

CENTRAL COUNCIL OF INDIAN MEDICINE

NISABE TALEEM OF MAHIR-E-TIB
(ILMUL SAIDLA)

SYLLABUS OF
DOCTOR OF MEDICINE (MD-UNANI)
(PHARMACY)

3 YEARS DEGREE COURSE

CENTRAL COUNCIL OF INDIAN MEDICINE
61-65, INSTITUTIONAL AREA,
JANAKPURI
NEW DELHI - 110058

(December, 2013)

M D Ilmul Saidla

Scheme of papers

First Year (Exam to be held at the end of one academic year)

Paper I

Research Methodology and Biostatistics

Paper II

Qawanine Dawasazi wa Ilmul Taklees (Principles of Pharmacy and Calciniology)

Paper III

General and Experimental Pharmacology

Final Year (Exam to be held at the end of three years, however teaching / training to be organized in both IInd & IIIrd year)

Paper I

Pharmaceutical Developments & its Applications in Saidla

Paper II

Cosmetology and Dietetics in Unani Medicine

PAPER III

Ilm Wasful Aqaqeer (Pharmacognosy of Unani Drugs)

PAPER IV

Quality Control and Quality Assurance of Unani Drugs
Thesis Work

First Year

Paper I- Research Methodology and Biostatistics

Research Methodology

- Types of research
 - (a) Literary research
 - (b) Clinical research
 - (c) Experimental research
 - (d) Observation and field studies
- Trends and possibilities of R&D of Unani Drugs
- Research problems
 - (a) Definition
 - (b) Selection and sources of research problems
- Hypothesis
 - Null and alternate hypothesis
- Research designs
 - (a) Types of Research designs
- Controls in research designs
 - (a) Selection criteria
 - (b) Placebo and plain control
 - (c) Randomization
 - (d) Balancing and matching
- Factors effecting research results.
- Tools and techniques in research
 - (a) Interview, questionnaire, inventories, scales
 - (b) Rating scales
- Computer programmes used in research
 - (a) Minitab
 - (b) SPSS
 - (c) Gpad
- Protocols for research and report writing
 - (a) Protocols for experimental, clinical and community based research.
 - (b) Writing research report.
 - (c) References in research report.
 - (i) Books
 - (ii) Journals
 - (iii) Compendia
 - (iv) Bulletins
 - (v) WHO Reports
 - (vi) Internet Sites

- Guidelines for Research
 - (a) WHO
 - (b) ICMR
 - (c) CPCSEA

Bio-Statistics

- Scope and utility of Biostatistics
- Descriptive Statistics
 - (a) Analysis of Data
 - (i) Data collection, tabulation and presentation of data.
 - (ii) Measure of central tendency – Mean, Median and Mode.
 - (iii) Measures of dispersion: Range, quartile deviation, standard deviation.
 - (b) Probability
 - (i) Definition and laws of probability
 - (ii) Types of probability distribution
 - (iii) NPC and its application size
 - (iv) Randomized samples
 - (c) Sampling
 - (i) Types and sample size
 - (ii) Randomized sampling
- Inferential Statistics
 - (a) Correlation and linear regression
 - (i) Karl Pearson correlation coefficient
 - (ii) Linear regression equations.
 - (b) Test of significance
 - (i) 't' test
 - (ii) 'z' test.
 - (c) Test of variance
 - (i) ANOVA one way
 - (ii) ANOVA two way
 - (iii) X^2 test.
 - (d) Non-parametric tests
 - (i) Median test, Mann Whitney U test.
 - (ii) Kruskal Wallis test, Fried test.
- Vital Statistics
 - (a) Rate and Ratios
 - (b) Standardization of population
 - (c) Risk factors

PRELIMINARY EXAMINATION

Paper II

Qawanine Dawasazi wa Ilmul Taklees (Principles of Pharmacy and Calcinology)

