alkanes:** Nomenclature, Physical properties, Industrial source and Preparation. Halogenation, combustion and pyrolitic reactions.
- **Cycloalkanes:** Nomenclature, Physical properties, Industrial source and Preparation. Bayer's Strain theory, Conformations of cyclohoxanes and its monosubstituted derivatives.
- Alkenes, Dienes and Alkynes: Nomenclature, physical properties, industrial source preparation and addition reactions. Polymerization of dienes. Acidity of alkynes.

#### Section D

- Alcohols: Alkyl Halides and Ethers: Nomenclature, General methods of preparation, physical properties, chemical reactions and applications.
- Aldehydes and Ketones : Structure, nomenclature, physical properties, industrial source, preparation and reactions. Acid/base promoted halogenation of ketones. Active Methylene compounds: Ethyl acetoacetate and diethyl malonate: synthesis and applications in organic synthesis. Michael, Mannich, Grignard, Reformatsky, Wittig and Perkin reactions. Aldol, Knoevengal and Bonzoin condensations.

#### Books Recommended (Latest editions unless specified):

- R.T. Morrison and R.N. Boyd. Organic Chemistry, Allyl and Bacon Inc., Boston, USA.
- I.L. Finar, Organic Chemistry, Vol. I and II, ELBS, Longman.
- P. Sykes, A Guidebook to Mechanisms in Organic Chemistry, Orient Longman, New Delhi.

#### **Suggested Readings:**

- J. March, Advanced Organic Chemistry, Reaction, Mechanisms and Structure, Wiley Eastern, New Delhi.
- G. Solomon and C. Fryhle, Organic Chemistry, John Wiley & Sons, 1992.
- S.H. Pine, Organic Chemistry, McGraw Hill Book.

#### Even Semester PHL 002: Pharm. Chem. XI: Pharmaceutical Analysis

Time: 3 Hrs.

4 Credits (3-1-0) Max. Marks : 100 Mid Semester Marks : 20 End Semester Marks : 80

#### Mid Semester Examination: 20% weightage End Semester Examination: 80% weightage

#### **Instructions for the Paper Setters:**

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#### Section A

1. **Non-aqueous Titrations:** Theoretical consideration, acid base equilibria in non-equeous media, titration of acids and bases, indicators, Applications.

2. **Complexometric Titrations:** Concept of complexation and chelation, Warner's coordination number and electronic structure of complex ions, stability constants, titration curves, masking and demasking agents, types of complexometric titration, metal ion indicators, factors influencing the stability of complexes, EDTA-METAL ion Complexes, Determination of hardness of water.

#### Section B

3. **Solvent Extraction:** Liquid solid extraction, liquid-lequid extraction, separation of mixtures by extraction, distribution law, successive extraction, the craige method of multiple extraction, contineuous counter-current extraction, effect of various factors on extraction.

**4.** Chromatography: Introduction, types of chromatography, Liquid- Solid adsorption chromatography, Liquid-Liquid partition chromatography, paper chromatography, Ion exchange chromatography, Thin layer chromatography. Gas chromatography, (introduction, basic GLC apparatus, Carrier gas, sample introduction, columns, solid support, temperature effects), Applications.

#### Section C

5. **Electrochemistry:** The electric cell, electrode potential, half-cell and its types, sign convention. Nernst equation, the salt bridge, electrochemical- series standard potential, standard hydrogen electrode, measuring relative voltage of half cells, calculations of standard potential, reference electrodes and indicator electrodes.

**6. Potentiometry:** Theoretical considerations, ion-selective electrodes, measurement of potential, Location of the end point, analytical applications, direct measurement of metal concentration, differential curve, determination of Ksp, pH measurements, pH meter, relation of pH to potential and applications.

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#### Section D

**7. Conductometric Methods:** Introduction measurement of conductance and conducto metric titration.

**8.** Colorimetric Titration's: Principle, controlled potential colorimetry, Cell design, instrumentation, advantages and limitations, electrode selection and applications.

**9. Polarography:** Theory, dropping mercury electrode air current potential relationship. Polarization, choice of electrodes, effect of oxygen, instrumentation and applications.

**10. Phase Solubility Analysis:** Theory, experimental procedure and applications.

#### **Books Recommended (Latest editions unless specified)**

- J. Bassett, R. C. Denney, G. H. Jeffery, J. Mendham, Vogel's textbook of Quantitative Inorganic Analysis, including Elementary Instrumental Analysis. The English Language book Society and Long man.
- K.A. Conner, A Textbook of Pharmaceutical Analysis, Willey Interscience publication.
- H. H. Willard. L. L. Merritt Jr and J. A. Dean, Instrumental Methods of Analysis, Van Nostrand Reinhold, New York, USA.

#### Suggested Reading (Latest editions).

Analytical Chemistry by D. A. Skoog and D. M. West.

Principles of Instrumental Analysis by D. A. Skoog and J. J. Lorry.

#### Odd Semester PHL003: Basics of Natural Drugs

Time: 3 Hrs.

Credits (3-1-0) Max. Marks : 100 Mid Semester Marks : 20 End Semester Marks : 80

#### Mid Semester Examination: 20% weightage End Semester Examination: 80% weightage

#### **Instructions for the Paper Setters:**

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

#### Section A

**Natural Sources of drugs:** Biological, marine, mineral and plant tissue cultures as sources of drugs.

#### Section B

- **Cultivation, collection, processing and storage of crude drugs:** Factors influencing cultivation of medicinal plants. Types of soils and fertilizers of common use. Pest management and natural pest control agents. Plant hormones and their applications. Polyploidy, mutation and hybridization with reference to medicinal plants.
- An introduction to active constituents of drugs: Their isolation, classification and properties

#### Section C

**Quality control of crude drugs:** Adulteration of crude drugs and their detection by organoleptic, microscopic, physical, chemical and biological methods of evaluation. Herbs as health foods and nutraceuticals.

#### Section D

The holistic concept of drug administration in traditional systems of medicine. Introduction of ayurvedic preparations like Arishtas, Asvas, Gutikas, Tailas, Churnas, Lehyas and Bhasmas.

#### **Books Recommended: (Latest editions unless specified)**

Trease, G.E. and Evans W.C.Pharmacognosy. Baillier , Tindall, Eastbourne, U.K.

Wallis, T.E. Textbook of Pharmacognosy. J and A. Churchill Ltd., London.

Kokate, C.K., Purohit, A.P. and Gokhale, S.B. Pharmacognosy (Degree). NiraliPrakashan, Pune.

#### **Suggested Books:**

Atal, C.K. and Kapur, B.M. Cultivation and Utilization of Medicinal Plants. R.R.L, Jammu. Shah, C.S. and Quadry, J.S. Textbook of Pharmacognosy, B.S. Shah Publishers, Ahmedabad. Tyler, V.C. Brady, L.R. and Robers, J.E. Pharmacognosy. Lea and Febiger, Philadelphia.