

I Year I Semester

PHR16111 – ENGLISH (50Hrs)

DETAILED TEXT-I : Recommended Topics :

1. **THE KNOWLEDGE SOCIETY- APJ KALAM (RAVINDRA PUBLISHERS) 07**
OBJECTIVE: To make the learners rediscover India as a land of Knowledge.
OUTCOME: The learners will achieve a higher quality of life, strength and sovereignty of a developed nation.
2. **MAN'S PERIL (RAVINDRA PUBLISHERS) 06**
OBJECTIVE: To inform the learner that all men are in peril.
OUTCOME: The learner will understand that all men can come together and avert the peril.
3. **IN LONDON: M.K.GANDHI (RAVINDRA PUBLISHERS) 06**
OBJECTIVE: To apprise the learner how Gandhi spent a period of three years in London as a student.
OUTCOME: The learner will understand how Gandhi grew in introspection and maturity.
4. **PRINCIPLES OF GOOD WRITING: L.A.HILL (RAVINDRA PUBLISHERS) 06**
OBJECTIVE: To inform the learners how to write clearly and logically.
OUTCOME: The learner will be able to think clearly and logically and write clearly and logically.

Text Book : 'Sure Outcomes' by Orient Black Swan Pvt. Ltd Publishers

NON-DETAILED TEXT: (From Modern Trailblazers of Orient Blackswan)

(Common single Text book for two semesters)

(Semester I (1 to 4 lessons)/ Semester II (5 to 8 lessons))

1. **G.D.Naidu 07**
OBJECTIVE: To inspire the learners by G.D.Naidu's example of inventions and contributions.
OUTCOME: The learner will be in a position to emulate G.D.Naidu and take to practical applications.
2. **G.R.Gopinath 06**
OBJECTIVE: To inspire the learners by his example of inventions.
OUTCOME: Like G.R.Gopinath, the learners will be able to achieve much at a low cost and help the common man.
3. **Sudhamurthy 06**
OBJECTIVE: To inspire the learners by the unique interests and contributions of Sudha Murthy.
OUTCOME: The learner will take interest in multiple fields of knowledge and make life worthwhile through social service.

4. Vijay Bhatkar

06

OBJECTIVE: To inspire the learner by his work and studies in different fields of engineering and science.

OUTCOME: The learner will emulate him and produce memorable things.

Text Book : 'Trail Blazers' by Orient Black Swan Pvt. Ltd. Publishers

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I Year I Semester

PHR16112 - Remedial Mathematics –I (50Hrs) (For Biology stream students)

UNIT – I	10
Algebra: Arithmetic Progression-Geometric Progression- Permutations & combinations-Binomial theorem partial fractions-Matrices-Determinants-Application of determinants to solve simultaneous equations (Cramer's Rule).	
UNIT II	10
Trigonometry: Trigonometric ratios and the relations between them Sin (A+B), Cos (A+B), Tan (A+B) formulae only. Trigonometric ratios of multiple angles-Heights and distances (simple problems there on).	
UNIT III	10
Co-ordinate Geometry: Distances between points-Area of a triangle, Co-ordinates of a point dividing a given segment in a given ratio-locus-equation to a straight line in different forms-Angle between straight lines-point of intersection.	
UNIT IV	05
Differential Calculus: Continuity and limit: Differentiation, derivability and derivative, R.H. derivatives and L.H. derivatives, Differentiation, General theorems of derivation.	
UNIT V	10
Integral Calculus: Integration as an inverse process of differentiation, definite integrals, integration by substitution, integration by parts, integration of algebraic function of E^x evolution of area in simple cases.	
UNIT VI	05
Differential equations: Formation of a differential equation, order and degree, solution of first order differential equations, Laplace transformation.	

TEXT BOOKS

1. Intermediate first Year mathematics
2. Intermediate Second year mathematics, printed and published by Telugu Academy, Himayatnagar, Hyderabad
3. Pharmaceutical Arithmetic's by Mohd. Ali CBS publishers and distributor, New Delhi.
4. Higher Engineering Mathematics by Grewal.
5. A text book of remedial mathematics, 2nd Ed. by P. Seshagiri Rao.
6. Pharmaceutical Statistics by Gopala Krishna Murthy, Srinivasa Babu and Seshagiri Rao

I Year I Semester

PHR16112 - REMEDIAL BIOLOGY – I (50Hrs) (For Maths stream students)

- Unit –I: Cell biology, histology and anatomy.** **10**
Prokaryotic and eukaryotic cells.
Ultra structure of plant cell and its organelles, differences between plant and animal cells.
Detailed study of ergastic substances, chromosomes, nucleic acids. Introduction to cell cycle, mitosis and meiosis. Different types of plant tissues and their functions. Plant tissue systems. Histology and anatomy of root, stem, bark, wood, leaf, flower, fruit and seed
- Unit –II: Morphology** **10**
General characteristics, types, functions and modification of root, stem and leaf, venation. Morphology of bark and wood. Inflorescence, structure and general description of flower, insertion of floral parts on the thalamus, Placentation. Morphology and classification of fruits, Morphology of seed.
- Unit –III: Plant Taxonomy** **09**
Functions and principles of Taxonomy, methods of classification of plants. Binomial nomenclature. Technical description of a flowering plant. Eichler's system of classification. Bentham and Hooker's system of classification. Description of selected families - Malvaceae, Solanaceae and Liliaceae.
- Unit –IV: General survey of Animal kingdom** **10**
Basics of Classification (levels of organization, symmetry, Diploblastic, Triploblastic organization, Coelom, Segmentation, Notochord), concept of species and taxonomic hierarchy. Classification of animal kingdom.
General characters of Non-chordates (Protozoa, Porifera, Cnidaria, Platyhelminthes, Nematelminthes, Annelida, Arthropoda, Mollusca and Echinodermata).
General characters of Hemichordata and Chordata.(Pisces, Amphibians, Reptiles, Aves and Mammals).
- Unit –V:** **07**
Parasitism and Parasitic adaptations.
Structure and life history of Protozoans: Amoeba, Entamoeba, Trypanosoma and Plasmodium.
Structure and life history of Helminthic parasites: Taenia solium, Wucheria bancrofti and Ascaris lumbricoides.

