

## SEMESTER - II

Course Code	Description	Course Title	Hours/ Week			Credits	Credits		Duration of exam
			L	T	P		-	End exam	
PY.05.881.2.1.T	PS, CORE	Pharmaceutical organic Chemistry-I	4	0	-	4	30	70	3
PY.05.881.2.2.T	PS, CORE	Introduction to Dosage Forms	4	0	-	4	30	70	3
PY.05.881.2.3.T	PS, CORE	Human Anatomy and Physiology- II	4	0	-	4	30	70	3
PY.05.881.2.4.T	BS, FC	Basic computer Applications-II	3	0	0	3	30	70	3
PY.05.881.2.5.T	BS, FC	Communicative English	3	0	0	3	30	70	3
PY.05.881.2.6.P	PS, CORE	Pharmaceutical Organic chemistry-I-Practical	0	0	4	2	30	70	4
PY.05.881.2.7.P	BS, FC	Introduction to Dosage Forms- Practical	0	0	4	2	30	70	4
PY.05.881.2.8.P	BS, FC	Basic Computer Applications-II and English Language Practical	0	0	4	2	30	70	4
			18	0	12	24	240	560	

**Note: Marks are converted into Grade Points and Total is calculated for SGPA on a 10 Point Scale**

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# PHARMACEUTICAL ORGANIC CHEMISTRY – I

## Scheme of Instruction

Total Duration	: 50 hrs
Periods / Week	: 4
Credits	: 4
Instruction Mode	: Lecture
Subject Code	: PY.05.881.2.1.T

## Scheme of Examination

Maximum Marks:	100
Internal Exam	: 30
End Semester	: 70
Exam Duration	: 3 Hrs

## Course Objectives

- To impart the students with basic knowledge of various classes organic compounds, their basic structure, preparation methods and physico chemical properties.
- To impart the students with knowledge on certain mechanisms of reactions and how they are applicable in synthesis of medicinal compounds.

## Course Outcome

- The students will get the knowledge on various aspects of organic compounds.
- The students will get understanding on the various mechanism involved in synthesis of organic compounds.

## Unit – I

### Structure and Reactivity of Organic Molecules

Atomic and Molecular orbitals, Hybridization of Orbitals and Covalent bond, Bond angles, Heterolysis, Polarity of covalent bond, Polarity of Molecules, Dipole moments, Intermolecular forces, Hydrogen bond, Boiling Point, Melting Point, Solubility.

**Electron displacements:** Inductive effect, Electromeric effect, Mesomerism and Resonance.

**General Nature of Organic Reactions:** Transition state theory, Energy diagrams of reactions.

## Unit – II

### Aliphatic Hydrocarbons

Nomenclature, Physical properties, General Methods of Preparation and Characteristic reactions of Alkanes, Alkenes, Alkynes. Free radical reactions of Alkanes (Halogenation), Catalytic reduction and Electrophilic addition reactions: Markonikov's Addition, Anti Markonikov's Addition, Peroxide effect or Kharasch effect, Acidity of 1-Alkynes, Electrophilic addition reactions of alkynes, stability of conjugated dienes and their addition reactions.

**Cycloalkanes:** Nomenclature, General methods of preparation, ring size, stability, Bayer's strain theory, Sachse - Mohr theory, Puckered rings, Configuration and Conformations of Cycloalkanes.

## Unit – III

### Halogen and Hydroxy Compounds

Nomenclature, General Methods of preparation of Alkyl halides and Hydroxy Compounds, Relative reactivity of Alkyl halides; Nucleophilic substitution reactions ( $SN_1$ ,  $SN_2$ ) - Walden inversion, Elimination reactions ( $E_1$  and  $E_2$ ) - Sayetzeffs rule. Nucleophilic substitution Vs Elimination.

Reactions of alcohols; Oxidation of alcohols;

**Ethers:** Nomenclature, Properties and preparation methods. (Williamson's synthesis and Ziesel's Method).

## Unit – IV

### A) Carbonyl Compounds (Aldehydes and Ketones)

Nomenclature, General Methods of Preparation, relative reactivities of Carbonyl Compounds, Mechanism of Nucleophilic addition reactions-Aldol condensation, Reformatsky reaction, Wittig reactions. Oxidation, reduction and addition reactions of carbonyl compounds.

