

## B.Pharm 8<sup>th</sup> Semester

1.8.1: Pharmaceutics- VIII (Dosage Design, Novel)  
Drug Delivery System, Cosmetology)

Theory

36 Hours.

### UNIT-I.

1. Pre formulation studies:- Physical Properties of Drugs, chemical properties of drugs, Bioavailability, Pro-drug concept.
2. Design development and process validation methods for pharmaceutical operations involved in the production of pharmaceutical products.
3. Stability testing protocol for various pharmaceuticals.
4. Design and development of various pharmaceutical dosage forms like oral drug delivery system, Mucosal drug delivery system, ocular drug delivery system, transdermal drug delivery system, Nasal, Vaginal and rectal drug delivery system, Pulmonary drug delivery system and parenteral controlled drug delivery system.

### UNIT-II

5. G.M.P., Quality assurance and Quality Audit.
6. Design, development, production and evaluation of controlled release formulation.
7. Origin and development of cosmetic sciences. Basic knowledge of skin, role of hormones and vitamins in skin nutrition.
8. Formulation and Evaluation of following cosmetics skin creams and lotion, Hair preparation, shampoos, face powders, lipstick and eye make up, dental products, dentifrices and mouth washes, Astringents and skin tonics.

1. Pre formulation studies including drug- excipients compatibility studies such as effect of stabilizers, preservatives in dosage design.
2. Dissolution testing of oral solid dosage form.
3. Evaluation of bio-equivalence of some marketed product.
4. Stability evaluation of various dosage forms.
5. Preparation and evaluation of controlled release dosage form.
6. Preparation of (a) Creams, Shampoos, Tooth Paste, Mouth Wash, Lipstick, Shaving Cream, After Shave Lotion etc.

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### **1.8.2: Pharmaceutical Chemistry-VIII**

(Medicinal Chemistry-III, including computer Aided Drug Design).

**Theory : 36 Hours.**

#### **UNIT-I**

#### **1. NON-MESSENGER TARGETS FOR DRUG ACTION**

- a. **CELL WALL SYNTHESIS INHIBITORS:** Penicillin G, Methicillin, Carbenicillin,, Ampicillin, Oxacillin, Piperacillin, Cephalothin, Cephalexin, Cephaloride, Ethambutol, Isoniazid, Cyclosporine.
- b. **ION-CONDITION BLOCKERS:** Local anesthetics: Cocaine, Benzocaine, Procaine, Tetracaine, Lidocaine (discuss SAR).
- c. **DRUGS INTERFERRING WITH TRANSCRIPTION AND TRANSLATION:** Streptomycin, Tetracycline, Rifampicin, Chloramphenicol, Erythromycin.

#### **2. ENZYMES AS TARGETS FOR DRUG ACTION**

- (a) **ACETYLCHOLINESTRASE INHIBITORS:** Edrophonium, Physostigmine, Neostigmine, Pralidoxine.
- (b) **DIHYDROTEROATE SYNTHETASE INHIBITORS:** Sulfanilamide, Sulfathiazole, Sulfaisoxazole, Sulfamerazine, Sulfamethoxime (discuss SAR).
- (c) **MAO INHIBITORS:** Phenelzine, Pargyline, Clorgyline, Ipronorazid, Isocarboxazid, Tranycypromine.
- (d) **HIV-I & HIV-2 Reverse Transcriptase Inhibitors:** AZT, Ddc, in DDA, Ddi, D4T, TSAO, TIBO, Nivirapine and BHAP (Synthesis excluded)

### 3. NUCLEIC ACID AS TARGETS OF DRUG ACTION

- (a) QUINOLINE ANTIMALARIALS: Quinine, Quinacrine, Chloroquine, Amodiaquine (Discuss SAR).
- (b) ALKYLATING AGENTS: Mechlormethamine, Mephalan, Uracil, Mustard, Cyclophosphamide, Busulfan.
- (c) ANTIMETABOLITES: Mercaptopurine, Thioguanine, Cytarabine, Azathioprine, Fluorouracil.
- (d) Antiviral : Idosuridine, Trifluridine, Acyclovir, Amantadine.
- (e) QUINOLONE ANTIBACTERIALS: Nalidixic acid, Oxolinic acids, Norfloxacin, Cliprofloxacin, Lomefloxacin.