- Scope and chronological evaluation of Unani Pharmacy.
- Technical terminologies and Scientific interpretation of Amaliyate dawasazi (Pharmaceutical Procedures)
Irgha, tarveeq, iqla, tashvia, tabkheer, tadhkeen, tadheen, tajfeef, ghasl, tasfia, tasveel, ihraq, taklees, tahmees, tabalvur, Izala Laun, Itfa, Sahaq, tahleel, Taqtee, Nakhl, Taseer, Tarsheeh, Tahbeeb, Takhmir wa Taafin.
- **Specific Unani Pharmaceutical Procedures:**
Methods of distillation and standardization of herbal distillates.
Methods of preparation of Usara, rub and sat.
Methods of Oil Extraction.
Sufoof Sazi :Classification of powder- principles, methods, related equipments and the grades of powder.
Methods of detoxification and purification of some specific drugs: Afyun, kmoon, azaraq, shangraf, habbus-salateen, turbud, ghariqoon, saqmunia, kibrit, sammulfar, hartaal, Amale Tasfia (Cleansing Process): shahad, kharateen, simab, sibr, bahroza, mom, abrak etc.
Methods of preparation of Qiwan used for it and measurement of syrupy consistency.
- Detailed knowledge of Unani Dosage Forms (Solid, Liquid, Semi solid, Gaseous), method of Preparations and need of improvisation.
- Methods of preparation of Qiwan and materials used for it and measurement of consistency.
- Detailed knowledge of ancient and contemporary pharmaceutical instruments used in Unani Pharmacy
Kharal, Aalae tareeq, Patal jantar, Jaljantar, Sieves, Granulator, Tablet making machine, Coating machine, Grinders, Distillation apparatus, Desiccator, Oven, Crucibles, Lyophilizer (Freeze Dryer).
- Good Manufacturing Practices (GMP) & shelf life.
- Hospital Pharmacy (Definition, functions, objectives, location and management)
- Introduction to Qarabadeen, Unani Pharmacopoeia of India, National Unani Formulary.
- Introduction to Traditional Knowledge Digital Library (TKDL).

Ilmul Taklees (Calcinology)

- Historical background of calcinology, Definition, Aims, objectives and scope of calcinology
- Basics of inorganic Chemistry in context of metals, non-metals and minerals used in Kushtasazi.
- Process of calcinations and their scientific evaluation.
- Calcination, Ignition and temperature standardization.
- Principles of calcination and general methods of preparation of following calx :
Faulad, Hartal, Shangraf, Sadaf, Marjan, Qalayee, Gaudanti, Qarnulayyil, Sammulfar, Nuqra, Tila, Jast.
- Evaluation of classical methods of preparation of Kushta and need of modification.
- SOPs for calcination.
- Methods of Identification of kushta :
 - a) Classical methods
 - b) Recent techniques useful in identification and Analysis of Kushta
- Actions and therapeutic uses of different kushtajat.
- Instruments used in the preparation of Kushta.: Classical and modern instruments

- Determination of Shelf life of a Kushta.

Practicals:

Training in processes mentioned in theory

PAPER III

General and Experimental Pharmacology

General Pharmacology and its various branches: Pharmacokinetics, Pharmacodynamics, Pharmacotherapeutics, Toxicology, Clinical pharmacology, Pharmaceutics, Posology.

- **Routes of Administration of Drugs**
- **Pharmacokinetics:** Absorption, Distribution of drugs, Metabolism and Excretion of drugs, Bioavailability and half life of drugs, Dose response curve, LD₅₀, ED₅₀
- **Pharmacodynamics:** Receptor theory of drug action, Receptor Families, Receptor – ligand Binding, Factors modifying drug actions
- **Pharmacovigilance:** Drug interactions, Adverse Drug Reaction, Reporting and monitoring of ADR.
- **Principles of Toxicology.**

Experimental Pharmacology:

Common laboratory animals, characteristics and experimental uses

Factors affecting drug response

Drug administration (Oral and IV) and withdrawal of blood samples

Dose conversion factors

Vehicles for animal administration

Isolated tissue preparations.

Methods of rendering the animals unconscious, and anaesthetics used.

