

7. **ALCOHOL DETERMINATION:** Alcoholometric methods, Problem during distillation of alcohol, Method for liquids containing less than 30% or more than 30% alcohol and special treatment before distillation.
8. **ALKALOIDAL DRUG ASSAY:** Weighing for assay, Extraction of drugs, Maceration, Percolation, Continuous extraction, Purification of Alkaloids and determination of alkaloids.
9. **QUALITY ASSURANCE OF VACCINES:** Introduction, Quality measures for stability of vaccines, potency testing, and post market surveillance of vaccines.
10. **MISCELLANEOUS DETERMINATIONS AND TESTS:** Determination of weight/ml, Water/Moisture content, Loss on Drying, Evaluation of Ointments, Ash contents and Alkalinity of Glass.
11. **STANDARDIZATION OF PHARMACEUTICALS:** An understanding of quality assurance system adopted in pharmaceutical industry. Good Manufacturing Practices and Current Good Manufacturing Practices.
12. **STATISTICAL INTERPRETATION OF QUALITY CONTROL CHARTS DURING MANUFACTURING PROCESSES:**

PHARMACEUTICS-VI (PHARMACEUTICAL QUALITY MANAGEMENT) (Practical)

Paper 9

Marks 100

NOTE: Practical of the subject shall be designed from time to time on the basis of the above mentioned theoretical topics and availability of the facilities e.g. Assay of various spirits, tinctures, extracts, syrups and elixirs, Assay of Ointments and suppositories, Assay of tablets and capsules, Test for alkalinity of glass, Determination of alcohol contents in the Pharmaceutical preparations and Pyrogen test. Sterility test, Determination of Ash contents, Determination of Moisture contents, Determination of total solids, Determination of viscosity of syrups, gels etc. Determination of emulsion types (Note: A minimum of 20 practicals will be performed).

FINAL PROFESSIONAL

PHARMACEUTICAL CHEMISTRY-IV (MEDICINAL CHEMISTRY) (Theory)

Paper 1

Marks 100

NOTE: The topics will be taught with special reference to their Pharmaceutical Applications.

1. **INTRODUCTION TO MEDICINAL CHEMISTRY:** Chemical constitution and biological activity: (Receptor, Theory, Structure Activity Relationships (SAR) and Drug Metabolism).

Modern concept of rational drug design, pro drug, combinatorial chemistry and computer aided drug design (CADD) and concept of antisense molecules.

2. DRUG TARGETS AND DRUG DESIGNING:

- a) Introduction and types of drug targets
- b) Introduction to molecular modeling and computational chemistry
- c) Structure based designing
- d) Ligand-based designing
- e) Various techniques in drug synthesis

3. GENERAL PROPERTIES, CHEMISTRY, BIOLOGICAL ACTION, STRUCTURE ACTIVITY RELATIONSHIP AND THERAPEUTIC APPLICATIONS OF THE FOLLOWING:

- a. Hormones: Steroidal Hormones (Testosterone, Progesterone, Estrogen, Aldosterone and Cortisol), Proteinous Hormones (Insulin, Glucagon, Oxytocin and Vasopressin).
- b. Anti-neoplastic Agents: Tamoxifen, Fluorouracil, Mercaptopurine, Methotrexate and Vincristine.
- c. Sedatives and Hypnotics: Benzodiazepines, Barbiturates, Paraldehyde, Glutethimide, Chloral hydrate, and alcohols.
- d. Anaesthetics: Local anaesthetics (Procaine, Lignocaine, Eucaine, Cocaine and Benzocaine), General anaesthetics (Cyclopropane, Halothane, Nitrous oxide, Chloroform, Thiopental Sodium, Ketamine, Methohexital, Thioamylal Sodium, Fentanyl Citrate, Tribromo ethanol).
- e. Analgesics and Antipyretics: Paracetamol, Salicylic acid analogues, Quinolines derivatives, Pyrazolone and Pyrazolodiones, N - arylanthranilic acids, Aryl and heteroaryl acetic acid derivatives.
- f. Sulphonamides: Prontosil, sulphanilamide, Sulphapyridine, sulphadimidine, Sulfamethoxazole, Sulfadiazine and Sulfafurazole.
- g. Antimalarials: 4-Aminoquinolines, 8-Aminoquinolines, 9-Amino acridines, Biguanides, Pyrimidine analogues, Mefloquine and Cinchona alkaloids.
- h. Diuretics: Mercaptopurine, Meralluride, Thiazides, Spironolactone, Theophylline, Furosemide, Acetazolamide, Ethacrynic acid and Triamterene.
- i. Antitubercular Drugs: Ethambutol, Isonicotinic acid, Hydrazid, Rifampicin, Thioguanine, Pyrazinamide, cycloserine, Ethionamide, Cytarabine, 5-Fluorouracil and Dacarbazine.
- j. Antiviral Drugs: Acyclovir, Tromantadine Hydrochloride and Ribavirin.
- k. Immunosuppressant Agents: Azathioprine and Cyclosporin.
- l. Antibiotics: Penicillins, Cephalosporins, Streptomycin, Chloramphenicol, Tetracyclines, Kanamycin and Erythromycin.