### B) Amines:

Nomenclature, primary, secondary and tertiary amines, Relative Basicity of amines, Reactions of amines, (Hofmann elimination) Hinsberg's method of separation of amines. Diazonium salts-coupling of diazonium salts.

## Unit – V

### B) Carboxylic Acids and Acid Derivatives

#### (Acid Halides, Anhydrides, Esters and Amides)

Nomenclature, General Methods of Preparation of Carboxylic acids, Relative acidity of Carboxylic acids, structure of Carboxylate ions, effect of substituents on acidity. Nucleophilic acyl substitution, Reactions of Carboxylic acids, methods of preparation of acid chlorides, esters, amides, alcohols from carboxylic acids. Synthesis and synthetic applications of malonic ester and aceto-acetic ester.

**Examination:** One question from each unit with internal choice.

### Text books

1. 'Organic Chemistry' by T.T.Morrison & R.Boyd. , 6<sup>th</sup> Edition 2007, Prentice Hall of India Private Limited, New Delhi.
2. A Text book of Organic Chemistry 21<sup>st</sup> Edition by Arun Bahl, B.S Bahl , S.Chand & Company, New Delhi.
3. I.L Finar, Organic Chemistry vol-I The Fundamental Principles 6<sup>th</sup> Edition, Pearson Education(Singapore) Pvt. Ltd. New Delhi.

### Reference Books

1. The Fundamental Principles of organic chemistry, by I.L.Finar, ELBS, London.
2. Organic chemistry by Cram & Hammond.
3. Text Books of Pharmaceutical Chemistry, by T.M.Atherden, Bentley and Drivers, Oxford University Press, London.

## INTRODUCTION TO DOSAGE FORMS

### Scheme of Instruction

Total Duration	: 50 hrs
Periods / Week	: 4
Credits	: 4
Instruction Mode	: Lecture
Subject Code	: PY.05.881.2.2.T

### Scheme of Examination

Maximum Marks: 100
Internal Exam : 30
End Semester : 70
Exam Duration : 3 Hrs

### Course Objectives

- To provide the students with a basic understanding and preliminary knowledge on various types of dosage forms.

### Course Outcome

- The student will get first time exposure to general methods of preparation of various dosage forms.

### Unit – I

**Introduction to drug and Dosage form:** Definition of drug, excipient and Dosage form, Classification of dosage forms on the basis of formulation and route of administration.

**Liquid preparations:** Introduction, General methods of preparation, labeling, and marketed products of Aromatic waters, spirits, syrups, elixirs, suspensions, emulsions, lotions, liniments, inhalations, throat paints, gargles, glycerin and collodions.

### Unit – II

#### Solid dosage forms:

**Tablets:** Types of tablet dosage forms, advantages, disadvantages, General methods of preparation.

**Capsules:** Types of capsules, General methods of preparation, Advantages and disadvantages of soft and hard gelatin capsules.

**Other solid dosage forms:** General introduction, methods of preparation and marketed products of Powders, insufflations, dusting powders, effervescent granules, Pastilles, Lozenges, tablet triturates, pills and eutectic mixtures.

### Unit – III

**Semisolids:** Introduction, General methods of preparation and marketed products of Ointments and their bases, creams (vanishing cream and cold cream), pastes, jellies.

**Suppositories** and their bases, types of suppositories, Displacement values.

### Unit IV

#### Sterile preparations:

**Water:** Purified water, Distilled water. Introduction to sterilization and sterility, Water for Injection (WFI), Sterile Water.

**Parenteral products:** Introduction, general methods of preparation and marketed products of Vials, Ampoules, Intravenous Fluids (Normal Saline, Dextrose Normal Saline, Ringer Lactate), Eye drops, Ear drops and Nasal drops.

## Unit V

**Incompatibilities:** Introduction, Definition, Types of incompatibilities: Physical, Chemical and Therapeutic. Methods of overcoming and handling of incompatible prescriptions.