Physiological salt solutions

Standard drugs and chemicals

Bio assay: Scope, Principles, Designing, Types.

Drugs Screening: Low & High throughput screening.

Low throughput (Simple Blind Programmed Screening)

High put Screening

Toxicity Studies: Acute, Sub acute, Chronic studies.

Neuro-pharmacological Studies: Irwin's profile, Smith's profile.

Anticonvulsant activity

Analgesic, Antipyretic, Anti-inflammatory, and Anti-ulcer activities

Hepatoprotective, Nephroprotective Activities

Hypoglycemic and Hypolipidemic Activities

Action of drugs on cardiovascular system

Practicals

In-vivo Experiments

- To study the general pharmacology and gross behaviour in mice/ rats.
- To study the effects of pentobarbital Induced hypnosis in mice.
- To study the effects of chlorpromazine on the locomotor activity using photoactometer in rats.
- To study the analgesic activity of morphine using tail flick method by analgesiometer in mice.

- To study the analgesic activity of morphine using hot plate method in mice.
- To study the analgesic activity of aspirin using acetic acid induced writhing test in rats.
- To study the anti-inflammatory activity of aspirin / indomethacin against carrageenin induced paw edema in mice.
- To study the anticonvulsant activity of phenytoin using convulsimeter in rats.
- To study the antisecretory and ulcer protective effect of H₂-Blockers in rats.

In-vitro Experiments (on isolated preparations)

- To record a concentration response curve (CRC) of acetylcholine using ileum preparation in rats.
- To record the effect of physostigmine (Eserine) on the CRC of acetylcholine using ileum preparation in rats.
- To record the blocking effect of atropine sulphate on the CRC of acetylcholine using ileum preparation in rats.

FINAL YEAR EXAMINATION

Paper I

Pharmaceutical Developments & its Applications in Saidla

- **Pharmaceutical Dosage Forms and their methods of preparations:**
 - **Oral Solid Dosage Forms:** Powder, Tablets, Capsules, Sustained release dosage forms, Suppositories and Pessaries.
 - **Oral Liquid Dosage Forms:** Solution, Suspension and Emulsion.
 - **Topical Semisolids:** Ointments, Pastes, Creams, Gels and Poultices
 - **Topical Liquids:** lotions, liniments, topical solutions, gargles, mouthwashes, ear drops and nasal preparations.
- **Principles of Pharmaceutical Processing, designing and application in Unani Pharmacy:**
 - Cutting, Milling and Mixing: Pulverizer, Grinders, Sieving shakers, Mixers, Impellor Mixer (for liquids), Ribbon Blender, Mixer (for solids), Triple rolling mills, Ball mill, Edge runner.
 - Incineration: Furnaces and ovens.
 - Drying of crude drugs and methods of drying: Type of Dryers (Oven, Spray dryer, Freeze dryer, Tray Dryer)
 - Granulation: Granulators
 - Tablet making machine
 - Pills making machine
 - Tablet Coating & Polishing machine
 - Capsule filling machine
 - Emulsions: Emulsifier, Homogenizer, Surfactants, emulsifying agents,
 - Ointment, pastes, gels and creams filling machine
 - Extracts and tinctures: various methods of Extraction.
 - Centrifugation: Centrifuge (Filter Centrifuge)
 - Pharmaceutical Aerosols: Various actuators and applicators.
 - Suppositories: Manufacturing and bases of suppositories.
 - Filtration: Different types of Filter equipments and Filter Aids
 - Evaporation and crystallization: Spray drying
 - Evaporation and Different types of Evaporators
- Humidifier and Dehumidifier

- Application of computer in pharmacy.
- Packaging material science.
- Lypholyser
- **Bases and Vehicles**
- **Permitted Pharmaceutical Excipients used in Unani and Modern Preparations:** Colorants, Preservatives, Flavoring Agents, Alternate Sweeteners, Surfactants and emulsifying agent.
- **Production Management.**
- **Factory and Pharmacy Act**

Practicals

- Practical classes will be conducted covering all the methods of preparation of dosage forms.
- Educational visits to atleast five GMP approved Unani pharmaceutical houses and R&D laboratories.

