

**DETAILED SYLLABUS
OF
MSc Pharma Chemistry**

Semester-I
MPC-111

QUANTITATIVE ANALYTICAL METHODS

Unit-I

General: Computation of analytical results, significant figures, concept of error, precision and accuracy, standard deviation, rejection of doubtful values with special reference to volumetric and gravimetric analysis, calibration of analytical equipments.

Fundamental of volumetric analysis: Methods of expressing concentrations, primary and secondary standards.

Unit-II

Neutralization reactions: Theory of indicators and neutralization indicators.

Oxidation-reduction titration: Principle of oxidation reduction filtrations, redox indicators & their use in pharmaceutical analysis.

Unit-III

Precipitation titration: Theory of precipitation titrations and use of adsorption indicators.

Gravimetric analysis: Method of gravimetric analysis

Unit-IV

Complexometric titrations: Complexometric methods using EDTA, principle of complexometric titrations, chelating agents, indicators, titrations with disodium edetate.

Unit-V

Nonaqueous titrations: General discussion and principle of titrations in non-aqueous media, aprotic, protophilic, protogenic and amphiprotic solvents. Titrations with perchloric acid, potassium methoxide and tetrabutyl ammonium hydroxide.

Ionic equations, numerical problems based on above topics

BOOK RECOMMENDED

1. A. H. Becket and J. B. Stenlake, Practical Pharmaceutical Chemistry, Part I, 4th ed., CBS Publishers & Distributors, New Delhi, 1997.
2. G.H. Jeffery, J. Bassett, J. Mendham and R.C. Denney Vogel's Text Book of Quantitative Chemical Analysis 5th ed., ELBS, U.K., 1989.
3. A. Keneth & A. Connors, A Text Book of Pharmaceutical Analysis, 3rd ed., Wiley Interscience Singapore, 1982.

Semester-I
MPC-112

BIOCHEMISTRY

Unit-I

Enzyme, enzyme kinetics, enzyme action, biological oxidation & reduction.

Unit-II

Energy metabolism, bioenergetics, Introduction to Intermediary metabolism and carbohydrate metabolism.

Unit-III

Protein & nucleic acid metabolism, lipid, water and mineral metabolism.

Unit-IV

Biosynthesis of protein, transmission & expression of genetic information, DNA genetic role, Structure replication of m-RNA, transcription, gene protein relationship and control of gene.

Unit-V

Immunoglobulins, structure classification, and their biological role. Vitamins, skeleton structure and their biological role.

BOOKS RECOMMENDED

1. Robert K. Murray, Daryl K. Granner, Peter A. Mayes, Victor W. Rodwell, Harper's Biochemistry, 25th ed. McGraw Hill health Professions Division, New York, USA, 1998.
2. A.V.S.S. Rama Rao, Text Book of Biochemistry, 6th ed., L. K. & S. Publishers, Visakhapatnam, 1991.
3. Melson David L. Lehninger Principles of Biochemistry, 3rd ed. Macmillan worth Publishers, N. Y. USA, 2001.
4. Stryer Lubert, Berg Jeremy M., Tymoczko Johan L, Biochemistry, 5th ed. W. H. Freeman & Company New York, 2002
5. M. C. Pant, Essentials of Biochemistry, 8th ed., Kedar nath Ram Nath & Co. Publishers, Meerut, 1996.
6. E. David Metzler, Carol M. Metzler, David J. Sauke, Biochemistry the chemical reactions of living cells, 2nd ed., Har court/Academic Press, New York.

Semester-I
MPC 113

ADVANCE ORGANIC CHEMISTRY

Unit-I

Optical isomerism, configuration, Cahn-Ingold-Prelog rule for designation of configuration. Stereochemistry of carbon compounds with no chiral atom, Biphenyls, Allenes, Alkylidenecycloalkanes, spirans and Geometrical isomerism.

Unit-II

Stereoisomerism of rings, stability of rings, ease of ring formation, Actual shape of six membered rings & its relation to properties & reactivity and Conformational analysis of Butane.