**Examination:** One question from each unit with internal choice.

### Text Books

1. Bentley's Text book of Pharmaceutics, E.A. Rawlins, 8<sup>th</sup> Edition, 1996, Bailliere Tindall, London.
2. Cooper & Gunn's dispensing for Pharmaceutical students, S.J.Carter, CBS Publishers, New Delhi.
3. Pharmaceutical Education, Harikishan Singh (History of Pharmacy in India & Related aspects), Volume- II, Vallabh Prakashan, Delhi.
4. A Textbook of professional pharmacy, N. K. Jain, S.N. Sharma, 6<sup>th</sup> Edition, 2016, Vallabh prakashan, Delhi.
5. R. M. Mehta, Dispensing Pharmacy, 3<sup>rd</sup> Edition, 2008, Vallabh Prakashan, Delhi.

### Reference Books

1. Pharmaceutical dosage forms & Drug delivery systems, H.C. Ansel, 8<sup>th</sup> Edition. 2008, Lippincott Williams & Wilkins, London.
2. Cooper & Gunn's Tutorial pharmacy, S.J.Carter, CBS Publishers, New Delhi.
3. Dispensing of Medication, Ed. E.W. Martin, Mach Publishing Co., Eastern PA.
4. Lachman Leon, "The Theory and Practice of Industrial Pharmacy, Special Indian 3<sup>rd</sup> Edition, 2009, Varghese Publishing House, Mumbai.
5. Indian Pharmacopeia (2014), British Pharmacopeia, United States Pharmacopeia & Merck Index.

## HUMAN ANATOMY AND PHYSIOLOGY-II

### Scheme of Instruction

Total Duration	: 50 hrs
Periods / Week	: 4
Credits	: 4
Instruction Mode	: Lecture
Subject Code	: PY.05.881.2.3.T

### Scheme of Examination

Maximum Marks: 100
Internal Exam : 30
End Semester : 70
Exam Duration : 3 Hrs

### Course Objectives

- To impart knowledge and understanding on the anatomy and physiology of various systems of human body.
- To impart the knowledge on the inter relationship of various organs and their functions in the human body.

### Course Outcome

- The students will be gaining a thorough understanding on various physiological functions of the organs of human body.
- This knowledge will become the basic foundation for understanding of pharmacology in higher semesters.

### Unit-I

**Respiratory system:** Anatomy of respiratory system, physiology of respiration, mechanisms of regulation of respiration. Lung volumes and capacities.

### Unit-II

**Nervous system:** Introduction to neuron, synapse, ganglion and plexus. Physiology of nerve impulse, neurotransmission. Parts and functions of brain and spinal cord, reflex arc and cranial nerves. Autonomic nervous system.

### Unit-III

**Digestive system:** Gross anatomy of alimentary canal. Physiology of digestion and process of absorption, Phases of Digestion.

### Unit-IV

**Endocrine system:** Secretions, regulation and functions of Pituitary, thyroid, parathyroid, pancreas, gonads, pineal and adrenal glands.

### Unit-V

**Urinary system:** Gross anatomy and functions of urinary system. Structure of nephron, physiology of urine formation and micturition.

**Reproductive system:** Gross anatomy and functions of male and female reproductive system. Spermatogenesis, oogenesis. Menstrual cycle, pregnancy and parturition, In-vitro Fertilization methods.

**Text Books**

1. Thakaore B, Gandhi P, Harit RD. Elements of human anatomy physiology and health Education, 21<sup>st</sup> Edition B.S. Shah Publishers, Ahmadabad.
2. Principles of Anatomy and Physiology by Ross & Wilson, 10<sup>th</sup> Edition 2007, Churchill Living stone Publishers, New York.

**Reference Books**

1. Human Physiology by C.C. Chatterjee, 11<sup>th</sup> Edition 1992, Medical Allied Agency, Kolkata, India.
2. Text Book of Medicinal Physiology by A.C. Guyton, W.B. Prism Books Pvt. Ltd. Bangaluru.
3. Principles of anatomy and physiology by Tortora G.J., and S.R. Grabowski, Volume I & II, John Wiley and Sons Inc, Singapore.

