<table>
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<tr>
<th>SN</th>
<th>Topics</th>
<th>Hrs</th>
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</table>
| 01 | Preformulation Considerations  
Concept, Study of physical properties: description, microscopic examination, particle size, partition coefficient, dissolution, solubility, membrane permeability, drug stability, crystal structure and polymorphism. | 07 |
| 02 | Suppository  
Introduction, Types of suppository, suppository bases, Preparation, new trends of suppository, Factors affecting drug absorption from various suppositories, Displacement value, Evaluation, packaging & storage. | 06 |
| 03 | Ointment  
Ointment bases, Preparation and preservation of ointment base, Drug absorption, ophthalmic ointment, Evaluation. | 05 |
| 04 | Capsule  
Introduction, advantage & disadvantages, Additives used in capsule, Types of capsule: Hard gelatin capsule- advantages & disadvantages, Material for production & manufacturing of capsule shell Methods of filling hard gelatin capsule, Capsule size  
Soft gelatin capsule (soft gel) - formulation & manufacture, Evaluation of capsule. | 08 |
| 05 | Tablet  
Rational, Types of tablet, Tablet excipients, Methods of tablet manufacture (wet, dry & direct compression) and granulation, Problems & defects during tablet manufacturing, Tablet standardization.  
Tablet coating: Types of coating, film forming material, Coating formulation, Coating process & equipment, Coating defects. | 14 |
| 06 | Cosmetics  
Fundamental concept, Classification, Formulation & Preparation of Cold cream, Vanishing cream, Moisturizing, Cleansing cream, Face powder, dentifrices, Tooth paste, Tooth powder, Shampoo, Lipstick. | 05 |
DOSAGES FORM & TECHNOLOGY (DFT-I) (BP-707)

PRACTICALS:
1) Introduction of instruments/machines used in Instrument/Machine room.
2) Introduction of different additives used in formulation.
3) To evaluate marketed uncoated and coated tablet formulations.
4) To prepare capsule formulations of any one drug.
5) Preparation and evaluation of following dosage forms.
   6) Tablets
   7) Capsules
   8) Ointments
   9) Suppositories
   10) Ophthalmic ointment
   11) Cold cream, vanishing cream, toothpaste, face powder, toothpowder, Cleansing cream, Shampoo, Lipstick etc.

REFERENCE BOOKS:
8. Parikh Dilip M., ”Handbook of Pharmaceutical Granulation Technology” Marcel Dekker, Vol. 81, Newyork
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<tr>
<th>SN</th>
<th>Topics</th>
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<tbody>
<tr>
<td>01</td>
<td>Drug Design: general introduction common approaches used in drug design, physicochemical properties affecting in drug design. Computer aided drug design. QSAR: Methods of QSAR and molecular modeling. Introduction of Combinatorial chemistry and high thorough-put screening.</td>
<td>10</td>
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<tr>
<td>02</td>
<td>Nomenclature, classification, mode of action, SAR, Uses and synthesis of some official drugs from following categories: <strong>Cardiovascular drugs:</strong> Antihypertensive, Antiarrhythmic, Anti-anginal, cardiotonics. Skeletal Muscle Relaxants, Diuretics, Anti-coagulant, Antithrombotic, Coronary vasodilator, Hypolipoproteinemic drugs. <strong>Chemotherapeutic Agents:</strong> Antiviral, Antineoplastics, Antiprotozoal (Antimalarials, Antiamoebics, Anthelmentics), Antibiotics. Antibacterial (Sulfonamides and Quinolones), Antimycobacterial Drugs (Antituberculers and Antileprotics), Antifungal agents.</td>
<td>35</td>
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</table>
PRACTICAL:
Introduction to Computer aided drug design.