Unit- VI:

04

General characters of phylum Arthropoda.

General structure and life history of insects: Cockroach, Mosquito and Silk worm.

TEXT BOOKS

1. Intermediate First Year and Second Year Botany / Zoology Text Books printed and published by Telugu Academy, Himayatnagar, Hyderabad.
2. A.C. Dutta, Text Book of Botany
3. Botany for Degree students Vol. - I & II by B.P. Pandey

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I Year I Semester**PHR16113 - HUMAN ANATOMY & PHYSIOLOGY - I (50 Hrs)****UNIT-I****Scope of Anatomy and physiology: 05**

Structure of cell , its components and their functions.

Elementary Tissues of the human body: Epithelial, connective, muscular and nervous tissues, their sub- types and properties.

Skeletal muscles: 04

Gross anatomy, physiology of muscle contraction, physiological properties of skeletal muscles and their disorders.

Skeletal system: 04

Structure, composition and functions of skeleton. Classification of joints, types of movements at joints, disorders of joints.

LO: To understand different tissues are involved in the formation of organs and perform different functions. For example skeletal muscle produce by way of its contraction and relaxation produce movement of the skeletal, nerves are involved in the transmission of electrical impulses, bones form body frame, muscles produce contraction and help in movement, circulation, digestion and excretion. Epithelial tissues protect and secretes juices.

UNIT-II 08**Haemopoietic system:**

Composition and functions of blood, Genesis and regulation of red blood cells production, blood groups, transfusion of blood. Leukocytes, properties of white blood cells, reticulo endothelial system, blood coagulation and its mechanism, formation and circulation of lymph. Disorders of blood.

Formed elements of blood: WBC, RBC and Platelets,

Haemopoiesis and blood hormones, Blood groups and their significance, Coagulating factors, Pathways of coagulation and Mechanism of coagulation, Disorders of blood.

LO: Blood is involved in oxygen and carbon dioxide transport, maintenance of B.P, defense immunity and excretion.

UNIT III**Cardiovascular system: 08**

Basic anatomy, structure and functions of the heart and blood vessels, action potential. Excitatory and conductive system of the heart, cardiac cycle, nervous regulation of heart. Systemic coronary and hepatic blood circulation, cardiac output, blood pressure in different blood vessels, blood pressure regulations and measurements. ECG of heart. Brief outline of cardiovascular disorders like hypertension, hypotension, atherosclerosis, angina, myocardial infarction, congestive heart failure and cardiac arrhythmias.

Lymph and Lymphatic System:

03

Composition, formation and circulation of lymph; disorders of lymph and lymphatic system. Basic physiology and functions of spleen.

LO: Heart and blood vessels maintain BP, transport gases, nutrients and waste products. Their function is essential to sustain circulation.

UNIT IV

07

Respiratory System: Anatomy of respiratory organs. Functions of respiration, mechanism and regulation of respiration, respiratory volumes and vital capacity.

LO: To know about external and internal respiration exchanging of gases, need of oxygen for metabolism of nutrients and generation of energy and is essential for life process.

UNIT V

06

Digestive System: Anatomy, structure and functions of different parts of gastrointestinal tract, motility of alimentary canal and its regulation. Gastrointestinal secretions, their compositions, function and regulations. Digestion of food in mouth, stomach and small intestine and its absorption.

LO: To understand digestion in various parts of GIT, role of enzymes and secretions involved in the process of digestion and their function.

UNIT VI

05

Urinary System: Structure and functions of Nephron, formation of urine, renal mechanism for concentrating and diluting the urine, regulation of acid-base balance, knowledge on release of renin from kidney and its functions. Regulations of blood volume and extra cellular fluid volume. Disease related to kidney.

LO: To understand how urine is formed and various mechanisms involved in formation of urine and diseases related to the kidney.

TEXT BOOKS

1. Tortora, G.J and Anagnostokas, Principles of Anatomy and Physiology, N.P Harper & Row Publishers N.Y
2. C.C.Chatterjee, Human Physiology.
3. Ross & Wilson, Anatomy-Physiology in health and illness.
4. Donald.C Rizzo, Fundamental of Anatomy and Physiology.
5. Dr. Jayaveera K.N., Vrushabendra Swamy B.M., Human Anatomy Physiology and Health Education, S.Chand publ.

REFERENCES

1. A.C.Guyton, Text Book of Medical Physiology
2. Best & Taylor, The Living Body-A Text Book on Human Physiology

I Year I Semester

PHR16114 – GENERAL & DISPENSING PHARMACY (50Hrs)

UNIT-I

6

Historical back ground and development of profession of Pharmacy & pharmaceutical industry in brief. Development of Indian Pharmacopoeia & other pharmacopoeias such as BP, USP, European Pharmacopoeia, Extra Pharmacopoeia & Indian national formulary.

LO: To understand the development of pharmacy profession & various pharmacopoeias.