PAPER II

Cosmetology and Dietetics in Unani Medicine

Cosmetology:

- Applied anatomy and physiology of skin
- Relevant and regulatory provisions of Unani drugs in Drug and Cosmetic Act
- Concept of cosmetology in Unani Medicine
- Common skin diseases leading to cosmetic problems
- **Important products used as cosmetics in Unani medicine**
- Preparation used on face: Ghaza, Ghalia, Ubtana etc
- Preparation used on skin: Marham Cream, Lotion, Ubtana, Aabiyat, Zimad, Tila, Adhaan, Ghasool.
- Preparation used on hair: Khizab, Camouflage
- Preparation used in eye: Kohl, Kajal, Surma, Lamelle
- Preparation used on nails: Sibgha, Mehndi
- Preparation used on teeth, gums and oral cavity: Sunoon, Gargara (Gargle), Mazmaza Mouth wash)
- Atriyat (Perfumes and Deodorants)
- Preparation of cosmetic products using classical and recent techniques. Common diluents and excipients used in cosmetics.
- Diets and Drugs used to improve the beauty
- Side effects of Cosmetics

Dietetics:

- Concept of Ghiza in Unani Medicine
- Concept of Nutraceuticals in Unani, Pharma food, Probiotics, Phytochemicals, Anti - oxidants
- Clinical dietetics
- Ghiza that cause specific disorders in the body
- Ghiza that are useful in different diseases conditions
- Ghiza useful for people of different age and different temperament
- Ghiza and life style Diseases
- Malnutrition and special diets prescribed in Unani Medicine
- Preparation and standard of special diets.

Mausshaer, Maullahm, Maurraib, Maul Asl, Maul Usool, Maul Fawakeh, Maul buqool, Maul Jubn, Paneer Maya, Jullab, Sikanjabeen, Abkama, Fuqqa, Nabeez, Asfeedaj, Sikbaj, Masoos, Tareena, Qalya, Khamr

Practicals

- Practical training of the processes mentioned in the Theory.

Paper III

Ilm Wasful Aqaqeer (Pharmacognosy of Unani Drugs)

- **Introduction to Pharmacognosy and Plant Nomenclature.**
- **Classification of Plant Kingdom.**
- **Factors affecting the quality of drugs.**
- **Collection, drying and storage of drugs.**
- **Deterioration of stored drugs.**
- **Identification of crude drugs**
Morphology of Root, leaf, stem, fruit, seeds, flowers and its types.
Anatomical Studies: Microtomy, Powder study,
Quantitative Microscopy: Stomatal number, Stomatal index, Pallisade ratio, Vein islet no.
- **Alkaloids and alkaloid containing drugs:** Kuchla, Ergot, Suranjan, Afyoon , Afsanteen, Asrol
- **Glycosides and glycoside containing drugs:** Revand, Senna, Sibr, Squill, Digitalis
- **Volatile oil & Resin containing drugs:** Ustokhuddus , Eucalyptus, Zeera, Darchini Anisoon
- **Fixed oil, fats and waxes.**
- **Fixed oil containing drugs:** Badam, Zaitoon, Kunjad , Baidinjeer, Katan.
- **Tannin containing drugs:** Halela, Balela, Ashok chhal, Katha, Sandal Surkh, Arjun chhal
- **Phenols and Phenolic Glycosides containing drugs:** Kamela, Badranjboya, Bedmushk, Revand Chini, Senna, Ghekwar.
- **Gums and Resins containing drugs:** Kateera, Babool, Chuniya gond, Sanobar, Heeng, Kundur, Mastagi, Murrh.
- **Saponins containing drugs:** Hulba, Qust, Aslussoos, Brahmi, Asgandh.
- **Charecteristic features of medicinally important plant families:**
Solanaecae, Apocynaceae, Papaveraceae, Liliaceae, Leguminosae, Umbellifercae
Malvaceae, Euphorbiaceae, Compositae, Asclepiadaceae