Synthesis and physico-chemical characterization of following compounds
- Orange II from sulfanilic acid and β-naphthol
- Phenothiazine from diphenyl amine
- Benzocain from p-aminobenzoic acid
- 7 hydroxy 4-methyl coumarin from resorcinol
- Benzhydrol from benzophenone
- 1-phenylazo 2-naphthol from aniline and 2-naphthol

Pharmacopoeial assay of following solid dosage form
- Mebendazole, Glipizide, Nifedipine, Cimetidine, Diclofenac, Atenolol

REFERENCES:
1. Wilson and Gisvold’s Text Book of Medicinal Chemistry, Lippincott Williams and Wilkins.
2. Indian Pharmacopoeia, Government of India, Ministry of Health and Family Welfare, Published by the Controller of Publications and Information Directorate (CSIR), New Delhi.
14. Kadam, Mahadik and Bothra “Advanced Practical Medicinal Chemistry”
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<tbody>
<tr>
<td>01</td>
<td><strong>X-ray diffraction</strong>: Theory, Instrumentation, methods, Applications.</td>
<td>03</td>
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<tr>
<td>02</td>
<td><strong>Mass Spectrometry</strong>: Introduction, Basic Principle, Instrumentation, Single focusing, Quadrupole Mass Filter, Applications.</td>
<td>08</td>
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<td>03</td>
<td><strong>Nuclear Magnetic Resonance Spectroscopy</strong>: Introduction, Theory, Chemical Shift and its measurement, Factor influencing Chemical Shift, Solvent used in NMR, Instrumentation, Applications.</td>
<td>08</td>
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<td>04</td>
<td><strong>Radio-immunoassay</strong>: Principle and applications.</td>
<td>05</td>
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<td>05</td>
<td><strong>Separation Techniques</strong>: Partition Coefficient, Liquid-Liquid extraction, solid-liquid extraction, Applications.</td>
<td>06</td>
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<td>06</td>
<td><strong>Photocolorimetry</strong>: Theory, Instrumentation, Applications.</td>
<td>02</td>
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<td>07</td>
<td><strong>Electrophoresis</strong>: Theory, Instrumentation, Applications.</td>
<td>02</td>
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<tr>
<td>08</td>
<td><strong>Miscellaneous methods of analysis</strong>: Nitrite Titrations, Kjeldahls Method of Nitrogen Estimation, Oxygen Combustion Flask, Karl Fischer Titration, Determination of Alcohol In Galenicals.</td>
<td>05</td>
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<tr>
<td>09</td>
<td><strong>Introduction to concept of quality assurance</strong>: Validation of analytical instruments and methods, GLP, ICH guidelines in pharmacopoeial and biochemical analysis, ISO guidelines, Documentation and record keeping.</td>
<td>06</td>
</tr>
</tbody>
</table>
PRACTICAL:
1. Determine accuracy and precision of standardization method of NaOH.
2. Estimation of Paracetamol in given sample by single point analysis by UV.
3. Estimation of diazepam in a given sample by using standard absorptivity by UV.
4. Assay of Sulfamethoxazole and trimethoprim as per IP.
5. Estimation of atenolol by using hydrotropic solubilizing agent.
8. Simultaneous spectrophotometric estimation of paracetamol and nimesulide by simultaneous equation method.

REFERENCES:
5. Indian Pharmacopoeia, Government of India, Ministry of Health and Family Welfare, Published by the Controller of Publications and Information Directorate (CSIR), New Delhi
13. G. R. Chatwal And Shyam K. Anand “instrumental methods of chemical analysis”
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<tbody>
<tr>
<td>01</td>
<td>Introduction to rational drug use: Definition, role of pharmacist, essential drug concept and rational drug formulations.</td>
<td>04</td>
</tr>
</tbody>
</table>
| 02 | **Etiopathogenesis and Pharmacotherapy of diseases/disorders associated with following systems.**  
Cardiovascular and Hemopoietic system: Hypertension, Angina Pectoris, Atherosclerosis, Congestive Heart Failure, Arrhythmias, Myocardial infarction, Hyperlipidaemias, Thromboembolic disorders and Anaemia.  
Respiratory system: Bronchial asthma, Chronic Obstructive Pulmonary Disease, Allergic rhinitis, Common cold & Cough, Cystic fibrosis.  
Gastro-intestinal system: Peptic ulcer, Inflammatory Bowel Disease, Liver diseases.  
Central Nervous system: Parkinsons disease, Alzheimer’s disease, Behavioral disorders.  
Urogenital system: Renal failure, Benign Prostatic Hypertrophy, Infertility, Dysmenorrhea, Menopause.  
Musculoskeletal system: Rheumatoid arthritis, Osteoarthritis, Gout, Spondylitis, Systemic Lupus Erythematosis. | 12  |

|   | 6  |
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|   | 6  |
|   | 5  |
Clinical Pharmacotherapeutics-I(BP-7010)

