

15CBPH41 Pharmaceutical Chemistry–III (Organic Chemistry-II)

Course Objective:

The course is designed to impart the knowledge in the field of heterocyclic chemistry. In heterocyclic chemistry, the nomenclature and numbering of single and fused ring systems, and structure, reactivity, synthesis and applications of the main five and six-membered ring systems with one and two heteroatoms will be covered. In pericyclic chemistry, both a frontier molecular orbital approach and the concept of conservation of orbital symmetry will be applied to explain the observed reactivity and stereochemistry for this class of reactions. Synthetic applications of these processes will also be illustrated. In addition to the theoretical aspects, the basic practical knowledge relevant to the analysis is also imparted.

Theory

3-0-0-3

Unit I: Introduction to Geometrical Isomerism, Stereoisomerism involving cyclic compounds 12 hrs

Geometrical isomerism,: Restricted rotation due to double bond, nomenclature, number of isomers, physical and chemical properties, determination of configuration of cis, trans or E, Z isomerism
stereochemistry of cyclic compounds: Conformational analysis of ethane, butane, cyclo butane, cyclohexane, cyclodecane. Conformational and Configurational isomers.

Unit II: Stereochemical aspects of following categories of reactions

12 hrs

Stereochemistry and reactivity S_N1 and S_N2 reactions, E1 and E2 elimination, Diels - Alder reaction, neighboring group participation. Frontier orbital and orbital symmetry cycloaddition (Diels Alder Reaction), Sigmatropic reactions eg. Cope rearrangement, Electrocyclic reactions.

Unit III: Structure, Nomenclature, preparation and reactions of following classes of heterocyclic 5 membered ring compounds

12 hrs

Heterocyclic compounds - general classification, nomenclature, synthesis, properties and reactions of Pyrroles, Furan, Thiophene, Pyrazole, Imidazole, Oxazole, Isoxazole

Unit IV: Structure, Nomenclature, preparation and reactions of following classes of heterocyclic 6 membered ring compounds

12 hrs

Heterocyclic compounds - general classification, nomenclature, synthesis, properties and reactions of, Pyridine, Piperidine, Quinoline, Isoquinoline, Pyrimidine, Pyrazine, Pyridazine

Unit V: Structure, Nomenclature, preparation and reactions of following classes of heterocyclic fused ring compounds and important medicinal compounds of heterocyclic nature

12 hrs

Heterocyclic compounds - general classification, nomenclature, synthesis, properties and reactions of Azepines, Phenothiazine.

Structures and medicinal uses of Nicotinic acid, INH, Mepyramine, Phenazone, Phenylbutazone, and, Chloroquine, Histamine, Carbimazole, Piperazine, DEC, Sulphadiazine, Metronidazole, Chlorpromazine, Imipramine, Diazepam

Total

60 hrs

Course Outcomes

At the end of the course, the student will be able to

- CO1:** Understand the concept of Stereochemistry, Illustrate the concepts of geometrical isomerism, explain the mechanisms involved in S_N1 and S_N2 reactions, E1 and E2 elimination, Diels - Alder reaction, neighboring group participation. Frontier orbital and orbital symmetry cycloaddition (Diels Alder Reaction) , Sigmatropic reactions eg. Cope rearrangement, Electrocyclic reactions
- CO2:** Define heterocyclic compounds, Classify them and explain the nomenclature , outline the synthesis and study of reactions ,uses of Pyrrole, Furan, Thiophene, Pyridine, Piperidine, Quinoline Isoquinoline
- CO3:** Explain the synthesis and study of reactions ,uses of Pyrazole, Imidazole, Oxazole, Isoxazole, Pyrimidine Pyrazine, Pyridazine Azepines, Phenothiazines
- CO4:** Illustrate the structure and lists the medicinal uses of heterocyclic derivatives of Nicotinic acid, INH, Mepyramine Phenazone
- CO5:** Illustrate the structure and lists the medicinal uses of heterocyclic derivatives of Phenylbutazone, chloroquine, Histamine, carbimazole, Piperazine, DEC, sulphadiazine, Metronidazole, Chlorpromazine, Imipramine, Diazepam