Practicals

- Organoleptic identification of ten medicinal plants
- Morphological identification of any five families mentioned in the theory.
- Anatomical characteristics and dissection of root and stem of two medicinal plants
- Floral formula and floral diagram of five medicinal plants

Paper IV

Quality Control and Quality Assurance of Unani Drugs

Aims and Objectives of Standardization

Standardization of Herbal, Mineral, and Animal origin drugs:

- (a) Physical standardization
- (b) Chemical standardization

Analytical methods in drug analysis:

- Sublimation.
- Distillation.
- Methods of separation and isolation.
- Chromatography: Aims and objectives and various types of Chromatography
Thin layer chromatography, Paper Chromatography, Column Chromatography, Gas Chromatography, HPLC and HPTLC
- General description of electrophoresis.
- Spectroscopy: UV and flame photometry, Atomic Absorption Spectroscopy.
- **Quality Assurance of single drugs of Unani Medicine:** Adulteration of drugs, Factors affecting quality of drugs, Aflatoxin contamination, Microbial contamination.
- Determination of pesticides and Heavy metals.
- **Quality Assurance of compound formulations:** Arq, Majoon, Safoof, Qurs, Kushta and other dosage forms:
- Chemical analysis, Particle size Distribution, Powder XRD studies, Infra red Studies, Thermal Analysis, pH measurement, Carbon Analysis of Kushtajat.
- Detailed knowledge of Standard operating Procedures (SOPs).
- Standardization of Raw materials, Finished Product standardization and storage.
- Stability studies, Shelf life, GLP.
- Weight variation of tablets/ pills, Hardness testing, disintegration test, dissolution rate study.
- Viscosity/ Rheological studies of liquid formulations.

Practicals

Practical demonstration:

- Determination of Ash values
 - Determination of moisture content.
 - Determination of extractive values.
 - Determination of Disintegration time
 - Determination of Refractive index.
 - Determination of Rf value by TLC.
 - Determination of viscosity.
 - Friability test.
 - Bulk Density
 - Swelling Index
 - Determination of Essential Oil.
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Recommended Readings:

Research Methodology and Biostatistics

1. Analytical chemistry, Christian Mc Graw Hill Publication, 2004.
2. Basic and clinical Biostatistics, Dawson & Trep, 1994.
3. CPCSEA Guidelines, www.cpcsea.org, 2001.
4. Ethical guidelines for biomedical research in human subjects, ICMR, New Delhi, 2000.
5. Fundamentals of experimental pharmacology, M.N.Gosh, Scientific book Agency, 1994.
6. Medical ethics and introduction to Biostatistics, II Edition, C.M.Francis, Jay pee Brothers, 2004, New Delhi.
7. Methods of bio statistics, R.T.Bhaskar, Paras Publishing Company, 2004.
8. Practical approach to P.G.Dissertation, I Edition, B.A Geetanjali, R Ravindran and Jay pee Brothers New Delhi, 1997.
9. Research Design, Mc Guigain, Mc Graw Hill Publication, 1980.
10. Research methodology, A.K. Kothari, New Age Publishers Delhi, 2003.
11. Research methodology and Bio-statistics in Pharmacology, M.Aslam & S. Singh, Academic publication Nai sarak, New Delhi, 2005.
12. Screening Methods of Pharmacology, R.Turner, 1965.
13. Standardization of herbal drugs, S.H. Afaq, Publication Div. AMU, Aligarh.