UNIT-II

10

Dispensing Pharmacy : Principles of dispensing, form of prescription, handling of prescription, source of errors for prescription, care required in dispensing procedures including labeling of dispensed products. Weights and Measures, introduction to Latin terms, Percentage calculations, allegation method, proof spirit calculations, displacement value and calculations of iso tonicity adjustment. General dispensing procedure- posology calculations of doses.

LO: To understand dispensing principles, procedures, calculations involved , doses.

UNIT-III

10

Principles involved and procedures adopted in dispensing of the following classes of preparations.

- (i) Mixtures
- (ii) Solutions – A study of the following solutions – Cresol with soap solution IP, Aqueous Iodine solution IP, Strong solution of Iodine IP, weak iodine solution IP, strong solution of Ammonium acetate.
- (iii) Emulsions
- (iv) Powders
- (v) lotions & liniments
- (vi) ointments

LO: To understand principles and procedures involved in the dispensing of various categories of products.

Unit-IV

08

Dosage forms – Purpose, classification, definitions and general characteristics of the following dosage forms

Solids: Tablets and capsules.

Liquid orals: Elixirs, Syrups, Lectures, Suspensions and Emulsions.

Liquids for external use: Lotions & liniments applications.

Semi solids: Ointments, Creams, Gels, Suppositories and Pessaries.

LO: To understand dosage forms and their general characteristics.

UNIT-V

08

Incompatibilities: Physical, chemical and therapeutic incompatibilities – methods of overcoming and handling of incompatible prescriptions.

LO: To understand incompatibility and methods of overcoming incompatibility.

UNIT-VI

08

Extraction and Galenical products: Principle and methods of extraction - preparation of infusions, tinctures, dry, soft and liquid extracts.

LO: To understand extraction and Galenical products – Principles and procedures.

TEXT BOOKS

1. Cooper & Gunns Dispensing Pharmacy, CBS, Publ. and Distributors New Delhi.
2. R.M Metha, Dispensing Pharmacy.
3. NK Jain and GD Guptha, Modern Dispensing Pharmacy, Pharma Med Press.
4. Sanmathi BS and Anshu Guptha, Dispensing Pharmacy – A Practical Manual, Pharma Med Press.
5. General Pharmacy by M.L.Schroff.
6. General Pharmacy by Cooper & Gunn.

REFERENCES

1. Lippincott Williams and Wilkins, Remington Pharmaceutical Sciences.
2. E.A. Rawlkins, Bentley's Text Book of Pharmaceutics, Elbs publ.
3. Hoover, Dispensing of Medication.

I Year I Semester**PHR16115 - PHARMACEUTICAL ORGANIC CHEMISTRY-I (50Hrs)****UNIT-I****08**

Structure and reactivity of organic molecules: Types of chemical bond and hybridization, Polarity of bonds, electronic effects: Electromeric effect, Inductive effect, Mesomeric effect and Hyperconjugation and their influence on the properties of organic molecules; charged species: carbocations and carbanions, their generation, stabilities, rearrangement in the case of carbocations; Free radicals: formation and stability

LO: Understanding the basic concepts influencing the reactivity of organic molecules, understanding the mechanisms wherever applicable, applications of the above in the interpretation of various properties of organic molecules.

UNIT-II**10**

Alkanes and cycloalkanes: Nomenclature, general methods of preparation, free radical substitution, chain and conformational isomerism in the case of alkenes and their relative stabilities, Bayer's strain theory and Sachse-Mohr theory in the case of cycloalkanes and their limitations.

Alkenes: Nomenclature, general methods of preparation, characteristic electrophilic and free radical addition reactions, orientation of product formation as interpreted by Markonikov's rule and peroxide effect (Anti-Markonikov's rule), ozonolysis and allylic substitution.

Alkadienes: Nomenclature, stability of conjugated dienes, 1,2- and 1,4- reactions and their relative stabilities.

Alkynes: Nomenclature, general methods of preparation, characteristic reactions with emphasis on acidity of one alkynes, formation of metal acetylides, stereospecific reduction of alkynes and addition of water involving keto-enol tautomerism

LO: Structures, equations involved in the preparations, mechanism of formation or the reaction, rearrangements, if any, discussion on stabilities and applications of the characteristic reactions in synthesis.

UNIT-III**08**

Alkylhalides: Nomenclature, general methods of preparation, significance of nucleophilic substitution of alkylhalides in organic synthesis, mechanisms and salient features of S_N1 and S_N2 reactions with examples including the proof in favor of these reactions, a comparison of S_N1 and S_N2 , elimination reactions ($E1$ and $E2$): mechanisms, salient features and orientation of product formation in terms of Saytzeff's rule and Hoffmann orientation.

LO: Structures, equations involving the methods of preparations and reactions, stabilities and applications of the reactions.

UNIT-IV

08

Alcohols: Nomenclature, classification, methods of preparation, industrial synthesis of ethanol and methanol, reactions of alcohols involving the replacement of hydroxyl or replacement of the hydrogen of the hydroxyl, iodoform reaction and Lucas test.

Ethers: Nomenclature, William sons synthesis, action of hydroiodic acid on ethers.

LO: Structures, general properties, equations involving the methods of preparation and reactions, mechanisms, reactivities.

UNIT-V

10

Stereochemistry: Isomerism and its comparison to stereoisomerism, stereoisomers, optical isomers (enantiomers), characteristics of enantiomers (chirality), racemic mixtures, methods of separation of racemic mixtures, optical activity, optical rotation, specific rotation, plane of symmetry and centre of symmetry, diastereomers, their properties and required characteristics with examples as given by Fischer projection formulae; mesoform and its characteristics; Configuration: relative configuration (D and L), absolute configuration (R and S); Geometric isomerism: cis-trans isomerism and E and Z nomenclature.