### UNIT-II

#### 4. DRUGS ACTING ON PROSTAGLANDINS & OTHER EICOSANOIDS.

- (a) PROSTAGLANDINS & OTHER EICOSANOIDS:  
Introduction, General structure of Prostaglandin, Biosynthesis of Arachidonic acid, Drug action mediated by eicosanoid drugs, Eicosanoids approved for human clinical use.
- (b) CYCLOOXYGENASE INHIBITORS: Ant inflammatory & Minor analgesics Shen's model of the fatty acid substrate binding site of PG- synthetase/ cyclo-oxygenase. NSAID, Mefenamic acid, Fluphenamic acid, Ibuprofen, Indomethacin, Naproxen, Sulindac Ibuprofen and Aspirin (Discuss structural relationship of arylakanoic acid with arachodonic acid and structure activity analysis).

#### 5. PRINCIPLES OF DRUG DESIGN.

(a) **FUNDAMENTALS:** Lead discovery, lead Modification strategies, structure activity relationship, variation of substituents, extension of structure, chain extension/contraction, chain branching, Ring variation, simplification and Rigidification of structure, Isosteres, Bioisosteres, Application of bioisosterism in drug design.

(b) **COMPUTER –AIDED DRUG DESIGN:**

1. **Quantitative structure activity relationship:** Introduction, discuss following Physicochemical parameters used in QSAR, Hydrophobic Parameter, Electronic Parameter, Steric parameter, calculation of Partition Coefficient using pi-values and fragmentation constants, pka using hammett constant, and molecular connectivity. Essentials of Hansch Linear Free energy Model, Workout one model example to illustrate the procedure and mechanism of applying the LFER model with single Physicochemical parameter, terms employed in regression analysis, Interpretation of regression analysis equation Strength and Weakness of hansch model.

2. Introduction to Molecular modeling.

**Practical 36 hours**

1. Synthesis of selected drugs from the course content involving two or more steps, monitoring progress of reaction by TLC.
2. Spectral analysis of the molecules synthesized
3. stereomodel Workshops.
4. Any other exercise to substantiate theory.

# B.Pharm 8<sup>th</sup> Semester

## 1.8.3: Standardization and Product development of Herbal Drugs.

Theory

36 Hours.

### UNIT-I.

1. Introduction to medicine from Natural resources insight to alternative systems of medicine, Drug development from natural products. Importance and status of herbal medicines and cosmetics. Brief account of herbal drug Industry.
2. Detailed methods of isolation, identification and estimation of phyto pharmaceuticals such as quinine, Ephedrine, Digitoxin, Ca-sennosides, Diosgenin, Glycyhiza, Rutin, Andriographolides, Phyllantin, Guggulusterone, Gymnemic acid, Asiaticoside.
3. Herbal Formulations:
  - (a) Methods of preparation of formulations in Ayurveda like Aristas, Asava, Ghutika, Taila, Churna, Leha and Bhasma.
  - (b) Role of herbs in cosmetics:- Shampoos- Soapnut, Conditioner- Amala, Henna, Hair Colorants- Amala, Henna, Skin care – Alovera, Turmeric, Sandal wood. Nutraceuticals- Spirulina, Garlic and their processing.
4. Study of traditional drugs:- Kantakari, Shatavari, Bilva, Kalijeera, Rasna, Apamarg, Gokhru, Shankapuspi, Gaduchi.

### UNIT-II

5. Standardization and Quality Control of raw material, extracts and formulation with suitable example. WHO guidelines for the assessment of crude drugs and extracts, sampling procedures, morphological examination, microscopical evaluation, modern techniques such as HPLC, HPTLC, G.C. etc.
6. Stability testing of herbal drugs. Adulteration and its effects on stability.

7. Role of Natural Products in Primary health care and aspects related to their safety and toxicity.
8. Regulatory and legal parameters for drug development from natural resources, various official monographs on natural products of therapeutic importance, regulation and guidelines on drug development from natural resources- Indian and global perspectives.