Unit-III

Carbocation, Carbanions, free radicals, formation and stability. Mechanism of reaction & methods of determining them. Mechanism involving aliphatic nucleophilic and electrophilic substitution reactions.

Unit-IV

Mechanisms involving Aromatic electrophilic and aromatic nucleophilic substitution reactions, free radical reactions. Addition to carbon-carbon multiple bonds & elimination reactions.

Unit-V

Study of Name Reactions such as: Fries Rearrangement Beckmann rearrangement, Hofmann rearrangement, Curtius reaction, Schmidt Reaction, Claisen's Condensation, Wittig Reaction, Oppenauer oxidation, Meerwein Ponderoff Valery Reduction, Birch Reduction, Clemmensen reduction, Reimer-Tiemann Reaction, Wolf Kishner's Reduction, , Pinacol-Pinacolone Rearrangement and Aldol Condensation,

BOOKS RECOMMENDED:

1. E.L. Eliel Stereochemistry of carbon compounds, Tata McGra Hill Publishing Company New Delhi 1975.
2. Jerry March, Advance organic Chemistry 4th ed.. A Wiley-Interscience Publication, 1999.

Semester-I MPC-114

BASIC PHARMACOLOGY

Unit-I

History of development of Pharmacology, introduction & general principles of route of drug administration, pharmacokinetics (absorption, distribution, metabolism & excretion) a pharmacodynamics (general mechanism of drug action).

Unit-II

Elementary introduction to adverse drug reactions & drug interactions, Drug allergy.

Unit-III

Toxicity

General concepts of toxicity, Acute, subacute & chronic toxicity tests, teratogenicity & carcinogenicity, itrogenic diseases, LD₅₀, ED₅₀, tolerance, habituation & addiction.

Unit-IV

Bio-assays: General principles, general methods, biological variations & animal ethics. Bioassays of insulin, heparin, d-tubocurarin, digitalis, acetylcholine, adrenaline, histamine.

Unit-V

General principles of screening of drugs, general screening methods, clinical trial. Screening methods for evaluation of anti-inflammatory, analgesics, antipyretics & antiulcer, anticonvulsants, hepatoprotective, antidiabetic, diuretic and drugs acting on CNS.

BOOKS RECOMMENDED

1. Goodman & Gillman, The Pharmacological Basis of Therapeutics 9th ed., McGraw Hill Companies, New York, USA, 1996.
2. Katzung G. Bertram, Basic and Clinical Pharmacology, 8th ed., McGraw Hill Companies, New York, USA, 2001.
3. Rang H.P., Dale M.M., Ritter J.M., Pharmacology, 4th ed., Churchill livingstone, N. Y., 1999.
4. R.S. Satoshkar, Pharmacology and Pharmacotherapeutics, vol. I & II: 16th ed., Mumbai Popular Prakashan, 1999.
5. Munson L. Paul, Principles of Pharmacology, Chapman & Hill, N. Y. 1995.
6. S. K. Kulkarni & P.C. Dandiya, Introduction to Pharmacology, 5th ed. Vallabh Prakasha, 1998.

7. Laurence & Bennett, Clinical Pharmacology, 8th ed., Churchill Livingstone, N. Y. 1997.
8. S. D. Seth, Text Book of Pharmacology, 2nd ed. Churchill Livingstone Pvt. Ltd., New Delhi.
9. F.S.K. Barar, Essential of Pharmacotherapeutics, 3rd ed. S. Chand and Company Ltd., New Delhi, 1995.
10. K.D. Tripathi, Essentials of Medical Pharmacology, 9th ed., Jaypee Brothers New Delhi, 1995.

Semester-I

Practical

MPC 111P

Practical based on theory

MPC-114P

- A. Synthesis of organic compounds involving 2 or more steps.
- B. Detection and identification of organic compound mixture.