LO: Stereochemical structures, importance of stereochemistry with respect to drugs as interpreted in terms of reactivity and the properties of chiral drugs.

UNIT-VI

06

Grignard reagent: Preparation, characteristic nucleophilic addition and substitution reactions, applications in organic synthesis and limitations.

LO: Structure, mechanism and usefulness in synthesis.

TEXT BOOKS

1. T.R. Morrison and R.N. Boyd, Organic chemistry, pentice hall of India private limited, New Delhi.
2. Arun Bahl & Bahl, Advanced Pharmaceutical Organic Chemistry.
3. C. N. Pillai, Text book of Organic Chemistry.
4. Bhupinder Mehta, Manju Mehta, Organic Chemistry.

REFERENCES

1. R.L Madan, *Organic Chemistry*.
2. Lloyd N. Ferguson, Text book of Organic Chemistry, 2nd edition,.
3. Raj K Bansal, A textbook of Organic Chemistry, 5th edition.

I Year I Semester

PHR16116 – ENGLISH COMMUNICATION SKILLS LAB

Suggested Lab Manual:

OBJECTIVE: To impart to the learner the skills of grammar as well as communication through listening, speaking, reading and writing including soft, i.e., life skills.

I: Listening and Speaking Skills:

To impart verbal and non-verbal communication skills through the following:

- (a). dialogues and body language
- (b). interviews and group discussions
- (c). Debate and Elocution
- (d). Phonetics.

II: Reading and Writing Skills:

To impart reading and writing skills through the following:

- a) Summarizing and abstracting.
- b) Case writing
- c) Office and business drafting like circular, Notice, Memo, enquiry letter, order letter, complaint letter and leave letter.
- d) Career skills like applying for a job, resume preparation, covering letter and e-mail writing etiquette.

TEXTBOOKS:-

1. Strengthen your communication skills, Part B by Maruthi Publications.
2. Spoken English in 3 volumes with 6 cassettes, OUP (CIEFL).
3. T. Balasubramanian, A textbook of English Phonetics for Indian students (Macmillan).

Reference books:-

1. M.Ashraf Rizvi Effective Technical Communication (Tata McGraw Hill Companies)
2. Bhaskaran & Horsburgh Strengthen your English (Oxford University Press).
3. Andrea J Rutherford Basic Communication Skills for Technology (Pearson Education Asia).
4. Orient Longman English Skills for Technical students, WBSCTE with British Council.
5. P. Eliah A handbook of English for professionals. (Pharma book syndicate).
6. Judy Garton- Sprenger BBC, English stage 1 (B.B.C. English).
7. KK Ramchandran, Business communication (Macmillan).
8. SR Inthira and V Saraswathi, “ Enrich your English – a)Communication skills, b)Academic Skills”, (CIEFL and OUP).
9. Mohan Krishna & Banerji Meera. Developing communication skills (Macmillan).

I Year I Semester

PHR16117 – REMEDIAL BIOLOGY LAB

1. Study of Simple and compound microscopes used in biology.
2. Section cutting, staining and mounting of sections.
3. Histological studies of the Leaf , Stem and Root with description of their stained sections.
4. Description and study of floral characters of the plants representing the families in theory.
5. Observation of permanent slides.

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I Year I Semester

PHR16118 - GENERAL & DISPENSING PHARMACY LAB

1. Dispensing of prescriptions falling under the categories; Mixtures, solutions, emulsions, creams, ointments, powders, pastes, lotions, liniments, inhalations, paints. etc.
2. Identification of various types of incompatibilities in a prescription, correlation thereof and dispensing of such prescriptions.
3. Dispensing procedures involving pharmaceutical calculations, pricing of prescriptions and dosage calculations for pediatric and geriatric patients.
4. Dispensing of prescriptions involving adjustment of tonicity.

A total 50 prescriptions are to be dispensed.

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I Year I Semester

PHR16119 - PHARMACEUTICAL ORGANIC CHEMISTRY - I LAB

Introduction to Equipment & Glassware

Re crystallization method, determinations of Melting point, Boiling Point and distillation

I. Preparation of organic compounds (each involving a specific organic reaction covered in theory)

1. N-Acetylation: Preparation of Acetanilide from Aniline
2. O-Acetylation: Preparation of Aspirin from salicylic acid
3. Nuclear Nitration: Preparation of m-Dinitrobenzene from nitrobenzene
4. Oxidation: Preparation of Benzoic acid from Benzyl chloride
5. Esterification: Preparation of n-Butyl acetate from n-Butyl alcohol
6. Etherification: Preparation of α -Naphthyl methyl ether from α -Naphthol
7. Halogenation: Preparation of Iodoform from Iodination of acetone
8. Extensive Nuclear Substitution: Preparation of Tribromophenol
9. Bromination of Tribromo aniline from Phenol or Aniline

II. Systematic qualitative Analysis (Identification) of Mono functional Organic Compounds:

Avoid water-soluble compounds, and compounds containing more than one functional group; at least six individual compounds to be analyzed.

REFERENCES

1. Vogel's Text Book of Practical Organic Chemistry, 5th Edition.
2. R.K. Bansal, Laboratory Manual of Organic Chemistry.
3. O.P. Agarwal, Advanced Practical Organic Chemistry.
4. F.G.Mann & B.C. Saunders, Practical Organic Chemistry.