PHARMACEUTICAL CHEMISTRY-IV (MEDICINAL CHEMISTRY) (Practical)

Paper 6

Marks 100

NOTE: Practical of the subject shall be designed from time to time on the basis of the above mentioned theoretical topics and availability of the facilities e.g. Estimation of functional groups; Carboxylic, Hydroxy, Amino and Nitro groups; Determination of Molecular weights of Organic Compounds. Synthesis of Paracetamol, Salicylic Acid, Methyl salicylate, Azobenzene, Benzoic Acid, 5-Hydroxy-1, 3-benzoxazol-2-one, Aspirin, P-nitrosophenol, 3-nitrophthalic acid, Chloro-benzoic acid. Assay of the Drugs like Sulpha drugs, Aspirin, Paracetamol, Benzyl Penicillin. Inorganic Preparations (**Note:** A minimum of 20 practicals will be conducted).

PHARMACY PRACTICE-VI (CLINICAL PHARMACY-II) (Theory)

Paper 2

Marks 100

1. **RATIONAL USE OF DRUGS:** Rational Prescribing, Rational Dispensing, Problems of Irrational Drug Use, Learning about drug use problem, Sampling to study drug use, Indicators of drug use.
2. **INTRODUCTION TO ESSENTIAL DRUGS:** Criteria for selection, Usage and Advantages. Development of EDL.
3. **DRUG UTILIZATION EVALUATION & DRUG UTILIZATION REVIEW (DUE/DUR):** Development of protocol of use of few very low therapeutic index drug groups like Steroids, Vancomycin and Cimetidine.
4. **CLINICAL PHARMACOKINETICS:** Therapeutic Drug Monitoring of Digoxin, Theophylline, Gentamycin, Lithium, Phenytoin, Cabamazepine, Phenobarbitone, Valproic Acid, Cyclosporins and Vancomycin.
5. **PHARMACEUTICAL CARE, ITS SCOPE, MANAGEMENT AND APPLICATION OF CARE PLAN:**
6. **CLINICAL THERAPEUTICS:** General Strategy: Terminology of Disease. Management and Treatment. Drug Selection.
7. **CLINICAL TOXICOLOGY:**
 - (a) General information. Role of pharmacist in treatment of poisoning and general management of poisoning & over dosage. Role and Status of Poison Control Centre.
 - (b) Antidotes and their mechanism of action.
8. **SAFE INTRAVENOUS THERAPY & HAZARDS OF IV THERAPY**
9. **NON-COMPLIANCE:** Definition, introduction and importance, Extent of non-compliance, Methods of assessment, Reasons for non-compliance, Strategies for improving compliance.

10. DISEASE MANAGEMENT:

- Unit V: Central nervous system unit (Stroke, Epilepsy, Psychosis)
- Unit VI: Infectious diseases (Meningitis, tuberculosis, dermatological infections, Rabies, Urinary track infection, Malaria fever, Typhoid fever, Fungal infections of skin, AIDS, Dengue fever, Common Cold, Pharyngitis & Tonsillitis, Conjunctivitis)
- Unit VII: Endocrinology Unit (Diabetes Mellitus, Hyper/Hypo-thyroidism, pituitary gland non-malignant disorders)
- Unit VIII: Oncology Unit (Types of tumors, Brief introduction to oncological diseases e.g. prostate cancer, breast cancer, lungs cancer)
- Unit IX: Nephrology Unit (Renal failure, nephrotic syndrom)
- Unit X: Hematology Unit (Bleeding disorders/coagulopathies/clotting disorders e.g. thrombocytopenia, hemophilia, Vit. K deficiency, Anemia).