Practicals

0-0-3-2

1. Synthesis of 2,3-Diphenylquinoxaline
2. Synthesis of Diphenylhydantoin
3. Synthesis of Benzimidazole
4. Synthesis of Phenothiazine
5. Synthesis of 2 methyl benzimidazole
6. Synthesis of 2,4,5-tri phenyl imidazole
7. Synthesis of benzotriazole
8. Synthesis of Phenylazo beta naphthol
9. Synthesis of 1-phenyl 3- methyl-5- pyrazolone
10. Stereomodels of ethane and conformational analysis
11. Stereomodels of butane and conformational analysis
12. Stereomodel of cyclohexane

Course Outcomes

At the end of the course, the student will be able to

- CO1:** Outline the Synthetic tract and method of laboratory preparation techniques for heterocyclic compounds of 5,5 - diphenyl hydantoin, 2 - methyl - 4 benzylidene - 5 oxazolone
- CO2:** Lists the Synthetic tract and method of laboratory preparation techniques for heterocyclic compounds

- of 2 - phenyl 4 - benzyldene - 5 oxazolone . 2,3 - diphenyl quinoxaline
- CO3:** Outline the Synthetic tract and method of laboratory preparation techniques for heterocyclic compounds of benzimidazole, resolution of alanine
- CO4:** Show the Synthetic tract and method of laboratory preparation techniques for heterocyclic compounds of benztriazole
- CO5:** Outline the Synthetic tract and method of laboratory preparation techniques for heterocyclic compounds of 2-methyl benzimidazole

Textbooks

1. Advanced Organic Chemistry Arunbahl and B.S .Bahl.
2. Tb. of Organic Chemistry, V.K Ahluwallia, 2ndEdn, Narosa, 2006.
3. Practical Pharmaceutical Chemistry, Part two, A. H. Beckett & J. B. Stenlake – 4thEdition. Bloomsbery Academic 2001
4. Heterocyclic Chemistry, Raj K Bansal, 5thEdn ,New Age, 2010

Reference Books

1. Elementary Practical Organic Chemistry Part - II: Qualitative Organic Analysis, 2 Ed. Vogel, Arthur I, cbs
2. Organic chemistry: stereochemistry & the chemistry of natural products, Finar, I L, vol: ii, 6 ed. ,Pearson, 1973
3. Organic reactions & their mechanisms, Kalsi, p s, 2 ed. New age. 2010
4. Stereochemistry: Conformation and Mechanism, Kalsi. P.S, 7thEdn, Newage, 2000.
5. Organic Reactions Mechanism, V .K Ahluwalia, 4thEdn, Narosa. 2006
6. Organic Chemistry, reactions and Reagents, O P Agrawal, 46thEdn, Goel,
7. Heterocyclic Chemistry, T L Gilchrist, 3rd ,Pearson. 1992.
8. Heterocyclic Chemistry, Joule, 4th Edn, Blackwell, 2000.

15CBPH42

Pharmaceutics - V (Unit Operations - II)

Course Objective:

Unit Operations play an important role in the design and manufacture of dosage forms. Operations like milling, granulation, drying, evaporation, mixing, blending etc. are often employed in the process of making of Drug Delivery systems like tablets, capsules, ointments, liquid oral dosage forms. The students of undergraduate programme in pharmacy do laboratory work by compounding various dosage forms on small scale without involving machines. The knowledge of how dosage forms are manufactured on large scale at accelerated rate involving various unit operations is therefore significant. The students shall be exposed to the technical operations employed by pharmaceutical manufacturers to produce drug delivery systems on large scale achieving reproducibility, efficacy with every unit of dosage form manufactured.

Theory**3-0-0-3****Unit I: Stoichiometry & Heat Transfer 12 hrs**

Unit processes material and energy balances, molecular units, mole fraction, (tie substances), gas laws, mole volume, primary and secondary quantities, equilibrium state, rate process, steady and unsteady states, dimensionless equations, dimensionless formulae, dimensionless groups, different types of graphical representation, mathematical problems.

Source of heat, heat transfer, steam and electricity as heating media. Determination of requirement of amount of steam/electrical energy, steam pressure, Boiler capacity, Mathematical problems on heat transfer.

Unit II: Evaporation & Distillation 12 hrs

Basic concept of phase equilibria, factors affecting evaporation, evaporators, film evaporators, single effect and multiple effect evaporators, problems on evaporation.