Semester-II

MPC-121

MODERN ANALYTICAL TECHNIQUES -1

Unit-I

Chromatography: Principles Instrumentation, Application of adsorption, partition, paper, thin layer, HPTLC, HPLC, Gel Electrophoresis, GLC Gas and, Ionexchange Chromatography.

Unit-II

Colorimetry: theory, methods of colour measurements and instrumentation.

Unit-III

Optical rotation, its significance, instrumentation.

Optical rotatory dispersion-terminology, plain curve, rotatory dispersion & circular dichroism and octane rule.

Unit-IV

Atomic absorption and flame emission spectroscopy, theory, instrumentation, atomic absorption spectrophotometers and structure determinations.

Unit-V

UV & infrared spectroscopy: Principle, techniques, instrumentation & application including interpretation of data.

BOOKS RECOMMENDED

1. Robert M. Silverstein, Francis X. Webster, Spectrometric identification of organic compounds, 6th ed. John Wiley and Sons-Inc 1998.
2. Comin N. Banwell, Elian M. McCash, Fundamentals of molecular spectroscopy 4th ed. Tata McGraw -Hill Publishing Company Limited New Delhi, 1995.
3. A.H. Becket and J.B. Stenlake, Practical Pharmaceutical Chemistry, part- II, 4th ed., CBS Publishers & Distributors, New Delhi, 1997.
4. W. Kemp, Organic Spectroscopy, 1st ed. ELBS/Macmillan, London, 1975.

UNIT-I

Preformulation studies: Factors affecting dissolution, diffusion – pH, pka, $K_{O/W}$, particle size, solubility etc. Methods to increase solubility of poorly soluble drugs, drug release mechanisms. Factors affecting/necessating preformulation of Drug.

Micromeritics: Introduction, pharmaceutical importance, particle size distribution, surface area and particle volume, derived properties of powder, flow properties of powder, angle of repose, factors affecting flow of powders. Different methods of particle size determination.

UNIT-II

Surface and interfacial tension: Measurement of surface and interfacial tension, spreading coefficient, general classification of surfactants, hydrophilic- lipophilic balance. Solubilization, factors affecting solubilization, micelle formation, factors affecting micelle formation, determination of critical micelle Concentration, detergency and wetting agents. Contact angle, flocculating agents, de-flocculating agents, foaming and antifoaming agents. Pharmaceutical applications of surfactants.

UNIT-III

Colloids: Pharmaceutical application of colloids, brief introduction to properties of colloids.

Coarse dispersions: Physical stability of suspension and emulsions, types of suspension, controlled flocculation-flocculated suspension, types of emulsion, theories of emulsification, emulsifying agents- mechanism of action, factors to improve physical stability of emulsions..

UNIT-IV

Rheology: Fundamentals of rheology, types of flow, thixotropy, thixotropy in formulations, rheology of disperse system, Pharmaceutical applications of rheology. Types of viscometers.

Chemical kinetics: Influence of temperature, light, oxygen acid base catalyst and methods to prevent drug degradation. Prediction of stability, accelerated stability studies.

UNIT-V

Disintegration: Disintegration, Disintegration time, factors affecting disintegration

Dissolution: Dissolution, dissolution models, factors affecting dissolution rate, co-relation of dissolution with bioavailability.

BOOKS RECOMMENDED

1. Remington's Pharmaceutical Sciences-Gennaro A.R., ed., 19th Edition, Mack Publishing co., Easton, PA. 1995.
2. Martin's Physical Pharmacy and Pharmaceutical Sciences, 5th edition by Patrick Sinko, 2006.
3. C. V. S. Subrahmanyam, A text book of physical pharmaceutics, 2nd ed, Vallabh prakashan
4. Leon Lachman, Herbert A, Lieberman, Joseph L. Kanig; The Theory & Practice of Industrial Pharmacy; 3rd ed . 1987

Semester-II
MPC-123

CHEMISTRY OF NATURAL PRODUCTS

Unit-I

Heterocyclic Compounds: Five membered heterocycles: Furan, Thiophene, pyrrole, thiazole, pyrazole, oxazole, imidazole, Six membered hydrocycles: Pyridine, pyrimidine.