PHARMACY PRACTICE-VI (CLINICAL PHARMACY-II) (Practical)

Paper 7

Marks 100

- Clerkship in the Clinical Setting. A project Related to Clinical Pharmacy Practices will be completed by the students and will be evaluated by the external examiner.
- Student are required to take/present verbal presentation, communication, written and problem-solving skills, critical analysis of data and provision of care through a weekly conference and projects

PHARMACEUTICS-VII (PHARMACEUTICAL TECHNOLOGY) (Theory)

Paper 3

Marks 100

1. **PRINCIPLES OF PHARMACEUTICAL FORMULATION AND DOSAGE FORM DESIGN:**
Need for dosage form; Pre-formulation Studies; Product Formulation.
2. **ADVANCED GRANULATION TECHNOLOGY (DESIGN & PRACTICE):**
Spray Drying Granulation Technology; Roller Compaction Technology; Extrusion/Spheronization as a Granulation Technique; Single-Pot Processing **Granulation Technology:** Rapid Release Granulation Technique; Particle Coating by Centrifugation Granulation Technology.
3. **POLYMERS USED IN DRUG DELIVERY SYSTEMS:**
4. **NOVEL DRUG DELIVERY SYSTEM (DDS):**
Sustained/ Controlled Release Drug Delivery System
 - i. Microencapsulation technique
 - Coacervation
 - Solvent evaporation
 - Interfacial polymerization
 - Spray drying
 - ii. Developmental aspects of Matrix and Reservoir Systems

5. NOVEL GIT DRUG DELIVERY SYSTEM (DDS):

- Oral Osmotic Pumps
- Ion-Exchange Controlled DDS
- pH-Controlled DDS
- Bio/mucoadhesive DDS
- Floating DDS

6. DRUG CARRIER SYSTEM:

- Liposomes
- Niosomes

7. TARGETED DRUG DELIVERY SYSTEM:

- Active Drug Delivery System
- Passive Drug Delivery System

8. PHARMACEUTICAL BIOTECHNOLOGY:

- a. Introduction to Biotechnology: Genetics/Genomics, Proteomics, Biomolecular target Identification, Pharmacogenomics, Gene therapy and Nucleic acid therapeutics.
- b. Techniques Used in Pharmaceutical biotechnology: PCR, DNA Sequencing, Affinity Protein Purification.
- c. Fundamentals of Genetic Engineering and its Application in Medicine
- d. Pharmaceutical Recombinant therapeutic Proteins, Growth factors, Therapeutic antibodies, High-throughput screening of putative therapeutic compounds.
- e. Biotechnological aspects in the product development
- f. Principle, Synthesis and Application of Monoclonal Antibodies
- g. Immobilized Enzymes and their application in Medicine

PHARMACEUTICS-VII (PHARMACEUTICAL TECHNOLOGY) (Practical)

Paper 8

Marks 100

NOTE: Practical of the subject shall be designed from time to time on the basis of the above mentioned theoretical topics and availability of the requirements, e.g.

- Various techniques to develop the formulation,
- Granulation technology,
- Study of drug delivery systems,
- Biotechnological aspect of product development,
- In-vitro Quality Control of various dosage forms.
- Microbial assay,
- Particle size analysis using various methods,
- Stability studies of Pharmaceuticals,
- Coating of particles and to prepare,
- Examine and control specifications of packaging materials.

PHARMACY PRACTICE-VII (FORENSIC PHARMACY) (Theory)

Paper 4

Marks 100

1. **GENERAL INTRODUCTION:** Forensic Pharmacy & Forensic Pharmacist, History of Drug Legislation and Pharmacy Profession in Pakistan, National Health Policy, National Drug Policy, Essential Drugs, Prescription handling at Retail level and Record keeping, Drug Control Administration at Federal and Provincial level.
2. **ROLE OF FORENSIC PHARMACIST:** Forensic drug Measurement, Post-mortem redistribution (PMR), Medication errors, prescription forgery, product tampering, Insurance fraud, Use of drugs or alcohol in car accidents or violent actions, Legal and illegal pharmaceutical evidence in criminal investigations, use of abused drugs in the workplace, professional malpractice, quackery and health care fraud.
3. **PHARMACEUTICAL ETHICS:** Patents and Generics, Ethics in Sale, Ethics in Industry, Ethics in Research.
4. **STUDY OF DRUG LAWS:**
 - a. The Drugs Act 1976 and rules framed there under.
 - b. Provincial Drug Rules (Respective Drug Rules will be taught in the relevant province).
 - c. Advertisement rules.
 - d. Other Related rules and Legal aspects.
5. **THE PHARMACY ACT 1967:**
6. **CONTROL OF NARCOTICS SUBSTANCES ACT 1997:** Laws relating to Narcotic drugs and psychotropic substances.
7. **THE POISONS ACT 1919:**
8. **THE FACTORIES ACT 934:**
9. **SHOPS AND ESTABLISHMENTS ORDINANCE 1969 WITH RULES:**