I Year II Semester

PHR16121 - HUMAN ANATOMY & PHYSIOLOGY – II (50 Hrs)

UNIT –I

08

Central Nervous System: Anatomy and physiology of different parts of brain, spinal cord and cranial nerves.

LO: Brain involvement in sensory and motor functions including pain perception, sleep wake cycle, cognitive skills, memory, behavior and governance.

UNIT – II

08

Neuron, axon conduction, Neurochemical transmission, reflex action, Electroencephalogram, specialized functions of the brain, and their functions.

LO: Chemical Mediators like Acetyl choline, Serotinine, Dopamine, Noradrenaline, Glutamic acid, Gaba involvement in transmission of impulse and disorders due to their changes.

UNIT – III

08

Autonomic Nervous System: Physiology and functions of sympathetic and parasympathetic nervous system. Mechanism of neurohumoral transmission in the A.N.S.

LO: Cholinergic system is Essential for life process while adrenergic system is needed to meet emergency by flight or fight. ANS works without rest through life without rest unlike CNS.

UNIT – IV

08

Endocrine System: Basic anatomy and physiology of pituitary, thyroid, parathyroid, adrenals, testes, ovary and endocrine functions of hormones and functions.

LO: Growth, reproduction and metabolism depend on hormonal activity. Their imbalance leads to disorders and some of them cannot be rectified.

UNIT-V

08

Reproductive System: Male and female reproductive systems and the functions of their hormones. Physiology of menstruation, Spermatogenesis and Oogenesis.

LO: Concept of male & female hormones, Characters, sex cell maturity, reproductive period, copulation and pregnancy, parturition, concept of pregnancy, menopause and their care.

UNIT-VI

10

Sense organs: basic anatomy and physiology of Eye, Ear, Nose, Tongue and skin.

LO: Sensations are the combined activities of sensory organs and specified areas of the brain.

TEXT BOOKS

1. Tortora, G.J and Anagnodokas, Principles of Anatomy and Physiology, N.P Harper & Row Publishers N.Y
2. Ross & Wilson – Anatomy & Physiology in health and illness – Anne Waugh, Allison Grant.
3. T.S. Ranganathan, A Text book of Human Anatomy.
4. Human Anatomy and Physiology. C.C Chatterjee.
5. Dr. Jayaveera K.N., Vrushabendra Swamy B.M., Human Anatomy Physiology and Health Education, S.Chand publ.

REFERENCES

1. Donald.C Rizzo, Fundamental of Anatomy and Physiology.
2. Subrhamanyam and Others, A textbook of Physiology
3. A.C.Guyton, Text Book of Medical Physiology Keele& Neil, Samson Wrights Applied Physiology
4. Best & Taylor, The Living Body-A Text Book on Human Physiology
5. M.N. Ghosh, Human Physiology Julia F. Gui, Learning Human Anatomy: A Laboratory Text
6. B.D. Chaurasia, Human Anatomy, Regional and Applied, Part-I,II and III, CBS Publishers and Distributors, New Delhi

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I Year II Semester

PHR16122 - PHARMACEUTICAL INORGANIC CHEMISTRY (50Hrs)

UNIT-I

08

1. Classification of inorganic pharmaceuticals based on their applications and therapeutic uses.
2. Sources of impurities, quality control and test for purity. Limit tests for chlorides, sulphates, iron, arsenic, lead and heavy metals and their pharmacopoeial standards.

LO: Pharmaceutical orientation to inorganic chemistry, definitions, principles, procedures, limits of detection, keeping the impurities in pharmaceutical substances to the minimal level.

UNIT-II

10

1. **Sodium, potassium and calcium replenishers:** sodium chloride, compound sodium chloride solution (Ringer solution), potassium chloride, ORS.
2. **Calcium replenishers:** Calcium chloride, calcium gluconate, dibasic calcium phosphate.
3. **Acid-base regulators:** sodium bicarbonate, sodium lactate, sodium citrate/potassium citrate, sodium acetate and ammonium chloride.
4. **Antacids:** Aluminium hydroxide gel, dried aluminium hydroxide gel, magnesium oxide, magnesium hydroxide mixture, magnesium trisilicate and calcium carbonate.
5. **Expectorants:** Ammonium chloride, potassium iodide.
6. **Emetics:** Potassium antimony tartrate and copper sulfate.
7. **Antidotes:** Sodium thiosulphate and sodium nitrite.

LO: Properties, classification, preparation, assay of ammonium chloride, sodium thiosulfate and sodium nitrite, uses.

UNIT-III

08

1. **Adsorbents:** Light kaolin, heavy kaolin and activated charcoal.
2. **Astringents:** Zinc oxide and Bismuth subcarbonate.
3. **Protectants:** Calamine, zinc oxide, zinc stearate, talc and titanium dioxide
4. **Silicone polymers:** Activated Dimethicone
5. **Anti-infectives:** Hydrogen peroxide solution, potassium permanganate, silver nitrate (Silver protein), iodine (Solutions of iodine, povidone-iodine) boric acid and yellow mercuric chloride.

LO: Properties, preparation wherever applicable, assay of hydrogen peroxide, potassium permanganate, boric acid, zinc oxide and uses.

UNIT-IV

08

1. **Laxatives:** Magnesium sulphate and Sodium phosphate.
2. **Haematinics:** Ferrous sulphate, Ferrous fumarate, Ferrous gluconate, Ferric ammonium Citrate, Iron and Dextrose injection.
3. **Suspending agents:** Bentonite and Colloidal silica.
4. **Excipients:** Di and tricalcium phosphates, Magnesium stearate, talc and Calcium carbonate (precipitated chalk).
5. **Colorants:** Titanium oxide and Ferric oxide.