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## BASIC COMPUTER APPLICATIONS- II

### Scheme of Instruction

Total Duration	: 40 hours
Periods / Week	: 3
Credits	: 3
Instruction mode	: Lecture
Subject Code	: PY.05.881.2.4.T

### Scheme of Examination

Maximum Marks	: 100
Internal Exam	: 30
End Semester	: 70
Exam Duration	: 3 Hrs

### Course Objectives

- To Impart the basic knowledge about the programming languages.
- To make the students to understand and acquire knowledge about various simple computer applications in those programming languages.

### Course Outcomes

- The students will get basic understanding on writing simple programs using the C and SQL
- The student will be able to apply these simple programs in other subjects also.

### Unit – I Programming In 'C' Language

Introduction, History, Importance of C-Language; Structure of 'C' program, writing and executing C-program, preprocessors in C; Keywords, Identifiers, Constants, Variables, Data Types, Storage classes, Type conversion, Input and output functions in C.

### Unit- II Programming In 'C' Language

**Types of operators and expressions:** Introduction, Operators (Arithmetic, Logical, Assignment, Conditional and Special operators), Expressions;

### Control Statements

IF, IF-ELSE statement and Nested IF statement. Break, Continue, Goto, Switch () case; Loop Control Statements – For loop, While loop, Do-while loop and nested loops.

**Arrays:** Definition, Initialization, One, Two dimensional Arrays, Working with Strings & Standard Functions.

### Unit-III Introduction to Database

Basic Concepts – Data, Information, Records and files. Traditional file based Systems, Limitations of traditional File Based Approach, Database Approach-Characteristics of Database Approach, Database Management System (DBMS), Advantages and Disadvantages of DBMS. Database Development Life Cycle (DDL), Conversion of E-R model to Table.

**Data Models:** E-R Model, Relational Model Concepts, Codd's Rules for Relational databases, Basic Concepts of Hierarchical and Network Data Model.

### Unit-IV Structured Query Language (SQL)

**SQL:** Data Definition and data types, Specifying Constraints in SQL, SQL Commands (DDL, DML, DCL & TCL), Reserved Words; Comparison for Access and SQL Server;



## Unit- V

### Use of Computers in Education and Research:

Basics of Data analysis, Heterogeneous storage (I-Cloud, Google drive etc.), cloud computing, big data, data mining and Inventory control;

Introduction to Chems sketch, Chemdraw, Chemical Database Design & their Tools

**Examination:** One question from each unit with internal choice.

### Text Books

1. Fundamentals of Computers by P.K. Sinha, 2<sup>nd</sup> Edition 1992, BPB Publications, New Delhi.
2. Let Us C by Yashvanth Kanetkar, 4<sup>th</sup> Edition 2002, BPB Publications, New Delhi.
3. Working in Microsoft Office By Ron Mansfield
4. SQL, PL/SQL The Programming Language of Oracle by Ivan Bayross

### Reference Books

1. Programming with 'C' by Byron Gottfried- Schum series 2<sup>nd</sup> Edition, TATA Mc Graw Hill Publishing Company, New Delhi.
2. Computer programming in 'C' by Y. Raja Raman , Prentice-Hall Pvt. Ltd, New Delhi.

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## COMMUNICATIVE ENGLISH

### Scheme of Instruction

Total Duration	: 40 hrs
Periods / Week	: 3
Credits	: 3
Instruction Mode	: Lecture
Subject Code	: PY.05.881.2.5.T

### Scheme of Examination

Maximum Marks: 100
Internal Exam : 30
End Semester : 70
Exam Duration : 3 Hrs

### Course Objectives

- Understanding different ways of communication and basic grammar skills.

### Course Outcomes

- The students will be able to know various types of communication skills
- The students will be able to write, speak good English with proper grammar.
- The students will be able to write good documents and other reports.