PHARMACY PRACTICE-VIII (PHARMACEUTICAL MANAGEMENT & MARKETING) (Theory)

Paper 5

Marks 100

1. **MANAGEMENT & MARKETING:**
 - a. Nature and Principles of Management:
 - b. Types and Functions of Managers:
 - c. Planning: Purpose and types of Planning, Steps in Planning
 - d. Organizing:
 - e. Management Control Systems: Purpose, Steps in the Control Process, Forms of operations control. Requirements for adequate control, Critical control points and standards.

- f. Motivation:
 - g. Innovation and Creativity:
 - h. Principals of Marketing:
 - i. Product Management:
 - j. Marketing Research:
2. **PRODUCTION MANAGEMENT:** Material Management, Planning of production, Batch record maintenance.
 3. **MARKETING MANAGEMENT:**
 - a. Ethical consideration of Pharmaceutical Marketing
 - b. Difference between Pharmaceutical Marketing and Consumer Marketing
 - c. Major stakeholders within pharmaceutical market environment.
 - d. Marketing Research (Process and Methodology)
 - e. Market Analysis Techniques 3Cs (Customer analysis, Company analysis, competitors analysis)
 - f. Evaluating the marketing performance (audit tools and audit process)
 - g. Designing sales force structure, sales force size and sales quota
 - h. Marketing channels, Promotion and Advertising and Salesmanship.
 4. **SALES MANAGEMENT:** Personnel, Buying, Receiving, Pricing, Sales promotion and Customer Services.
 5. **BUSINESS DEVELOPMENT MANAGEMENT:** General principles, strategies, short and long term planning and objectives.
 6. **BUSINESS COMMUNICATION:** Importance and benefits of business communication, components of communication, concept and problems of communication, 7C's of communications.
 7. **STRATEGIES FOR SUCCESSFUL BUSINESS AND GLOBAL MEETINGS:** Background information on groups, purpose and kinds of meetings, solving problems in meetings, leadership responsibilities in meetings, participant's responsibilities in meetings.

NOTE: Upon completion of recognized Pharm.D. degree, a pharmacy graduate is required to undergo residency based training for a period of 1 year in any area; at public or private Hospital, Pharmaceutical Industry, Community Pharmacy, Pharmaceutical Marketing, Research & Development and Public health recognized by the Pharmacy Council of Pakistan. The objective of the residency is to undergo a planned training on aspects of pharmacy practice under the supervision of a registered pharmacist.

LIST OF RECOMMENDED BOOKS

ENGLISH

Functional English

Grammar:

1. Thomson AJ, Martinet AV. **Practical english grammar**. 3rd Ed. Oxford University Press; 1986.

Writing:

2. Kirsznner LG, Mandell SR. **Patterns of College Writing: A Rhetorical Reader and Guide**. 10th Ed. Stephen Martin's Press; 2006.
3. Maley A. **Oxford supplementary skills**: 1st Ed. Writing Intermediate. Cornelsen & Oxford University Press; 1998.

Reading/Comprehension:

4. Langan J. **Reading and Study Skills**. 9th Ed. McGraw Hill Humanities; 2009.

Speaking:

5. Nolasco R. **Speaking: Elementary**: Oxford Supplementary Skills. 4th Ed. Oxford University Press; 1987.

Communication Skills:

Reading/Comprehension:

6. Tomlinson B, Ellis R. **Reading Advanced**. Oxford Supplementary Skills. 3rd Ed. Oxford University Press; 1992.

Technical Writing and Presentation Skills:

Essay Writing and Academic Writing;

7. Langan J. **College Writing Skills with Readings**. 8th Ed. McGraw Hill; 2010.

Presentation Skills;

8. Gilbert MD. **English for Pharmacy writing and oral communication**. 1st Ed. Lippincott Williams & Wilkins; 2008.

Reading;

9. Neulib J, Cain KS, Ruffus S, Scharton M. **The Mercury Reader**: A custom publication. 4th Ed. Pearson; 2011.
10. White R. **Advanced**: Oxford Supplementary Skills. 3rd Ed. Oxford University Press; 1992.
11. Wong L. **Essential Study Skills**. 7th Ed. Wadsworth Publishing; 2011.