Qawanine Dawasazi wa Ilmul Taklees (Principles of Pharmacy and Calcinology)

1. Bayaze Kabeer, Vol. I – III, Md. Kabeeruddin, Daftarul Maseeh Hyderabad, 1960, 66, 67.
2. Pharmacographica Indica, H. Siad, Hamdard Foundation Karachi, 1991.
3. Pharmacopoeia of India, Ministry of Health, New Delhi, 1983.
4. Qarabadeen Azam (Urdu), Azam Khan, Asmat Ali, Hasrat Lucknawi, Aijaz Publishing House, New Delhi, 1996.
5. Qarabadeen Kabeer (Urdu), Vol. I, Mir Md. Husain, Munshi Naval Kishore, Lucknow, 1892 AD.
6. Qarabadeen Qadri, Md. Akbar Arzani, Munshi Naval Kishore Lucknow, 1880 AD.
7. The Pharmaceutical Codex, 12th Edition, Walter Lund London, The Pharmaceutical Press 1994.
8. Bibliography of Pharmacognosy of Medicinal plants, R.Mitra, EBIS, Lucknow.
9. Chemistry of Medicinal plants, CRUM, New Delhi.
10. Flora of British India, D.Hooker, J, BSM Dehradun.
11. Fune Dawasazi, S.Z.Rehman, Publication Div. AMU.
12. Glimpses of Indian Medicinal Plants, Drug development research, R.B. Arora, IHHMMR, New Delhi.
13. Kitabul Taklees, Kabiruddin, Matab Masihi, Delhi.
14. Kushta ki Pehli kitab, M.Abdullah, Hamdard, Delhi.

15. Makhzanul Advia, M.Hasan, Matba Munshi Nawal Kishore, Lucknow.
16. Makhzanul Jawahar, G.Jeelani, Refah-Aam Press, Lahore.
17. Minhajul Saidla, Rafiquddin, Publication Div. AMU, Aligarh.
18. Pharmacognosy, Phytochemistry, Pharmacology and clinical studies of Unani medicinal plants, S.H. Afaq, Publication Div. AMU, Aligarh.
19. Physico-chemical standardization of Unani Medicine, CCRUM, New Delhi.
20. Qavaneene Advia , Ayyub Ali, Publication Div AMU, Aligarh.
21. Research & Development of Indigenous drugs, P.C. Dandiya, IHHMMR, New Delhi.
22. Research in Ilmu Advia, S.Z. Rehman, Publication Div. AMU, Aligarh.
23. Standardization of single Unani medicine, Part I – III, CCRUM, New Delhi.
24. Misbahul Advia, Kulliyate Advia, Hkm Abdus Samad Khan, Aijaz Publishing House, New Delhi.

Ilm Wasful Aqaqeer (Pharmacognosy of Unani Drugs)

1. Bibliography of Pharmacognosy of Medicinal plants; R.Mitra; EBIS, Lucknow.
2. Instrumental method of analysis; W.H.Hobart; CBS, New Delhi.
3. Modern method of plant analysis; Peach & Tracey; Spriger Verlag Berlin, Gottengen Heidelberg; 1955.
4. Pharmacognosy; V.E Tyler, L.R.Brady, J.E.Robber; Pharmacognosy Lae Faibiger, Philadelphia; 1976.
5. Plant Micro technique; D.A. Johnson; Tata Mc Graw Hill Book Company, New York, 1940.
6. Plant Micro technique; J.D.Alexeder; Tata Mc Graw Hill Book Company.
7. Text book of pharmacognosy; 5th Edition; T.E.Wallis; J& A Churchill Ltd, London; 1967.
8. Trease and Evans pharmacognosy; 15th Edition; William Charles Evans; Saunders An imprint of Elsevier Science; 2002.

Cosmetology and Dietetics in Unani Medicine

1. Maat Masihi: Abu Sahal Masihi.
2. Al Qanoon Fit Tib (5th Volume): Avicenna.
3. Basic Nutrition and Diet Therapy, 10th edition , S R Williams, Mosby publishing House
4. Clinical Dietetics and Nutrition, F.P Anita, P Abraham , Oxford Press
5. Nutrition and Health, Topics and Controversies, F Bronner , CRC Press
6. Dietary guidelines for Indians, A Manual, National Institute of nutrition, Hyderabad
7. Nutrition for Mother & Child, National Institute of nutrition, Hyderabad
8. Diet and Heart disease, National Institute of nutrition, Hyderabad
9. Nutrient requirements and Dietary allowances for Indians, Indian Council of Medical research
10. Some Therapeutic Diets, National Institute of nutrition
11. Nutrition and Child Development, K E Elizabeth, Paras Publishing