LO: Properties, preparations wherever applicable, uses.

UNIT-V

08

Dental products:

1. **Fluorides:** Sodium fluoride and Stannous fluoride.
2. **Oral antiseptics:** Hydrogen peroxide, Zinc peroxide and mouth washes.
3. **Dentifrices:** Dibasic calcium phosphate, Strontium chloride and Sodium metaphosphate.
4. **Cements and Fillers:** Zinc oxide.

LO: Properties, preparations wherever applicable, uses.

UNIT-VI

08

Miscellaneous medicinal agents of inorganic nature:

Cisplatin (Antineoplastic), lithium carbonate (Antipsychotic), Barium sulfate (diagnostic agent), Plaster of paris (surgical aid), Sodium aurothiomalate (antirheumatic), Sodium antimonygluconate (internal parasiticide) and Potassium perchlorate (antithyroid).

LO: Structures, properties and uses.

TEXT BOOKS

1. A.H.Beckett and J.B.Stenlake, Practical pharmaceutical chemistry, Part-I. The Athtone press, University of London, London.
2. Advanced Inorganic Chemistry by Satya prakash, G.D.Tuli
3. Wal Ankita, Wal, Pranay, Rai, Awani Kumar, Inorganic Pharmaceutical Chemistry, New Age International Publishers.

REFERENCES

1. J.H Block, E.Roche, T.O Soine and C.O. Wilson, Inorganic Medical and pharmaceutical Chemistry Lea & Febiger Philadelphia PA.
2. P. Gundu Rao, Inorganic pharmaceutical chemistry; Vallabh Prakashan, Delhi.
3. L.M. Atherden, Bentley and Driver's Textbook of Pharmaceutical Chemistry Oxford University Press, London.
4. G.R Chatwal, Pharmaceutical Chemistry Inorganic, Himalaya Publishers.
5. K Somasekhar Rao, C Venkata Suresh, Pharmaceutical Inorganic Chemistry, Pharma Med Press.

I Year II Semester

PHR16123 - PHARMACEUTICAL ORGANIC CHEMISTRY-II (50Hrs)

UNIT-I

10

Benzene: Kekule's structure, Aromaticity, Huckel's rule, resonance energy, characteristic electrophilic substitution reactions: Nitration, Halogenations, Sulfonation, Friedel-Craft's alkylation and acylation with limitations, orientation in mono substituted benzenes.

Polynuclear aromatic hydrocarbons: Nomenclature, methods of preparation of Naphthalene, Anthracene and Phenanthrene, their oxidation and reduction reactions, relative susceptibilities to oxidation as interpreted in terms of sacrifice of resonance energies, Electrophilic substitution reactions.

Arylhalides: Nomenclature, comparison of reactivity with respect to alkylhalides, mechanism of nucleophilic substitution (Benzyne concept).

LO: Understanding the properties of aromatic compounds, mechanisms of reactions and their usefulness in organic synthesis, electronic factors influencing orientation.

UNIT-II

08

Carbonyl compounds: Nomenclature, important methods of preparation, characteristic nucleophilic addition reactions (addition of bisulphate, Grignard reagent, hydrogen cyanide, hydrazine derivatives and alcohols); Aldol condensation, Cannizzaro reaction and Perkin reaction.

LO: General properties, relative reactivities towards nucleophilic addition, mechanisms and applications.

UNIT-III

08

Carboxylic acids: Nomenclature, important methods of preparation, characteristic reactions (acidity, relative acidities, reduction, H-V-Z reaction, conversion into acid chlorides, amides and esters); methods of preparation of important esters (Acetoacetic ester and Malonic ester) and their applications in organic synthesis.

LO: General properties, measurement of relative acidities, equations involving the reactions and mechanisms, applications in synthesis.

UNIT-IV

08

Phenols: Nomenclature, general methods of preparation, industrial synthesis of phenol by Dow process, characteristic reactions (acidity and its comparison to alcohols and carboxylic acids as interpreted by resonance, ether formation, ester formation, Kolbe reaction, Reimer-Tiemann Reaction, Bromination and nitration).

LO: Structures, equations, mechanisms, importance of these reactions in pharmaceutical organic synthesis.

UNIT-V

08

Amines and Diazonium compounds: Nomenclature, methods of preparation, characteristic reactions (basicity and relative basicities, alkylation and exhaustive alkylation, nitration and orientation), separation of all three classes of amines by Hinsberg's method; formation of Diazonium compounds, characteristic reactions (replacement by hydrogen, Sandmeyer reaction, replacement by nitrile, and their applications in synthesis and coupling reactions).

LO: Properties, structures, equations, mechanisms, orientations and applications.

UNIT-VI

08

Name reactions: Beckmann rearrangement, Mannich reaction, Fries rearrangement, Michael addition, Schmidt reaction, Benzoin condensation.

LO: General reaction, structures and mechanism, applications in organic synthesis.

TEXT BOOKS

1. T.R. Morrison and R.N. Boyd, Organic chemistry, pentice hall of India private limited, New Delhi.
2. Arun Bahl & Bahl, Advanced Pharmaceutical Organic Chemistry.
3. C. N. Pillai, Text book of Organic Chemistry.
4. Bhupinder Mehta, Manju Mehta, Organic Chemistry.

REFERENCES

1. R.L Madan, *Organic Chemistry*.
2. Lloyd N. Ferguson, Text book of Organic Chemistry, 2nd edition,.
3. Raj K Bansal, A textbook of Organic Chemistry, 5th edition.