PHYSICAL PHARMACY

1. Allen LV, Popovich NG. **Ansel's pharmaceutical dosage forms and drug delivery systems**. 8th Ed. Lippincott Williams & Wilkins New York; 2005.
2. Attwood D, Florence AT. **Surfactant Systems: Their Chemistry, Pharmacy and Biology**. 1st Ed. London: Chapman and Hall Ltd; 1982.
3. Aulton ME. **Aulton's pharmaceuticals: the design and manufacture of medicines**. Churchill Livingstone; 2007.
4. Britain MD. **British national formulary**. 54th Ed. British Medical Association; 2001.
5. Carstensen JT. **Pharmaceutics of solids and solid dosage forms**. 1st Ed. Wiley; 1977.
6. Connors KA, Mecozzi S. **Thermodynamics of pharmaceutical systems: An introduction to Theory and Applications**. 2nd Ed. Wiley & Sons; 2010.
7. Cooper JW, Gunn C, Carter SJ. **Cooper and Gunn's Tutorial Pharmacy**. 6th Ed. New Delhi: CBS Publishers & Distributors; 2004.
8. Davis H. **Bentley's Text Book of Pharmaceutics**. 2nd Ed. Tindall and Cox Publishers; 1961.
9. Finlay WH. **The mechanics of Inhaled pharmaceutical aerosols: An introduction**. 1st Ed. Academic Press; 2001.
10. Florence AT, Attwood D. **Physicochemical Principles of Pharmacy**. 5th Ed. Pharmaceutical Press; 2011.
11. Florence AT, Siepmann J. **Moderen Pharmaceutics: Basic Principles and Systems: (Drugs and the Pharmaceutical Sciences)**. 5th Ed. Taylor & Francis; 2008.
12. Ganderton D, Jones T, McGinity J. **Advances in Pharmaceutical Sciences**. 1st Ed. Academic Press; 1995.
13. Ghosh TK, Jasti BR. **Theory and practice of contemporary pharmaceutics**. 1st Ed. CRC Press; 2005.
14. Kleemann A, Engel J, Kutscher B, Reichert D. **Pharmaceutical substances: Syntheses, Patents, Applications of the most relevant APIs**. 5th Ed. Thieme; 2008.
15. Lewis GA, Mathieu D, Phan RTL. **Pharmaceutical experimental design: (Drugs & the Pharmaceutical Sciences)**. 1st Ed. Informa HealthCare; 1998.
16. Lund W. **The pharmaceutical Codex: Principles and practice of pharmaceutics**. 16th Ed. Co CBS Publishers; 2009.
17. Rienger M, Scott-Blair GW. **Rheology**. 3rd Ed. Academic Press; 1990.
18. Rowe RC, Sheskey PJ, Quinn ME. **Handbook of pharmaceutical excipients**. 6th Ed. Pharmaceutical Press; 2009.
19. Sinko PJ, Martin AN. **Martin's physical pharmacy and pharmaceutical sciences: physical chemical and biopharmaceutical principles in the pharmaceutical sciences**. 5th Ed. Lippincott Williams & Wilkins; 2006.
20. Sinko PJ. **Martin's Physical Pharmacy and Pharmaceutical Sciences**. 6th Ed. Lippincott Williams & Wilkins; 2010.
21. Winfield AJ, Richards RME. **Pharmaceutical practice**. Elsevier Health Sciences; 2004.
22. Zinc G. **Remington: The Science and Practice of Pharmacy**. Philadelphia College of Pharmacy and Science; 2005.