Raoult's law, phase diagrams, volatility: simple steam and flash distillations, principles of rectification, Mc Cabe Thiele method for calculations of number of theoretical plates, Azeotropic and extractive distillation, Mathematical problems on distillation.

Unit III: Drying & Mixing 12 hrs

Moisture content and mechanism of drying, rate of drying and time of drying calculations: classification and types of dryers, dryers used in pharmaceutical industries and special drying methods. Mathematical problems on drying.

Theory of mixing, solid - solid, solid -liquid and liquid -liquid mixing equipments.

Unit IV: Size Reduction and Size Separation 12 hrs

Definition, objectives of size reduction, factors affecting size reduction, laws governing energy and power requirements of a mill, types of mills including ball mill, hammer mill, fluid energy mill etc.

Unit V: Automated process control systems & Reactors 12 hrs

Process variables, temperature, pressure, flow, level and vacuum and their measurements. Elements of automatic process control and introduction to automatic process control systems. Elements of computer aided manufacturing (CAM).

Reactors and fundamentals of reactors design for chemical reactions.

Total 60 hrs

Course Outcomes

At the end of the course, the student will be able to

- CO1:** Explain the Unit processes material and energy balances, molecular units, mole fraction, (tie substances), gas laws, mole volume, primary and secondary quantities, equilibrium state, rate process, steady and unsteady states.
- CO2:** Identify the Basic concept of phase equilibria, factors affecting evaporation, evaporators, film evaporators, single effect and multiple effect evaporators, problems on evaporation.
- CO3:** Examine the Moisture content and mechanism of drying, Explain the rate of drying and time of drying calculations.
- CO4:** Explain the Definition, objectives of size reduction, factors affecting size reduction.
- CO5:** Discuss the Process variables, temperature, pressure, flow, level and vacuum and their measurements.

Practicals

0-0-3-2

1. Particle size separation and analysis by Sieve Method.
2. Determination of Grinding Efficiency.
3. Size reduction of chalk powder using Ball Mill.
4. Effect of mixers on globule size of castor oil emulsion.
5. Particle size distribution determination using sedimentation method.
6. Mixing index of solids in liquids.
7. Experiment to illustrate solid - solid mixing.
8. Determination of rate of evaporation.
9. Determination of influence of various factors over evaporation.
10. Determination of moisture content of granules by drying method.
11. Construction of drying curve for the given sample.
12. Determination of equilibrium moisture content of the given sample.

Course Outcomes

At the end of the course, the student will be able to

- CO1:** Determination of Particle size separation and analysis by Sieve Method.
Determination of Grinding Efficiency

- CO2:** Determination of Size reduction of chalk powder using Ball Mill.
Determination of Effect of mixers on globule size of castor oil emulsion.
- CO3:** Determination of Mixing index of solids in liquids.
Determination of Experiment to illustrate solid - solid mixing.
- CO4:** Determination of rate of evaporation.
Determination of influence of various factors over evaporation.
- CO5:** Determination of Particle size distribution using sedimentation method.

Text Books

1. Pharmaceutical Engineering (Principles and Practices) by C.V.S. Subrahmanyam, 2009, Vallabh Prakashan, Delhi
2. Tutorial Pharmacy by Cooper & Gunn, ed. S.J.Carter, CBS Publishers & Distributors, Delhi, 6th Edition, 2000.
3. Pharmaceutical Engineering - K. Sambamurthy, 2002 NAI (P) Ltd., Delhi.

Reference Books

1. Elementary Chemical Engineering - Max S. Peters, Published by McGraw Hill Book Company, New York, 1954.
2. Perry's Chemical Engineer's Handbook - Robert H Perry, Green D.W., Maloney J.O.7th Edition, 1998, McGraw - Hill Inc., New York.
3. Unit Operations of Chemical Engineering, 5th edition, 1993 - McCabe, Smith & Harriott, McGraw - Hill Inc., New York.
4. Pharmaceutics: The Science of Dosage Form Design - M.E. Aulton, 2nd edition, 2002, Churchill Livingstone, Elsevier Limited.
5. The Theory & Practice of Industrial Pharmacy - Lachman L., Lieberman H.A. & Kanjig J.L., 3rd edition, 1990, Varghese Publishing House, Bombay.
6. Remington: The Science & Practice of Pharmacy. Vol. I & II. Lippincott, Williams & Wilkins Philadelphia, 21st Revised edition (1 May 2005) Mack Publishing Co. Easton.
7. Introduction to Chemical Engineering by Walter L. Badger & Julius T. Banchemo, McGraw Hill International edition, 1955, New Delhi.
8. E.A. Rawlin's, Bentley's Text Book of Pharmaceutics, 8th edition, 2012, BSP Books Pvt.Ltd-Hyderabad.