12. Nutritive values of Indian Foods, Gopalan, Shastri , National Institute of nutrition 1996
13. National Disorder and Community Health, P Gupta, R Thakkar, Saunders An imprint of Elsevier Science 2002.
14. Poucher's; Perfumes, cosmetics and soaps; W. A. Poucher; vol - 1, 2, 3; 9th edition.
15. Small scale manufacturer of soaps and detergents; D.N. Mathur.
16. Clinical safety and efficacy testing of cosmetics; by William C. Waggoner.
17. Cosmetic science and technology series; Eric Jungerman; vol-1-8.
18. Chemistry and technology of the cosmetics and toiletries industries; D.F. William and W.H. Schmitt.
19. Modern Cosmetics; E.G. Thomssen.
20. Harry's Cosmetology; J.B. Willinkinson; 7th edition.
21. Handbook of Synthetic and Herbal Cosmetics; Ankur, Engineer India Research Institute.

Pharmaceutical Sciences and its Application in Saidla

1. Minhajuddukkan wa Dasturul Ayan Fit tib: Abu Nasar Attar Israeli.
2. Kitabul Hawi (22 & 23 Volume): Al Razi.
3. The Pharmaceutical Codex, Principles and practice of pharmaceutics; XIIth; The Pharmaceutical Press; 1994.
4. Pharmaceutical Practice; IIIrd; Winfield, Richards.
5. Remington (The Science and Practice of Pharmacy); 21st; Beringer, Gupta, Hoover; Lippincot, William and Wilkins; 2005.
6. Analytical Chemistry; VIth; Christian; WSE.
7. Vogel, Drug Discovery and Evaluation; IInd.
8. Theory and Practice of Industrial Pharmacy; IIIrd; Lachman, Lieberman, Kanig; Varghese Publishing House.
9. Trease and Evans pharmacognosy; 15th Edition; William Charles Evans; Saunders An imprint of Elsevier Science; 2002.
10. Modern Pharmaceutics, Basic Principles and Systems , 1 & 2, Alexender T. Florence, Juergen Siepmann
11. Martin's Physical Pharmacy & Pharmaceutical Sciences, Vth, Patrick J. Sinco
12. Pharmaceutical Product Development, In Vitro and In Vivo Corelation, Dakshina Murthy Chilukri
13. Pharmaceutical dosage Forms: Tablets, Vol 1,2,3, Larry L. Augsberger, Stephen W. Hoag.

General and Experimental Pharmacology

1. Clinical Pharmacology; 9th Edition; P.N. Bennett, M.J Brown; Elsevier, division of Reed Elsevier, India Pvt. Ltd; 2003.
2. CRC Desk reference of clinical pharmacology; M.Ebadi; CRC Desk Reference series editor, Gerald Kerkut; 1998.

3. Drug discovery and evolution pharmacological assays; W.H.Vogel; Spriger Verlag Publication.
4. Essentials of Medical pharmacology; 5th Edition; K.D.-Tripathi; Jay pee Brothers New Delhi; 2003.
5. Fundamentals of experimental pharmacology; M.N.Gosh; Scientific book Agency; 1994.
6. Good man and Gilman's the pharmacological basis of therapeutics; 10th Edition; J.G.Hardman, L.E.Limbird; Mc Graw Hill –Medical publishing division; 2001.
7. Guidelines on animal use; ICMR, New Delhi; 2001.
8. Melmon & Morrrelli's Clinical pharmacology; 4th Edition; S.G. Carruthers , B.B.Hoffman , K.L Melmon , D.W. Nierenberg; Mc Graw Hill –International edition health care professions series; 2003.
9. Research methodology and bio-statistics in pharmacology; M.Asam & S .Singh; Academic publication, Nai sarak, New Delhi; 2005.
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