### Unit – I

Role and Importance of Communication; Verbal and Non-Verbal Communication; Group Communication, Effective Communication; Barriers to communication; Communication Mediums; Participating in discussions, Conduct of Seminars, Conferences etc., Making Presentations through collection, evaluation, organizing the information, Interacting with learners and teachers; Role of Wit and Humor in Communication

### Unit – II

Spoken English Vs Written English; Formal / Informal English (one way/two way); British/American/Indian English; How to introduce one self and others; How to tender apology; How to thank in different ways; Greetings; Some Polite Expressions; Agreements and Disagreements; How to use a dictionary; How to use a Thesaurus; Vocabulary Development; Synonyms and antonyms; Single word substitutes; comprehensions;

### Unit – III

Communication through Letters; Official and Personal Letters; Letters of complaint; Letters of Enquiries; and Responses; Writing Memos, Circulars and Notices; What to avoid while writing; Writing Paragraph, Document and Scientific/Technical Report; Drafting & Delivering a Speech;

### Unit – IV

Grammar in English: Tenses; Voice; Articles; Direct and Indirect speech; Degrees of Comparison; Common errors in English made by Indian Learners of English  
Concepts of Learning and Listening: Types and Methods of Learning and Listening; Learning and Listening of Knowledge, Attitudes, Skills and Practices.

### Unit – V

The following Four Essays from “Selections from Modern English” prose Edited by Haladhar Panda are prescribed.

1. “Our Own Civilization” - C.EM. Joad; 2. “ Andrew Carnegie” - E.H Carter; 3. “ The Secret of work” - Swami Vivekananda; 4. “The Generation Gap’ - Benjamin Spock

**Examination** : One question from each unit with internal choice.

## **Text Books**

1. "Business Correspondence and report Writing" R.C.Sharma and Krishna Mohan, Tata McGraw Hill Publishers, New Delhi
2. "Communicative English" E. Suresh kumar, Raj Kamal Publications, Hyderabad
3. "Selections of Modern English Prose" Ed. By Haladhar Panda, Published by Universities Press (India) Pvt. Ltd., Hyderabad

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## PHARMACEUTICAL ORGANIC CHEMISTRY – I PRACTICAL

### Scheme of Instruction

Total Duration	: 48 hrs
Periods / Week	: 4
Credits	: 2
Instruction Mode	: Practical
Subject Code	: PY.05.881.2.6.P

### Scheme of Examination

Maximum Marks: 100
Internal Exam : 30
End Semester : 70
Exam Duration : 4 Hrs

### Course Objectives

- To give a practical training on the preparation of some of the pharmaceutical organic compounds studied in theory.

### Course Outcome

- The students will get hands on experience and knowledge about the methods of preparation and various reaction mechanisms involved.

### List of Experiments

- Organic Chemistry laboratory techniques.
- Experiments in simple qualitative analysis including preparation of derivatives.
- Nitration : Preparation of Nitro phenol from Phenol.
- Halogenation : Preparation of p-Bromo acetanilide from Acetanilide.
- Oxidation : Preparation of Benzoic acid from toluene or Benzoylchloride
- Reduction : Preparation of m-Nitroaniline from m-Dinitro Benzene.
- Esterification : Preparation of n-Butyl acetate from n-Butyl alcohol.
- Acetylation : Preparation of Acetanilide from Aniline.
- Etherification : Preparation of  $\beta$ -Naphthyl methyl ether from  $\beta$ -Naphthol.
- Hydrolysis (Saponification) : Preparation of Benzoic Acid from Methyl Benzoate OR Preparation of Benzoic acid from Benzamide.

### Reference Books

- B. S. Furniss, A. J. Hannaford, P. W. G. Smith and A. R. Tatchell, **Vogel's Text Book of Practical Organic Chemistry**, 5<sup>th</sup> Edition, Longman Singapore Publishers, Singapore, 1996.
- R.K Bansel, **Laboratory Manual of Organic Chemistry**, 4<sup>th</sup> Edition, New Age International Publishers, New Delhi, 2005.
- F.G Mann and B. C Saunders, **Practical Organic Chemistry**, 4<sup>th</sup> Edition, Orient Longman, Hyderabad, 2004.
- Vogel A.I, **Elementary Practical Organic Chemistry Part – I, Small scale Preparations**, 2<sup>nd</sup> Edition, CBS Publishers & Distributors, New Delhi, 2004.