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Pharmaceutical Microbiology

Course Objective:

Pharmaceutical Microbiology is an applied branch of Microbiology. It involves the study of microorganisms associated with the manufacture of pharmaceuticals e.g. minimizing the number of microorganisms in a process environment, excluding microorganisms and microbial by-products like exotoxin and endotoxin from water and other starting materials, and ensuring the finished pharmaceutical product is sterile.

Theory **2-0-0-2**

Unit I: scope of microbiology **9hrs**

Introduction to the scope of microbiology, classification of microbes and their taxonomy, actinomycetes, bacteria, rickettsiae, spirochetes and viruses.

Unit II: Identification of Microbes **9hrs**

Structure of bacterial cell, nutrition, cultivation, isolation of bacteria, actinomycetes, fungi, viruses, Stains and types of staining techniques, electron microscopy.

Unit III: Control of microbes by physical and chemical methods **9hrs**

Disinfection, factors influencing disinfectants, dynamics of disinfection, disinfectants and antiseptics and their evaluation, Sterilization, different methods, validation of sterilization methods & equipments. Sterility testing of all Pharmaceutical products, Microbial genetics and variation.

Unit IV: Immunity **9hrs**

Immunity, Primary and secondary defensive mechanism of body, microbial resistance, interferon.

Unit V: Microbial assays **9hrs**

Microbial assays of antibiotics, vitamins & amino acids

Total **45 hrs**

Course Outcomes

At the end of the course, the student will be able to

- CO1:** Outline the Prokaryotes and Eukaryotes, microbes and their taxonomy of bacteria, rickettsiae, spirochetes and viruses.
- CO2:** Choose the bacterial cell, nutrition, cultivation, isolation of bacteria, actinomycetes, fungi, viruses, Stains and types of staining techniques, electron microscopy
- CO3:** Classify disinfectants and Factors influencing disinfection, Sterilization, different methods, validation of sterilization methods & equipments. Sterility testing of all Pharmaceutical products, Microbial genetics and variation
- CO4:** Explain the Immunity, Primary and secondary defensive mechanism of body, microbial resistance, interferon
- CO5:** Discuss about the Microbial assays of antibiotics, vitamins & amino acids

Practicals **0-0-3-2**

1. Preparation and sterilization of nutrient agar and broth
2. Determination of microorganism by simple staining method

- 3 Determination of microorganism by Gram's staining method
- 4 Determination of microorganism Acid fast staining method
- 5 Aseptic Inoculation of microorganism in liquid medium
- 6 Isolation of pure culture by streak plate method
- 7 Inoculation of microorganism by pour plate method
- 8 Isolation and characterization of actinomycetes from soil
- 9 Determination of motility by hanging drop technique
- 10 Microbiological assay of semi synthetic penicillins
- 11 Microbiological assays of vitamins
- 12 Evaluation of disinfectant by rideal walker co-efficient method.

Course Outcomes

At the end of the course, the student will be able to

- CO1:** Outline the sterilization of nutrient agar simple staining method Gram's staining method, Acid fast staining method
- CO2:** Experiment with the Isolation of pure culture of micro-organisms
- CO3:** Analyze the of actinomycetes from soil and motility by hanging drop technique
- CO4:** Explain the concepts of Microbiological assay of antibiotics by cup plate method and other method.
- CO5:** Discuss about the Sterility testing of pharmaceuticals and disinfectant by rideal walker co-efficient method.

Text Books

1. Textbook of Microbiology, R. Vasanthakumari. BI Publications Pvt Ltd, 01-Jan-2007
2. Textbook of Microbiology, D.R.Arora.2nd ed, publisher CBS Publishers, 2003.

Reference Books

1. Microbiology-Concepts And Applications, Michael J. Pelczar, Jr., E.C.S. Chan, And Noel R. Krieg. Published by McGraw-Hill (1993).
2. Introduction to Microbiology, John L. Ingraham. Publisher: Brooks/Cole Pub Co (October 1999).
3. Anthanarayan and Paniker's Textbook of Microbiology,R.Ananthanarayan,C.K.Jayaram Paniker,Publisher:Universities Press;Eight edition(2009).