Benzfused heterocycles: Quinoline, isoquinoline and indole.

Unit-II

Carbohydrate: Introduction, mutarotation, ring structure of glucose, configuration of monosaccharides, structure elucidation of disaccharides, sucrose and maltose. Polysaccharides, starch. Glycosides: general structural elucidation of glycoside including cardiac glycosides.

Unit-III

Alkaloids: General introduction, distribution in plants, isolation & purification. General methods of structure determination. Structural elucidation of atropine, quinine and Nicotine. Structural features of morphine and Caffeine.

Unit-IV

Terpenoids: General introduction, isolation, purification and structure elucidation of citral, menthol, camphor.

Unit-V

Steroids: General introduction and structure elucidation of sterols with special reference to cholesterol.

BOOKS RECOMMENDED

1. I.L. Finar, Organic chemistry, Vol. II, 1st Indian ed., Pearson Education Pte Ltd Indian Branch, Delhi, 2002.
2. O.P. Agarwal, Chemistry of Natural Products, Vol. I & II, 7th ed., Goel Publishing House, Meerut, 1983.

Unit I

Introduction and scope of Biostatistics

Presentation of data: classification of data, Methods of collection of data (primary and secondary), frequency distribution, graphical representation of data by histogram, frequency polygon, frequency curve and cumulative frequency curve.

Central tendency and measures of dispersion, mean, median, mode and their properties, partition value, standard deviation and coefficient of variation, simple correlation coefficient and regression coefficient, regression lines, tests of significance: t-test, z-test, chi-square tests, F-test, heterogeneity and independence of attributes.

Unit II

Testing of hypothesis

Types of errors, power of test, test of significance based on normal distribution T-test for mean of population, difference of means of two normal population, chi-square test of goodness of fit, independent test, test of variance of normal population F-test for variance ration, correlation and regression, latest square methods and its application, significance of coefficient of correlation, rank correlation curve fitting and sign test.

Unit III

Computer fundamentals

Sample model of computer and its working, input-output devices, computer languages and their hierarchy (low level and high level), Introduction to microcomputers, concept of operating system, computer networking, Introduction of software (MS-Word, MS-Excel & Power point etc.)

Unit IV

Introduction of C++ Programming

Difference between C and C++, concept of OOP'S, basic data types and operators, sample programs, conditional statements(IF-ELSE ,NESTED IF),concept of looping(for, while and do-while),Introduction to subscripted variables(single and double), classes and objects, function & function overloading, constructor and destructor, pointers.

UNIT V

Internet and its working, Uniform resource locator (URL), World wide web, HTTP, Internet explorer.

Role of computers in pharmaceutical sciences.

Books Recommended:

1. Information technology-D.P.Curtin, Tata McGraw Hill,New Delhi.
2. Guide to Medical Informatics, The Internet & Telemedicine-E Coiera, Amold Publishers, USA.
3. Biostatistics-Arora & Malhan, Himalaya Publishing House, Bombay.
4. Statistical Methods in Biology-Baidy, Cambridge University press.
5. P. K. Sinha, B.P.B Publication New Delhi.

Semester-II

H-121P LABORATORY I

Experiments based on the theory H-121P

H-123P LABORATORY II

Laboratory II shall constitute of the following:

- A. Natural Products-Isolation and identification of compounds.
- B. Phytochemical test for Carbohydrate, Alkaloids, Steroids, Terpenoids, Amino acids, Phenolics, Proteins.

Semester-II

MPC-131

MODERN ANALYTICAL TECHNIQUES -II

UNIT-I

Molecular Emission Spectroscopy: Principle, molecule exhibiting fluorescence, Factors interfering with fluorescence intensity and Application, Raman Spectroscopy-Principle, Instrumentation and Application

Unit-II

Mass Spectroscopy: Principle, techniques, instrumentation, fragmentation pattern & structural elucidation of compounds. GC-MS and LC-MS Principle and Application.