I Year II Semester

PHR16124 - PHYSICAL PHARMACY – I (50 Hrs)

UNIT – I

10

Intermolecular forces and states of matter: Binding forces between molecules, the states of matter, the gaseous state, the liquid state, solids and the crystalline state. Phase equilibria and the phase rule.

LO: To learn intermolecular forces and states of matter, Phase equilibria and Phase rule

UNIT – II

08

Thermodynamics: The first law of thermodynamics, The second law of thermodynamics. The third law of thermodynamics, Free energy functions and applications. Thermochemistry

LO: To understand laws of Thermodynamics and their Applications

UNIT – III

08

Physical properties of Drug Molecules: Dielectric constant induced polarization, Dipole moment, Refractive index and Molar refraction, Optical rotatory dispersion.

LO: To understand the physical properties of drug molecules and their significance.

UNIT – IV

12

Solutions of Non electrolytes: Concentration expressions, Ideal and Real solutions, Colligative properties, molecular weight determinations.

LO: To understand properties of Non electrolytes and their significance

Solutions of Electrolytes: Properties of solutions of electrolytes. The Arrhenius theory of electrolyte dissociation. The modern theory of strong electrolytes and other coefficients for expressing colligative properties.

LO: To know theories of electrolytes and their dissolution and colligative properties

UNIT - V

05

Buffers and buffered isotonic systems: The buffer equation, buffer capacity, buffers in pharmaceutical and biological systems, buffered isotonic solutions, methods of adjusting tonicity and pH (relevant numerical problems).

LO: To know about buffers, buffer isotonic solutions, Methods of adjusting isotonicity and their Significance.

UNIT - VI

07

Solubility and Distribution Phenomena: Solvent-solute interaction, solubility of gases in liquids, liquids in liquids, solids in liquids, distribution of solutes in immiscible solvents.

Introduction to phenomena of diffusion: Ficks first law and second law.

LO: To understand the solubility and distribution phenomenon and laws of diffusion.

TEXT BOOKS

1. Patrick J. Sinko, Martin's Physical Pharmacy and Pharmaceutical Sciences Fifth Edition.
2. C.V.S.Subramanyam, Essentials of Physical Pharmacy, Vallabh Prakashan.
3. C.V.S.Subramanyam, Physical Pharmacy, Vallabh Prakashan.
4. E. Shotton and K. Ridgaway, Physical Pharmaceutics, Oxford University Press, London.
5. Bentley's Text Book of Pharmaceutics by E.A. Rawlins.
6. Manavalan & Ramasamy, Physical Pharmaceutics, Vignesh Publishers

REFERENCES

1. Pharmacopoeia, (I.P., B.P., U.S.P. and European.)
2. B.S Bahl, ArunBahl and G.D Tuli, Essentials of Physical Chemistry.
3. Martindale, the Extra Pharmacopoeia; Latest Edition the Royal Pharmaceutical Society
4. Lippincott Williams and Wilkins, Remington Pharmaceutical Sciences
5. Robin J. Haiwan, Hand Book of Pharmacy and Health Care Edition, ThePharma Press, U.K.
6. S. J Carter, Cooper and Gunn's Tutorial pharmacy.

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I Year II Semester**PHR16125 - COMPUTER APPLICATIONS AND BIOSTATISTICS (50Hrs)**

Unit-I	22
Overview of computer with general applications: components of computers, computer languages, usage of computers, introduction of operative system.	
Introduction to MS-Office: MS- word: Basics, working with files, working with text, formatting paragraphs, styles, lists, tables, graphics, spelling and grammar, page formatting macros and table of contents.	
MS-Excel: Basics, spreadsheets, data types, formulas, formatting charts and graphs.	
MS-Power Point: Basics, views, slide controls, applied design, page setup, templates, background control, colour screens, traditions and animations, working with texts and working with graphics.	
MS-Access: Data base concepts, screens layouts, creating tables, data sheet record, table relationships, shorting and filtering, query forms, form controls, sub forms, reports, importing, exporting and linking.	
<i>LO:</i> The student should be familiar with overview of the computers and MS-office	
Unit-II	06
Information Technology Today: Internet and World Wide Web (www), structure and organization of www, browsers, information searching in www, search engines, pharmaceutical resources in www types of indexing tools and search strategies, Hyper Text Manuscripts Languages (HTML) and e-mail.	
<i>LO:</i> Familiarity with internet, WWW, browsing, HTML & e-mails.	
Unit-III	06
Database Management: Concepts and objectives of Database Management systems, advantages of database management systems and examples of DBMS packs (like DBASE III).	
<i>LO:</i> Familiarity with Database management	
Unit-IV	08
Data collection and treatment: Significant digits and rounding of numbers, data collection, random and non-random sampling methods, sample size, data organization, diagrammatic representation of data, bar, pie, 2-D and 3-D diagrams.	
Measures of central tendency and variations: Mean, median, mode, properties and applications, range, standard deviations and standard error of means, coefficient of variation, kurtosis, skewness and confidence (fiducial) limits for mean and proportions.	
<i>LO:</i> Fundamentals of data / Sample collection and diagrammatic presentation. Measures of central tendency and dispersion.	
Unit-V	04
Correlation and Regression: Correlation and regression analysis, method of least squares and non-linear regression.	
<i>LO:</i> Correlation and regression in pharmacy.	
Unit-VI	04

Statistical inference: t-test, chi square test and their applications in pharmacy.

LO: Application of t-test, Chi square test and approve in the testing the significance of difference or similarity.