15CBPH44

Pharmacognosy-III

Course objective

The objective is to provide knowledge about the role of traditional medicine in health care system ,current challenges,opportunities and strategy for traditional medicine.It also gives information about standardization of Ayurvedic formulation to determine its safety and efficacy.

Theory **3-0-0-3**

UNIT-I **12 hours**

Introduction to glycosides

Definition, classification, properties types , Chemical test for identification and their isolation from natural source

UNIT-II **12 hours**

Drugs containing Cardiac and Anthracene glycosides

Study of the biological sources cultivation, collection , commercial varieties , chemical constituents , substitutes , adulterants , uses , diagnostic macroscopic and microscopic features and chemical test of the drugs : Digitalis , Squill , Strophanthus, Thevetia,Aloe , Senna , Rhubarb and Cascara.

UNIT-III **12 hours**

Drugs Containing Saponin , Bitter glycosides and Miscellaneous

Study of the biological sources cultivation, collection , commercial varieties , chemical constituents , substitutes , adulterants , uses , diagnostic macroscopic and microscopic features and chemical test of the drugs : Liquorice , Ginseng , Dioscorea , Sarsaparilla , Senega Psoralea , Ammi majus , Ammi visnaga , Gentian , Saffron , Chirata and quassia

UNIT-IV **12 hours**

Monograph of Traditional drugs

Studies of traditional drugs , common vernacular name , botanical sources , morphology , chemical nature of chief constituents , pharmacology , categories , common uses and marketed formulations of following indigenous drugs- Amala , Kantkara , Satavara , Tylophora , Bhilwa , Kalijira , Bach , Rasna, Punarnava , Chitrak , Apamarg , Gokhru , Shanaku , Pushpi , Brahmi , Adusa , Arjuna , Ashoka , Methi , Lahsun , Palash , Guggul , Gymnema , Shilajit , Nagarmoth and Neem

UNIT-V **12 hours**

Traditional system of medicine

The holistic concept of drug administration and traditional systems of medicines. Introduction to Ayurvedic Preparations like Aristas , Asavas , Gutikas , Thailas

Total – 60 hours

Course Outcomes

At the end of the course, the student will be able to

- CO1:** Develop knowledge about glycosides, its properties, different types, isolation methods and identification tests.
- CO2:** Explain the pharmacognosy of cardiac and anthracene glycoside containing crude drugs under various pharmacognostic items.
- CO3:** Explain the pharmacognosy of saponin, bitter glycoside containing crude drugs and other miscellaneous glycosides under various pharmacognostic items.
- CO4:** Describe the monograph of various traditional drugs of significance by a thorough pharmacognostic study. Illustrate the marketed formulations of the indigenous drugs.
- CO5:** Understand the holistic concepts of various traditional systems of medicine. Apply the concepts in preparation of few ayurvedic dosage forms like asavas, arishtas, ghutikas, tailas.

PRACTICAL

0-0-3-2

1. Macroscopy of crude drugs containing cardiac glycosides
2. Macroscopy of crude drugs containing anthracene glycosides
3. Macroscopy of crude drugs containing flavonoid glycosides
4. Macroscopy of crude drugs containing bitter and saponin glycosides
5. .Microscopy of crude drugs containing glycosides (Digitalis,senna,liquorice,chirata, quassia, strophanthus and Neem)
6. powder microscopy of drugs containing glycoside (senna,liquorice,digitalis,chirata and quassia)
7. standardization of Arista
8. Standardization of Asava
9. Standardization of Thaila
10. Standardiazation of Churna
11. .Standardization of Lehya
12. Standardisation of Kutika

Course Outcomes

At the end of the course, the student will be able to

- CO1:** Identify the morphological characters of various medicinally important glycoside containing drugs.
- CO2:** Identify the microscopical characters of few medicinally important glycoside containing drugs
- CO3:** Analyze the powder characters of few medicinally significant glycosidic drugs.
- CO4:** Standardize/Evaluate the various ayurvedic liquid dosage formulations such as asavas, arishtas by standard protocols (WHO guidelines/Ayurvedic Formulary)
- CO5:** Standardize/Evaluate the various ayurvedic solid and semi-solid dosage formulations such as churna, lehya, taila etc by standard protocols (WHO guidelines/Ayurvedic Formulary)