PHARMACEUTICAL CHEMISTRY (ORGANIC)

1. Bansel RK. **Organic Reaction Mechanism**. 3rd Ed. Tata McGraw Hill; 1992.
2. Bhal BS. **Textbook of Organic Chemistry**. 16th Ed. S. Chand & Co; 2007.
3. Block JH, Beale JM. **Wilson and Gisvold's textbook of organic medicinal and pharmaceutical chemistry**. 20th Ed. Lippincott Williams & Wilkins; 2010.
4. Eliel EL, Wilen SH. **Stereochemistry of Carbon Compounds**. 1st Ed. Tata McGraw Hill; 1994.
5. Finar IL. **Organic Chemistry**. 6th Ed. Person Education Asia; 2001.
6. Roberts JD, Caserio MC. **Basic Principles of organic Chemistry**. 3rd Ed. Addison Wesley; 1990.
7. Sykes P. **Guide Book to Mechanism in Organic Chemistry**. 6th Ed. Longman Co; 1991. Vogel AI, Tatchell AR, Furnis BS, Hannaford AJ, Smith PWG. **Vogel's Textbook of Practical Organic Chemistry**. 5th Ed. Pearson Education Limited; 1996.
8. Wade LG. **Organic Chemistry**. 7th Ed. Prentice Hall; 2010.

PHARMACEUTICAL CHEMISTRY (BIOCHEMISTRY)

1. Berg JM, Tymoczko JL, Stryer L. **Biochemistry**. 7th Ed. WH Freeman and Company; 2010.
2. Bishop ML, Fody EP, Schoeff LE. **Clinical Chemistry: Techniques, Principles and Correlations**. 6th Ed. Lippincott Williams & Wilkins; 2009.
3. Champe PC, Harvey RA. **Illustrated Biochemistry**. 4th Ed. Lippincott Company; 2007.
4. Chatterjee MN. **Medical Biochemistry**. 7th Ed. Jaypee Brothers Medical Publishers; 2007.
5. Conn EE, Stumpf PK. **Outlines of Biochemistry**. 5th Ed. John Willey & Sons; 1999.
6. Lehninger AL. **Principles of Biochemistry**. 4th Ed. CBS Publisher; 2004.
7. Murray R, Rodwell V, Bender D, Kathleen M, Botham P, Weil A et al. **Harper's Illustrated Biochemistry**. 28th Ed. Print-Hall; 2009.
8. West ES, Todd RW, Van BTJ. **Text Book of Biochemistry**. The MacMillan Co; 1996.

PHYSIOLOGY

1. Chatterjee CC. **Human Physiology**. 9th Ed. Medical Allied Agency; 1994.
2. Cyril A, Neil E, Joels N. **Samson Wright's Applied Physiology**. 13th Ed. Oxford University Press; 1992.
3. Guyton AC. **Text Books of Medical Physiology**. 9th Ed. W B Saunders Company; 2011.
4. Kuntzman AJ, Tortora GJ. **Anatomy and physiology for the manual therapies**. 1st Ed. John Wiley & Sons; 2009.
5. Martini F. **Fundamentals of anatomy and physiology**. 8th Ed. Prentice Hall; 2010.
6. Saladin KS, Miller L. **Anatomy & physiology: The Unity of Form and Function**. 6th Ed. McGraw-Hill; 1998.
7. Snell RS. **Clinical Anatomy for Medical Students**. 1st Ed. Litle Brown & CoInc; 1992.
8. Spence AP, Elliot B, Mason EB. **Human Anatomy and Physiology**. 3rd Ed. West Publishing Company; 1992.
9. Stuart Ira. **Human Physiology**. 11th Ed. Fox; 2008.
10. Tortora GJ, Derrickson B. **Principles of anatomy and physiology**. 13th Ed. Wiley; 2010.
11. Widmaier E, Raff H, Strang K. **Vander's Human Physiology**. 12th Ed. McGraw Hill; 2010.
12. William F, Ganong WF. **Review of Medical physiology**. 22nd Ed. Prentice Hall International Inc; 2005.