## INTRODUCTION TO DOSAGE FORMS PRACTICAL

### Scheme of Instruction

Total Duration	: 48 hrs
Periods / Week	: 4
Credits	: 2
Instruction Mode	: Practical
Subject Code	: PY.05.881.2.7.P

### Scheme of Examination

Maximum Marks: 100
Internal Exam : 30
End Semester : 70
Exam Duration : 4Hrs

### Course Objectives

- To give a practical training on the preparation of various types of dosage forms studied in theory.

### Course Outcome

- The students will get hands on experience and knowledge about principles and techniques involved in the preparation of various dosage forms.

### List of Experiments

1. Incompatibility studies in few simple dosage forms.
2. Preparation of Aromatic waters
3. Preparation of spirits
4. Preparation of different types of iodine solution
5. Preparation of cresol soap solution
6. Preparation of Calamine lotion
7. Preparation of turpentine liniment
8. Preparation of gargles
9. Preparation of simple ointment
10. Preparation zinc oxide
11. Preparation of whitfield ointment
12. Preparation of non staining iodine ointment
13. Preparation of cold cream
14. Preparation of any glycerogelatine based suppository
15. Preparation of Tragacanth gel
16. Preparation of effervescent granules
17. Preparation of simple syrup
18. Preparation of ear / eye drops
19. Preparation emulsion and suspension.

### Reference Books

1. C.V.S Subrahmanyam, J. Thimma Setty and G.C. Prabhu Shankar, **Laboratory Manual of Pharmaceutics**, Vallabh Publications, New Delhi, 2006.
2. R.S Gaud and G.D Gupta, Practical Pharmaceutics.

## BASIC COMPUTER APPLICATIONS-II AND ENGLISH LANGUAGE PRACTICAL

### Scheme of Instruction

Total Duration	: 48 hrs
Periods / Week	: 4
Credits	: 2
Instruction Mode	: Practical
Subject Code	: PY.07.881.2.8.P

### Scheme of Examination

Maximum Marks:	100
Internal Exam	: 30
End Semester	: 70
Exam Duration	: 4 Hrs

### Course Objectives

- To provide hands on practice on writing simple programs based on C and SQL
- To provide hand on experience on various search engines to retrieve the data.

### Course Outcomes

- The students will gain hands on experience on writing simple programs based on C and SQL which will be useful in pharmaceutical applications.
- The students will gain hands on experience and practice on usage of better communication skills.

### List of Experiments

**Exercises: 1 -4** Based on 'C' programming

**Exercises: 5-8** Based on SQL

**Exercise--9** : Information Transfer- Using of Graphs, Tables and Figures for representing a data

**Exercise – 10** : Basics of Web Page Design; Writing and Designing for World Wide Web;

**Exercise – 11** : Document Authoring and Maintenance; HTML Language and Electronic Publishing;

**Exercise – 12** : Designing and Writing for Multimedia

**Exercise – 13** : Collaborations of Health care providers using Network Technologies; Intranets, Software used for remote collaboration and Tele medicine.

### Text Books

1. Fundamentals of Computers by P.K. Sinha, 2<sup>nd</sup> Edition 1992, BPB Publications, New Delhi.
2. Let Us C by Yashvanth Kanetkar, 4<sup>th</sup> Edition 2002, BPB Publications, New Delhi.
3. Working in Microsoft Office By Ron Mansfield
4. SQL, PL/SQL The Programming Language of Oracle by Ivan Bayross
5. "Business Correspondence and report Writing" R.C.Sharma and Krishna Mohan, Tata McGraw Hill Publishers, New Delhi
6. "Communicative English" E. Suresh kumar, Raj Kamal Publications, Hyderabad
7. "Selections of Modern English Prose" Ed. By Haladhar Panda, Published by Universities Press (India) Pvt. Ltd., Hyderabad

### Reference Books

1. Programming with 'C' by Byron Gottfried- Schum series 2<sup>nd</sup> Edition, TATA Mc Graw Hill Publishing Company, New Delhi.
2. Computer programming in 'C' by Y. Raja Raman , Prentice-Hall Pvt. Ltd, N