Text books

1. Text book of Pharmacognosy by T.E. Wallis.S.K.Jain for CBS publishers, 5 th edition 2003
2. Text book of Industrial Pharmacognosy by A.N. Kalia,V.K Jain for CBS Publishers, 1st edition 2005
3. Practical Pharmacognosy by Dr. C.K. Kokate. M.K.Jain for vallabh prakashan,4 th edition 1994
4. Pharmacognosy and Phytochemistry by Vinod. D. Rangari, career publications 1 st edition 2002

Reference Books

1. Pharmacognosy by G.E. Trease and W.G. Evans.,Elesievier 16 th edition, 2009

2. Pharmacognosy by Vano E.Tyler, Lynn, James and E. Robbers.,Wolters klcewer, 9 th edition,1998
3. Cultivation of medicinal plants by Dr. C.K. Kokate, Dr. A.S. Gokhale, and Prof S.B. Gokhale.Nirali prakashan,5 th edition 2008
4. Indian herbal pharmacopoeia, M,H,F.W. CSIR vol1&2.1996
5. Ayurvedic pharmacopoeia of India, Par 1,vol&2 ,M.H.F.W.Controller of Publications.
6. Ayurvedic formulary of India , M.H.F.W.Part1&2
7. Ayurvedic drugs and other plant sources , V,V.Sivaranjan , Oxford ,IBH.1994

15CBPH45 Pathophysiology of Common Diseases

Course Objective: This course is designed to impart a thorough knowledge of the relevant aspects of pathology of various conditions with reference to its pharmacological applications, and understanding of basic pathophysiological mechanisms. Upon completion of the subject student shall be able to describe the etiology and pathogenesis of the selected disease states; name the signs and symptoms of the diseases; and mention the complications of the diseases.

Theory **3-0-0-3**

Unit 1: Basic principles of cell injury and adaptation **12 hrs**

Causes of Cellular injury, pathogenesis, and morphology of cell injury. Intercellular alterations in lipids, proteins and carbohydrates, Cellular adaptation, atrophy and hypertrophy.

Unit 2: Basic Mechanisms involved in the process of inflammation and repair **12 hrs**

Alterations in vascular permeability and blood flow migration of WBC, acute and chronic inflammation, mediators of inflammation, brief outline of the process of repair.

Unit 3: Pathophysiology of common diseases **12 hrs**

Rheumatoid arthritis, gout, epilepsy, psychosis, depression, mania, hypertension, angina, congestive heart failure, atherosclerosis, myocardial infarction, diabetes, peptic ulcer, asthma, ulcerative colitis, hepatic disorders, acute and chronic renal failure.

Unit 4: Infectious Diseases **12 hrs**

Tuberculosis, urinary tract infections, sexually transmitted diseases

Unit 5: Common types of neoplasms and Anemias **12 hrs**

Benign and Malignant tumors, etiology and pathogenesis of cancer, invasions and metastasis, classification of tumors and general biology of tumors and anemias.

Total **60 hrs**

Course Outcomes

At the end of the course, the student will be able to

- CO1:** Explain the Morphology of Reversible cell injury
- CO2:** Organise the process of repair
- CO3:** Compare and classify the difference between acute and chronic renal failure
- CO4:** Explain tuberculosis and justify its pathophysiological management
- CO5:** Elaborate the Pathogenesis of Cancer

Text Books:

1. Robbins & Cotran Pathologic basis of disease by Vinay Kumar and Abul K. Abbas, 1st edition, 2014.
2. Text book of Pathology by Harsh Mohan Jaypee Brothers Medical Publishers; 7th Revised edition, 2014.

References:

1. Goodman Gilman's The Pharmacological Basis of Therapeutics by Laurence Brunton and Bruce A. Chabner. Twelfth edition, McGraw Hill Education, 2011.
2. Best and Taylor's Physiological basis of medical practice by William and Wilkins, Baltimore.
3. Guyton A and Hall Textbook of Medical Physiology by John E. Hall, 12th edition. WB Saunders Company, 2010.
4. Clinical Pharmacy and Therapeutics by Roger Walker; Second edition, Churchill Livingstone publication