ANATOMY & HISTOLOGY

Anatomy

1. Drake RL, Vogl WA, Mitchell AWM. **Gray's Anatomy: Descriptive and Applied**. 2nd Ed. Churchill Living Stone; 2009.
2. Grant B. **A Method of Anatomy**. 9th Ed. Bailliere Tinal and Co Ltd; 1975.
3. Hamilton WJ. **A Textbook of Anatomy**. 2nd Ed. Macmillan and Co; 1976.
4. Kuntzman AJ, Tortora GJ. **Anatomy and physiology for the manual therapies**. 1st Ed. John Wiley & Sons; 2009.
5. Last RJ. **Anatomy: Regional and Applied**. 11th Ed. J and A Churchill Ltd; 2001.
6. Martini F, Ober WC, Garrison CW, Welch K, Hutchings RT. **Fundamentals of Anatomy and Physiology**. 5th Ed. Prentice Hall; 2001.
7. Moore KL, Dalley AF, Agur AMR. **Clinically Oriented Anatomy**. 6th Ed. Lipponcott Williams and Wilkin; 2009.
8. Romanes GJ. **Cunningham's Manual of Practical Anatomy**. 15th Ed. Oxford University Press; 1986.
9. Saladin KS, Miller L. **Anatomy & physiology: The Unity of Form and Function**. 6th Ed. McGraw Hill; 1998.
10. Snell RS. **Clinical Anatomy**. 7th Ed. Boston Little Brown and Company; 2003.
11. Standring S. **Gray's anatomy: The Anatomical Basis of Clinical Practice**. 40th Ed. Churchill Livingstone; 2008.
12. **Tissues of the body by Legros Clerks**. Publisher Oxford at the Clarendon Press, London.
13. Tortora GJ, Derrickson B. **Principles of anatomy and physiology**. 13th Ed. Wiley; 2010.

Histology

1. Cormack HD. **Essentials of Histology**. 2nd Ed. JB Lippincott Co; 1993.
2. Hammersen F. **Histology: Color atlas of microscopic anatomy**. 3rd Ed. Lee & Febijer Co; 1985.
3. Hewer EE, Bradbury S. **Textbook of Histology for Medical Students**. 9th Ed. William Heinemann Medical Books Ltd; 1973.

ISLAMIC STUDIES

1. Bhatia HS. **Studies in Islamic Law: Religion and Society**. Deep & Deep Publications New Delhi; 1989.
2. Hasan A. **Principles of Islamic Jurisprudence**. Islamic Research Institute, International Islamic University, Islamabad; 1993.
3. Hassan HH. **An Introduction to the Study of Islamic Law**. Leaf Publication Islamabad, Pakistan.
4. Muhammad HU. **Emergence of Islam**. IRI, Islamabad.
5. Muhammad HU. **Introduction to Islam**. Maulana Muhammad Yousaf Islahi.
6. Muhammad HU. **Muslim Conduct of State**.
7. Waliullah M. **Muslim Jrisprudence and the Quranic Law of Crimes**. Islamic Book Service; 1982.
8. Zia-ul-Haq M. **Introduction to Al-Sharia Al-Islamia**. Allama Iqbal Open University, Islamabad; 2001.

PHARMACEUTICS (DOSAGE FORMS SCIENCE)

1. Allen LV, Popovich NG, Ansel HC. **Ansel's Pharmaceutical Dosage Forms and Drug Delivery Systems**. 9th Ed. Lippincott Williams & Wilkins; 2010.
2. Armstrong NA, James KC. **Understanding Experimental Design and Interpretation in Pharmaceutics**. 1st Ed. Taylor & Francis Ltd; 1990.
3. Aulton ME. **Aulton's Pharmaceutics: The Design and Manufacture of Medicines**. 3rd Ed. Churchill Livingstone; 2007.
4. Bentley AO. **Text book of Pharmaceutics**. 8th Ed. Macmillan Publishing Co Inc; 1977.
5. Carstensen JT. **Pharmaceutics of Solids and Solid Dosage Forms**. 1st Ed. John Wiley & Sons Inc; 1977.
6. Davis H. **Bentley's Text book of Pharmaceutics**. 2nd Ed. Tindall and Cox Publishers; 1961.
7. Dittert LW. **Sprowl's American Pharmacy**. 7th Ed. JB Lippincott Co; 1990.
8. Finlay WH. **The Mechanics of Inhaled Pharmaceutical Aerosols: An Introduction**. 1st Ed. Academic Press; 2001.
9. Florence AT, Siepmann J. **Moderen Pharmaceutics: Basic Principles and Systems**. 5th Ed. Taylor & Francis; 2009.
10. Ghosh T, Jasti B. **Theory and Practice of Contemporary Pharmaceutics**. 1st Ed. CRC Press; 2005.
11. Kleemann A, Engel J, Kutscher B, Reichert D. **Pharmaceutical Substances: Synthesis, Patents, Applications of the most relevant APIs**. 5th Ed. Thieme; 2008.
12. Lewis GA, Mathieu D, Phan RTL. **Pharmaceutical Experimental Design**. 1st Ed. Informa HealthCare; 1998.
13. Lund W. **The Pharmaceutical Codex: Principles and Practice of Pharmaceutics**. 12th Ed. The Pharmaceutical Press; 1994.
14. Mehta D. **British National Formulary (BNF)**. 54th Ed. Pharmaceutical Press; 2007.
15. Rowe RC. **Handbook of Pharmaceutical Excipients**. 6th Ed. Pharmaceutical Press; 2009.
16. Sinko PJ, Martin AN. **Martin's physical pharmacy and pharmaceutical sciences: physical chemical and biopharmaceutical principles in the pharmaceutical sciences**. 5th Ed. Lippincott Williams & Wilkins; 2006.
17. Winfield AJ, Richards RME. **Pharmaceutical practice**. 3rd Ed. Elsevier Health Sciences; 2004.
18. Zinc G. **Remington: The Science and Practice of Pharmacy**. 21st Ed. Philadelphia College of Pharmacy and Science; 2005.