Unit-III

Proton Magnetic Resonance, Principle, techniques, instrumentation, ^1H NMR signals, chemical shift, spin-spin coupling, shielding deshielding effect, diamagnetic anisotropy, geminal coupling, AMX, ABX, ABC system, shift reagents & interpretation of spectra. ^{13}C -NMR, introduction and interpretation of data.

Unit-IV

Application of spectroscopic techniques to structural elucidation, introduction aids to spectral interpretation exercises.

Unit-V

Microbiology assays, Principles of microbiological assays, assays of vitamins & antibiotics.

BOOKS RECOMMENDED

1. Robert M. Silverstein, Francis X. Webster, Spectrometric identification of organic compounds, 6th ed. John Wiley and Sons-Inc 1998.
2. Comin N. Banwell, Elian M. McCash, Fundamentals of molecular spectroscopy 4th ed. Tata McGraw -Hill Publishing Company Limited New Delhi, 1995.
3. A.H. Becket and J.B. Stenlake, Practical Pharmaceutical Chemistry, part- II, 4th ed., CBS Publishers & Distributors, New Delhi, 1997.
4. W. Kemp, Organic Spectroscopy, 1st ed. ELBS/Macmillan, London, 1975.

Semester-111
MPC-133

DRUG DELIVERY SYSTEM & BIOPHARMACEUTICS

Unit-I

Types, advantages, disadvantages & formulation and evaluation/quality control of oral dosage forms including:

- a) Liquid dosage forms like solution, syrups, suspension & emulsion.
- b) Solid dosage forms like tablets, capsules etc.
- c) Semisolid dosage like ointment, cream, gels.

Unit-II

Parenteral drug delivery system: Preparation, Evaluation and quality control. A brief introduction to new approach such as liposomes, neosomes, nanoparticles, Resealed erythrocytes as novel parenteral drug delivery.

Unit-III

Controlled release drug delivery system.

Advantages, drug properties relevant of controlled release formulation.

Oral dosage form: diffusion system, dissolution system, osmotic pump ion exchange resin & prodrug.

Parenteral dosage form: Intramuscular injection & implants.

Unit-IV

Drug absorption: factors affecting drug absorption including physicochemical, biological and pharmaceutical. Passive and active diffusion.

Unit-V

Drug disposition: Distribution in blood, plasma protein binding, cellular distribution, drug excretion, biotransformation of drugs.

Bioavailability: Concept of bioavailability & comparative bioavailability, methods of estimation of bioavailability, bioequivalence studies.

BOOKS RECOMMENDED

1. Remington's Pharmaceutical Sciences-Gennaro A.R., ed., 19th Edition, Mack Publishing co., Easton, PA. 1995.
2. Leon Lachman, Herbert A, Lieberman, Joseph L. Kanig; The Theory & Practice of Industrial Pharmacy; 3rd ed . 1987
3. B. M. Mithal, A text book of pharmaceutical formulation, 6th edition, Vallabh prakashan
4. Fundamentals of Clinical Pharmacokinetics-Wagner, J.C., Drug Intelligence Publication, M. Hamilton, 1975.
5. Clinical Pharmacokinetics-Rowland, M, & Tozer, N., 2nd edition, Lea & Febiger, Philadelphia, 1989.
6. Pharmacokinetics-Gibaldi M. & Perrier, D., 2nd ed., Marcel Dekker, New York, 1982.
7. Biopharmaceutics and Pharmacokinetics- Notrari, R.E., 2nd ed., marcel Dekker, New York, 1975.
8. Biopharmaceutics and Pharmacokinetics: Bramhankar & Jaiswal.

Semester-III
MPC-132

Medical Chemistry I (Chemotherapeutic Agents)

Chemical Classifications, SAR Studies, Mode of actions and Therapeutic uses.

Unit-I

Beta lactam antibiotics: Penicillins, Cephalosprins including their semi-synthetic products. Monobactams.

Unit-II

Tetracyclines, Semi-synthetic tetracyclines, Gentamycins, Neomycins, Kanamycins, Fluoroquinolones type of antibacterials.