TEXTBOOKS

1. Computer Fundamentals, Anita Goel, Pearson.
2. Information Technology Workshop, 3e, G Praveen Babu, M V Narayana BS Publications.
3. Khan & Khan, "*Fundamentals of Biostatistics*".
4. Pranab Kumar Banerjee, "*Introduction to Biostatistics*".

REFERENCE BOOK:

1. Essential Computer and IT Fundamentals for Engineering and Science Students, Dr. N.B. Venkateswarlu
2. Biostatistics for medical, nursing and pharmacy students by A. Indrayan, L Satyanarayana.
3. Introduction to Information Technology, ITL Education Solutions Ltd., 2nd Ed, PEARSON
4. Comdex Information Technology, Vikas Gupta, dreamtech.

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I Year II Semester

PHR16126 - HUMAN ANATOMY PHYSIOLOGY LAB

1. Study of compound microscope and precautions to be taken while handling it.
2. Microscopic study of structure of cell and different tissues.
3. To understand and learn Blood withdrawal techniques.
4. Determination of bleeding time, clotting time, blood grouping and Estimation of Hemoglobin in blood.
5. Study of Haemocytometry.
6. Estimation of W.B.C count.
7. Estimation of R.B.C. count.
8. Estimation of D.L.C.
9. Study of human skeleton.
10. Study of different systems with the help of charts and models.
11. Recording of body temperature, pulse rate and blood pressure.
12. Determination of vital capacity, experiments on Spirometer.
13. Various devices used in family planning like Copper T, Lippe's loop, diaphragm, condom and oral pills.

I Year II Semester

PHR16127 - PHYSICAL PHARMACY – I LAB

1. Determination of density of a liquid.
2. Determination of specific rotation of optically active substance by using polarimeter.
3. Determination of concentration of sugar solution by using Polarimeter.
4. Determination of refractive index of a liquid by using Refractometer.
5. Determination of Percent composition of a binary liquid mixture by using Refractometer.
6. Determination of Molecular weight of a given substance by using Landsberger method.
7. Determination of Molecular weight of a given substance by using Rast camphor method.
8. Calibration of pH Meter and determination of pH of a solution.
9. Estimation of pKa by Half Neutralization Method.
10. Determination of Upper Consolute Temperature by using Phenol water system.
11. Determination of heat of neutralization of strong acid by strong base.
12. Determination of effect of impurities on phase diagram of water – phenol system.
13. Preparation of Buffers.
14. Determination of Buffer capacity.
15. Determination of partition coefficient.
16. Effect of temperature on solubility of solid in liquid.
17. Effect of addition of salt / pH / cosolvent of the solubility.

I Year II Semester

PHR16128 - COMPUTER APPLICATIONS LAB

Identification of the peripherals of a computer.

To prepare a report containing the block diagram of the CPU along with the configuration of each peripheral and its functions. Description of various I/O Devices

A practice on disassemble the components of a PC and assembling them to working condition. Examples of Operating systems-Dos, Windows, Installation of MS windows on a PC. Introduction to Memory and Storage Devices , I/O Port, Device Drivers, Assemblers, Compilers, Interpreters , Linkers, Loaders.

Internet & World Wide Web :Importance of Networking, Transmission Media, Networking Devices- Gateway, Routers, Hub, Bridge, NIC ,Bluetooth Technology, Wireless Technology, Modem, DSL, Dialup Connection.

Orientation & Connectivity Boot Camp and surfing the Web using Web Browsers: Students should get connected to their Local Area Network and access the Internet. In the process they should configure the TCP/IP setting and demonstrate how to access the websites and email. Students customize their web browsers using bookmarks, search toolbars and pop up blockers.

Search Engines & Netiquette: Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google.

MS Office

Word Orientation: Word as word Processors.

Accessing, overview of toolbars, saving files, Using help and resources, rulers, formatting ,Drop Cap , Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option

Creating project : Abstract Features to be covered:-Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check , Track Changes, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes and Paragraphs.

MS Excel

Excel Orientation: The mentor needs to tell the importance of MS Excel as a Spreadsheet tool, give the details of the tasks and features that would be covered in each.

Using Excel Accessing, overview of toolbars, saving excel files, Using help and resources

Creating a Scheduler - Features to be covered: Gridlines, Format Cells, Summation, auto fill, Formatting Text

Performance Analysis - Features to be covered: Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting

Power Point

Students will be working on basic power point utilities and tools which help them create basic power point presentation. Topic covered during this week includes :- PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows, Hyperlinks, Inserting –Images, Clip Art, Tables and Charts in PowerPoint.

Concentrating on the in and out of Microsoft power point. Helps them learn best practices in designing and preparing power point presentation. Topic covered during this week includes: - Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), and Inserting – Background, textures, Design Templates, Hidden slides.

MS Access:

Students have to work on creating data bases, tables, storing and organizing data in the data base, querying, Creating Forms and Reports (take appropriate examples.)

TEXT BOOK:

- 1 Computer Fundamentals, Anita Goel, Pearson.
- 2 Information Technology Workshop, 3e, G Praveen Babu, M V Narayana BS Publications.
- 3 Introduction to Information Technology, ITL Education Solutions Ltd., 2nd & 3rd Eds., PEARSON.
- 4 Comdex Information Technology, Vikas Gupta, Dreamtech.

REFERENCE BOOK:

1. Williams, Using Information Technology: Practical Introduction, TMH.
2. Essential Computer and IT Fundamentals for Engineering and Science Students, Dr. N.B. Venkateswarlu.