**Practical 36 hours**

1. Isolation of phyto pharmaceuticals.
2. Estimation of curcumin, Aloin, Quinine, caffeine.
3. Chromatographic techniques-
  - (a) Paper chromatography of sugars.
  - (b) Thinlayer chromatography for alkaloids.
  - (c) Identification of markers in glycyrrhiza, Aloe, Cinchona.
4. Evaluation of crude drugs by powder microscopy, Punarnava, Ashwagandha, Kalmegh, Vasaka, Ashoka.
5. Estimation of alcohol content in various preparation.
6. Estimation of bitters in Kalmegh.
7. HPTLC and HPLC profiles of few drugs.

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**1.8.4: Pharmacology-III**

Theory

36 Hours.

**UNIT-I.**

1. Pharmacology of drugs Acting on Gastrointestinal Tract:- Antacids, Antiulcer drugs, Laxatives and purgatives, Emetics and Antiemetics, Appetizers, Digestants and carminatives.
2. Pharmacology of Hormones and Hormone Antagonists:- Thyroid and anti thyroid drugs, Insulin and oral hypoglycemic agents, Sex hormones and oral contraceptives, oxytocin and other uterine stimulants and relaxants.
3. Chemotherapy: - Drugs used in Malaria, Amoebiasis and Giardiasis, Anthelmintic drugs, anti cancer drugs.

**UNIT-II**

4. Bio Assays:- Scope, principles involved and General methods.
5. Immuno Pharmacology- Immuno suppressants and stimulants.
6. Drug - Drug, Drug-food interactions - classification, Basic concepts of mechanism of interaction, Monitoring.
7. Introduction to clinical pharmacy and its application.
8. Therapeutic drug monitoring, concept of Essential drugs and Rational use, Drugs used during pregnancy, Drug induced diseases, Drug used during infancy and in Elderly patients.



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**1.8.5: Pharmaceutical Analysis-III**

Theory

36 Hours.

**UNIT-I.**

1. **Ultraviolet and visible spectrophotometry, Introduction, Absorption laws, instrumentation, types of electronic transition, Chromophores and auxochromes, absorption and intensity shifts, types of absorption band, solvent effects, Woodward-Ufford rules, assays based on chemical derivatisation, applications, calculation methods involving the assay of single component system.**
2. (a) **General discussion, fluorescence and chemical structure, factors affecting the intensity of fluorescence, instrumentation, application.**  
(b) **ATOMIC ABSORPTION SPECTROPHOTOMETRY: Theoretical consideration, Instrumentation, application.**  
(c) **FLAME PHOTOMETRY: Theoretical consideration, Instrumentation, application.**
3. **INFRARED SPECTROPHOTOMETRY: Introduction, theory-molecular vibrations, number of fundamental vibrations, factors influencing vibrational frequencies, instrumentation, sampling techniques, guidelines for applications.**

**UNIT-II**

4. **NUCLEAR MAGNETIC RESONANCE SPECTROSCOPY: Theory of nuclear resonance, relaxation processes, instrumentation, number of signals, factors influencing the chemical shift, splitting of signal, chemical exchange process, proton-spin coupling notion, guidelines for peak area and proton counting and application.**

5. (a) **MASS SPECTROMETRY:** General discussion, instrumentation, fragmentation, guidelines for interpretation of spectra, applications.
- (b) **X-RAY DIFFRACTION:** Introduction, Bragg's equation, different methods, applications.
- © **RADIOCHEMISTRY:** Measurement of radioactivity, quality control of radio pharmaceuticals, Radioimmuno-assay and other radio chemical methods, applications.
6. (a) **QUALITY ASSURANCE:** Good laboratory practice, ISO 9000, total quality management, documentation.
- (b) **Regulatory control regulating drugs analysis, interpretation of analytical data.**
- © **Quality of equipment, validation of equipment and analytical instruments.**

**Practical : 36 hours**

Experiment based on U.V. and visible spectrophotometry, fluorimetry, flame photometric and atomic absorption spectrophotometric methods, IR spectra of compounds, interpretation of UV, IR, NMR and mass spectrum of simple organic compounds.