Unit-III

Sulfonamides, Antileprotics, Antimycobacterials, Antifungals.

Unit-IV

Antiprotozoal includes – Antimalarials, Antiamoebics, Antihelminths.

Unit-V

Anticancer, Antivirals and Synthesis of following drugs involving not more than three steps.

5- Fluorouracil, 6 -Mercaptopurine, Amoxycillin, Ampicillin, Benzathine, Benzidiazole, Busulfan, Cefrozil, Cepirone, Chloroquine, Ciprofloxacin, Clotrimazole, Cyclophosphamide, Dapsone, Deoxycycline, Diloxamide., Ethionamide, Fucytocine, Hydroxy urea, Idoxuridine, Isoniazid, Ketoconazole, Loracarbef, Mafenide Acetate, Melphalan, Metronidazole, Pamaquine, Penicillins G, Piperazine Citrate, Proguanil, Pyrimethamine, Sulfadioxime, Sulfasalazine, Thiabendazole, Thiotepa, Trimethoprin.

BOOKS RECOMMENDED

1. William O. Foye, Principles of Medicinal Chemistry, 3rd ed., Varghese Publishing House, Mumbai, 1989.
2. Jaime N. Delgado & William A. Remers, Wilson and Gisvold's, Text Book of Organic Medicinal and Pharmaceutical Chemistry, 9th ed. J.B. Lippincott Company, Philadelphia, 1991.
3. Manfred E. Wolff, Burger's Medicinal Chemistry & Drug Discovery, 5th ed., Wiley Interscience, New York, 1995.
4. H. Singh and V.K. Kapoor, Medicinal and Pharmaceutical Chemistry, 1st ed., Vallabh Prakashan, Delhi, 1996.
5. Ashutosh Kar, Medicinal Chemistry, New Age International (P) Limited, New Delhi, 1993.

Semester – III

MPC – 134

Drug Design

Unit-I

- Specific and non-specific drug action
- Drug receptors
- Basic concept and classification of receptors
- Forces involved in drug receptors- interactions
- Receptor agonism and antagonism
- Concept of Spare receptors
- Simple kinetics of drug- receptor interaction
- Receptor theories: Clark's occupancy theory, Ariens-Stephenson modification, Induced fit and macromolecular perturbation theories
- Ion Channel receptors

Unit-II

Topographical study of the following receptors includes only preferred conformations, pharmacophores and modes of bindings/interactions

- Adrenergic
- Cholinergic
- Opioid receptors
- H-1 & H-2 receptors
- Diazepine
- Serotonin

Unit-III

- Concept of isosterism and bioisosterism and their applications in drug design
- Antimetabolite approach to drug design
- Analog drug design
- Prodrugs and drug latention
 - Carrier-linked prodrugs
 - Bioprecursors
 - Role of functional groups in prodrug design
- General pathways of drug metabolism and simple kinetics of drug metabolism
- Pharmacokinetic oriented drug design

Unit-IV

- Stereochemical aspects of drug action
 - Stereoselectivity of optical isomers
 - Role of planarity in drug action

- Stereoselectivity of conformational isomers
- QSAR including
 - Types of QSAR models
 - Classification of parameters utilized in QSAR studies
 - Statistical concept of QSAR
 - Hansch model of QSAR
 - De Novo model of QSAR
 - Hammett and Taft model of QSAR equations
 - Applications of QSAR in drug design

Unit-V

- Basics of combinatorial chemistry
- Rational approach to drug design
- Basic strategies of drug discovery
- Role of molecular docking/modeling in drug design, computer assisted drug design

Books Recommended:

1. William O. Foye, Principles of Medicinal Chemistry, 3rd ed., Varghese Publishing House, Mumbai, 1989.
2. Jaime N. Delgado & William A. Remers, Wilson and Gisvold's, Text Book of Organic Medicinal and Pharmaceutical Chemistry, 9th ed. J.B. Lippincott Company, Philadelphia, 1991.
3. Manfred E. Wolff, Burger's medicinal Chemistry and Drug Discovery, Vol. I to V, 5th ed., A Wiley-Interscience publication John Wiley & Sons, Inc. (New York), 1995.
4. Kadam & Mahadik, Bothara, Principles of Medicinal Chemistry vol. I & II, 4th ed. Nirali Prakash Pune, 1997

LABORATORY-I

MPC-131P ANALYSIS OF PHARMACEUTICALS

1. The laboratory shall constitute analysis of dosage form, typical pharmacopial assays, including disintegration time, dissolution rate, friability etc.

LABORATORY- II

MPC-132P SYNTHETIC MEDICINAL CHEMISTRY

1. Synthesis of Compounds using 3-4 steps,.
2. Structure confirmation by spectroscopic methods
3. Interpretation of UV, IR, ¹HNMR and Mass Spectroscopy of compounds.
- 4.

Medical Chemistry II (Pharmacodynamic Agents)

Chemical Classifications, SAR Studies, Mode of actions and Therapeutic uses of the following classes of drugs.

Unit-I

Drugs acting on CVS – Antianginals, Antihypertensives, Antilipidemics, Antiarrhythmics, Diuretics.

Unit-II

Analgesics – Narcotic and NSAIDs, Antipyretics, Uricosurics (Antigouts).

Unit-III

Drug acting on CNS – Hypnotic Sedative only, Barbiturates and halogenated drugs, Antiepileptics, General anaesthetics, Antiparkinsonian drugs

Unit-IV

Psychotherapeutics – Antipsychotics, Anxiolytic drugs, Antidepressants and Antidiabetics.

Unit-V

H - 1 – R blockers (Anti-histaminics), H – 2 – R blockers (Anti-ulcers), Carbohydrate based drugs, Oligonucleotides and Synthesis of following drug involving not more than three steps:

Acetazolamide, Amantidine HCl, Amyl nitrate, Amoxepine, Buspropion, Captopril, Carbamazepine, Cetrizine, Chlorocyclizine, Chlorpheniramine, Chlorpromazine, Chlorpropamide, Cimetidine, Clofibrate, Clonidine HCl, Desipramine, Diazepam, Diltiazem HCl, Diphenhydramine, Disopyramide, Enalapril maleate, Enthimate, Ethacrynic acid, Ethosuximide, Felodipine, Fentanyl citrate, Fluvastatin, Fluoxetine, Furasemide, Gemfibrozil, Glipizide, Guanethidin monosulphate, Hydrothiazide, Imipramine, Ibuprofen, Isosorbide dinitrate, Labetolol, Loratidine, Lorazepam, Lovastatin, Meperidine, Methadone, Methyldopate HCl, Nalorphine, Naloxone, Nitrazepam, Oxycodone, Phenoformin, Phenytoin, Polythiazide, Procainamide, Promazine, Propoxyphene napsylate, Propranolol, Pyrilamine maleate, Ranitidine, Salsalate, Sotalol, Sufindac, Tolbutamide, Triamterene, Triazolam, Trimeprazine, Thioridazine, Tripeleppamine maleate, Verapril.

BOOKS RECOMMENDED

1. William O. Foye, Principles of Medicinal Chemistry, 3rd ed., Varghese Publishing House, Mumbai, 1989.
2. Jaime N. Delgado & William A. Remers, Wilson and Gisvold's, Text Book of Organic Medicinal and Pharmaceutical Chemistry, 9th ed. J.B. Lippincott Company, Philadelphia, 1991.
3. Manfred E. Wolff, Burger's Medicinal Chemistry & Drug Discovery, 5th ed., Wiley Interscience, New York, 1995.
4. H. Singh and V.K. Kapoor, Medicinal and Pharmaceutical Chemistry, 1st ed., Vallabh Prakashan, Delhi, 1996.
5. Ashutosh Kar, Medicinal Chemistry, New Age International (P) Limited, New Delhi, 1993.