PRACTICAL:

1. Bioassay (Bracketing & Interpolation) on isolated tissue of rat.
2. Demonstration of Anesthesia (general and local).
3. Study of drugs on some models related to central nervous system. (Sedative & Hypnotics, Locomotor, Stereotypy, Muscle Relaxant, Analgesic & Anti-inflammatory).
4. Prescription related patient oriented problems on
   - Some common problems of gastro-intestinal tract (Dyspepsia, nausea, vomiting, colic, dehydration and constipation).
   - Some common problems of respiratory system (Cough, bronchial asthma).
   - Anaemia
   - Management of some painful conditions.
   - Use of some drugs in emergency (Myocardial infarction, hypertensive emergency, acute cardiac failure, anaphylaxis, cardiovascular collapse, pulmonary embolism).
   - Diabetes mellitus
   - Some bacterial infections (Respiratory infections, urinary tract infections, infective diarrhea etc.)
   - Malaria and Amoebiasis
5. Medication errors in prescribing, drawing up and administration of medication for diseases prescribed in theory.
6. Dose calculation of commonly used drugs including drugs for I.V. infusions.
7. Presentations of analysis related to Pharmacoeconomics. Data related to prescriptions from patients with similar disease to be collected & analyse in terms of cost & effectiveness.
8. Study of drugs on some models related to central nervous system (anticonvulsant, anxiolytic, antianxiety, catatonia & amnesia).

References:
1. B. Widdop. Therapeutic Drug Monitoring. Churchill Livingstone
13. Klaassen C.D, Casarett & Doull”s. Toxicology. The basic science of poison Mc-Graw Hill
20. Raymond J.M. Niesink, John de vries. Hollinger M.A. Toxicology- Principle and applications, CRC, Florida
21. Remington’s Pharmaceutical Science and practice pharmacy. Lippincott Williams and Wilkins, New Delhi
34. Maickel, Pradhan, Pharmacology in Medicines – Principles and Practice. SP Press International INC.
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<tbody>
<tr>
<td>01</td>
<td>Alkaloids</td>
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</table>
|   | Introduction, definition, occurrence, properties, classification, chemistry. General Biosynthetic pathways for Indole, Tropane, Quinoline and Isoquinoline alkaloids. Systematic pharmacognostic study of following crude drugs containing Alkaloids.  
   b. Tropane - Datura, Coca, Belladona.  
   c. Purines - Tea, Theobroma.  
   d. Quinoline - Cinchona.  
   e. Isoquinoline - Opium, Ipecac.  
   f. Pyridine/ piperidine - Lobelia.  
   g. Imidazole - Pilocarpus.  
   h. Quinazoline – Vasaka  
   i. Amino alkaloids - Colchicum, Ephedra.  
   j. Steroidal - Ahwagandha, Kurchi | |
| 02 | Extraction, Isolation and Estimation of following Phytoc constituents: Quinine, Ephedrin and Atropine | 03 |
| 03 | Flavonoids | 05 |
|   | Introduction, properties, classification, chemistry and general method of extraction  
   2. Flavonol: Buck Wheat, Green Tea  
   3. Flavonones: Liquorice, Citrus Peels  
   4. Bioflavonones- Gingko | |
| 04 | Study of traditional drugs: | 10 |
|   | Common/Vernacular names, B.S., morphology, chemical nature, pharmacology, traditional uses, marketed formulations of the following: Kantkari, Tylophora, Kalijiri, Rasna, Punarnava, Chitrak, Apsnarg, Gokhru, Sankhpushpi, Tulsi, Methi, Palash, Gymnema, Shilajit, Nagarmotha, Tinospora, Neem, and Bhringraj. Lehsun, Guggul, Artemisia, Asoka, Saffron. | |
| 05 | Herbal Drug Interactions | 06 |
|   | General introduction to interaction and classification. Study of following drugs and their possible side effects and interactions. Hypercium, kava-kava, Ginkobiloiba, Ginseng, garlic, Ginger & Ephedra. | |
| 06 | Standardization of Herbal Drugs | 06 |
|   | Importance of standardization and problems involved in the standardisation. Standardization of single Drug and compound Formulations, W.H.O. guidelines for quality standards of Herbal formulations, Validation of Herbal products. Estimation of parameters, limit Used for standardization and herbal extracts | |
Pharmacognosy-V (BP-7011)