PHARMACEUTICS (PHARM. MICROBIOLOGY & IMMUNOLOGY)

1. Brooks G, Carroll KC, Butel J, Morse S, Mietzner T. **Jawetz, Melnick & Adelberg's Medical Microbiology and Immunology**. 24th Ed. Churchill Livingstone; 2010.
2. Collins CH, Lynes PM, Grange JM, Falkinham JO. **Collins & Lyne's Microbiological Methods**. 8th Ed. Vutterworth Heineman; 2004.
3. Fraise A, Lambert PA, Maillard JY. **Russell, Hugo & Ayliffe's Principles and Practice of Disinfection, Preservation & Sterilization**. 4th Ed. Wiley Blackwell; 2004.
4. Harvey RA, Champe PC, Fisher BD. **Microbiology: Lippincott's Illustrated Reviews Series**. 4th Ed. William & Willkins; 2004.
5. Hugo WB, Russell AD. **Pharmaceutical Microbiology**. 7th Ed. Black Well Science Ltd; 1998.

6. Hugo WB, Denyer SP, Hodges NA, Gorman SP. **Hugo and Russell's pharmaceutical microbiology**. 7th Ed. Wiley Blackwell; 2004.
7. McKane L, Kandel J. **Microbiology: Essentials and Application**. 2nd Ed. McGraw Hill Inc; 1995.
8. Pelczar MJ. **Microbiology**. 7th Ed. McGraw Hill Inc; 2007.
9. Pommerville JC. **Alcarno's Fundamentals of Microbiology**. 9th Ed. John Bartlett Publishers; 2010.
10. Singleton P, Sainsbury D. **Dictionary of Microbiology and Molecular Biology**. 3rd Ed. John Willey & Sons; 2006.
11. Willey J, Sherwood L, Woolverton C. **Prescott's Microbiology**. 8th Ed. C Brown Publishers; 2010.

PHARMACOLOGY & THERAPEUTICS

1. Brunton L, Lazo J, Parker K. **Goodman & Gilman's Pharmacological Basis of Therapeutics**. 11th Ed. McGraw Hill Book Company; 2005.
2. Chang HM, But PPH, Yao SC, Wang LL, Yeung SCS. **Pharmacology and applications of Chinese Materia Medica**. 3rd Ed. World Scientific Pub Co Inc; 2000.
3. Ebadi M. **Pharmacology**. 3rd Ed. Little Brown & Company; 1996.
4. Harvey RA, Champe PC. **Lippincott's Illustrated Reviews: Pharmacology**. 4th Ed. Lippincott William & Wilkins; 2008.
5. Humphrey P. **Rang & Dale's Pharmacology**. 6th Ed. Churchill Livingstone; 2007.
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RECOMMENDATIONS:

1. The up-dated curriculum of Doctor of Pharmacy program after the approval from Pharmacy Council of Pakistan (PCP) and Higher Education Commission (HEC) shall be binding on every Pharmacy Institution/ University (Public and Private) to adopt revised curricula.
2. The revised curricula shall be adopted from the 2012 session.
3. Violation in adoption of the approved curriculum shall be liable to penalty under section 17 & 19 of Pharmacy Act, 1967 and rules framed there-under, which may lead to revoking of affiliation/ accreditation by the PCP.
4. No omission and changes are allowed in the said curriculum approved by PCP and HEC, by any institution.
5. Doctor of Pharmacy degree holders will be allowed for direct admission in M.S. /M. Phil leading to PhD program.