PRACTICAL:
1. Extraction, Isolation and Identification of curcumin by TLC.
2. Extraction, Isolation and Identification of caffeine by TLC.
3. Study of morphological, microscopical characters & chemical / microchemical tests for following drugs:
   a. Leaf: Datura, Vinca, Vasaka
   b. Root: Rauwolfia
   c. Barks: Cinchona, Kurchi,
   d. Stem: Ephedra
   e. Seed: Nux-Vomica
4. Determination of Ash value & Extractive values of crude drugs
5. Estimation of the crude fibre contents in given sample
6. Extraction, Isolation of following phytopharmaceuticals.
   · Eugenol from clove oil
   · Hesperidene from orange peel
   · Quinine from cinchona bark

Reference Books
### Topics

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<td>01</td>
<td><strong>Pilot Plant Scale up Techniques:</strong></td>
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<tr>
<td></td>
<td>Significance of pilot plant study, requirements, raw materials,</td>
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<td>preparation of master procedures, Product considerations: solid</td>
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<td>dosage forms, injections, semisolids and ophthalmic products.</td>
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<td>02</td>
<td><strong>Pelletization Techniques:</strong></td>
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<td></td>
<td>A general overview of pellets, preparation of pellets by extrusion/</td>
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<td>spheronization centrifugal method, fluid bed processes. Properties</td>
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<td></td>
<td>of pellets: size and size distribution, shape, density/porosity,</td>
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<td>mechanical properties. Formulation aspect of pellets.</td>
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<td>03</td>
<td><strong>Aerosols:</strong></td>
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<tr>
<td></td>
<td>Principle, component of aerosol package- propellants (types), container,</td>
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<td>valves and actuators, aerosol formulation and different types of</td>
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<td>systems, manufacture, stability testing and quality of aerosols.</td>
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<td>04</td>
<td>**Optimization Techniques in Pharmaceutical Formulation and</td>
<td>05</td>
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<td></td>
<td>processing:**</td>
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<td>Concept of optimization, optimization parameters, optimization</td>
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<td></td>
<td>methods.</td>
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<td>05</td>
<td><strong>Packaging of Pharmaceuticals:</strong></td>
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<td></td>
<td>Desirable characteristics, Detail study of different types of</td>
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<td>container and closure (glass, plastic and rubbers) including their</td>
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<td></td>
<td>merits and demerits, Temper-resistant packaging, blister and strip</td>
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<td></td>
<td>packaging, Selection and evaluation of pharmaceutical packaging</td>
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<td>materials.</td>
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<td>06</td>
<td><strong>cGMP:</strong></td>
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<tr>
<td></td>
<td>Introduction, Regulatory objectives of cGMP, Organization and</td>
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<td>Personnel, Buildings and Facilities, Production and Process control,</td>
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<td>packaging and Labeling control, Record and Reports.</td>
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<td>07</td>
<td><strong>Safety management:</strong></td>
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<td>Industrial hazards due to fire, accident, mechanical and electrical</td>
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<td>equipment, chemicals and pharmaceutical safety measures.</td>
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### Reference Books:

7. World Health Organization’s guidelines on good manufacturing practices and inspection (available at [http://www.who.int](http://www.who.int)).