B. PHARM. SEMESTER-IV

401 T: PHARMACEUTICS -V (DOSAGE FORM DESIGN)

1. Preformulation studies: Study of physical properties of drug like physical form, particle size, shape, density, wetting, dielectric constant, solubility, dissolution and organoleptic property and their effect on formulation, stability and bioavailability. Study of chemical properties of drugs like hydrolysis, oxidation, reduction, racemization, polymerization etc. and their influence on formulation and stability of products. Biopharmaceutical consideration in the formulation stages of dosage form development.

2. Study of different types of formulation additives e.g., diluents, binders, disintegrants, lubricants, vehicles, anti-oxidants, preservatives, coloring, flavoring, sweetening, suspending and emulsifying agents. Drug-excipient interactions.

3. Stability studies: Determination of shelf life (expiry date) and overage calculations, stabilization and stability testing protocol for various pharmaceutical products.

4. Polymers: Classification, synthesis, properties, characterization and evaluation of polymers including biodegradable polymers, mechanism of biodegradation in body, pharmaceutical applications of polymers.

5. Dissolution technology: Types of various dissolution apparatus as per pharmaceutical compendia, dissolution media, factors affecting dissolution, dissolution testing of different types of dosage formulations, data interpretation, similarity and difference factors.


401 P: PHARMACEUTICS V (DOSAGE FORM DESIGN)

1. Establish the following preformulation parameters of the given drug sample: (a) melting point (b) solubility (c) intrinsic solubility (d) pKa (e) partition coefficient.

2. Establish the following preformulation parameters of the given drug sample: (a) particle size distribution (b) flow proportion (c) bulk density (d) Carr’s index (e) compression preparation.

3. Study the drug excipient compatibility of given drug with commonly used excipient by TLC technique.

4. Estimate the shelf life of the given drug.
5. Study the effect of moisture content on chemical stability of aspirin.
7. Determine the molecular mass of given polymer by viscometer.
8. Perform the in-vitro dissolution study of given the sample of tablet.
9. Study the effect of presence of surfactant in dissolution of tablet containing poorly soluble drug.
10. Study the effect of solvent / co-solvent hydrotropic agents on solubility of given drug.
11. Study the effect of pH of dissolution on in-vitro dissolution study.
12. Compare the dissolution profile of two marketed tablet products.

**BOOKS RECOMMENDED**

2. Turco, S. Sterile Dosage Form, Williams and Wilkins, U.S.A.
6. Pharmacopoeia of India, Ministry of Health and Family Welfare, Govt. of India, New Delhi.

**402T: PHARMACEUTICAL ANALYSIS-II**

1. Conductometry: Ohm’s law and ionic conductivities, instrumentation, conductometric titration curves, applications of conductometry in acid-base, redox, precipitation and complexometric titrations with suitable examples.
2. Potentiometry: Theory and principles, reference electrodes, indicator electrodes, instrumentation for potentiometric titrations, location of end point in potentiometry, application of potentiometry in acid-base, redox, precipitation and complexometric titrations with suitable examples.
3. Polarography: Principle, polarographic wave, Illkovic equation and factors affecting it,
dropping mercury electrode, instrumentation, polarographic methods of analysis, pharmaceutical applications.

4. Amperometry: Principle, amperometric titration curves, applications.


6. Radioimmunoassay: Principle, procedure, pharmaceutical applications.


402P: PHARMACEUTICAL ANALYSIS-II

1. Perform the potentiometric titration of the given amino acid.
2. Perform the assay of sodium dihydrogen phosphate dihydrate IP.
3. Perform the conductometric titration of hydrochloric acid and acetic acid with sodium hydroxide.
4. Perform the conductometric titration curve of a strong acid against a strong base.
5. Perform the conductometric titration curve of a weak acid against a strong base.
6. Perform coulometric titration of hydrochloric acid.
7. Study of a typical polarographic wave.
8. Perform amperometric titration of given sample.
9. Perform the assay of sulphamethoxazole IP.
10. Perform the assay of sulphacetamide sodium IP.
11. Determine the water content of given sample using Karl-Fischer reagent.
12. Determine the content of iodine in diiodohydroxyquinoline IP using oxygen flask combustion.
13. Determine the content of nitrogen in the given sample using Kjeldahl’s method.

BOOKS RECOMMENDED

CBS Publishers and Distributors, New Delhi, India.


4. Pharmacopoeia of India, Govt. of India, Ministry of Health and Family Welfare, New Delhi.


403T: PHARMACEUTICAL CHEMISTRY- IV (BIOCHEMISTRY)

1. Enzymes: Nomenclature and classification, structure of enzymes, mechanism of enzyme action, mode of enzyme action, factors affecting enzyme action, enzyme inhibition, regulation of enzyme activity, allosteric enzymes and pharmaceutical application.

2. Co-enzymes: Metals and vitamins as coenzymes and their significance.

3. Carbohydrates metabolism: Glycolysis, gluconeogenesis and glycogenolysis, citric acid cycle, pentosephosphate, pathway, uronic acid pathway, metabolism of galactose and galactosemia.

4. Lipid metabolism: Transportation and absorption of fats, role of liver in fat metabolism, oxidation of fatty acids, ketosis, biosynthesis of saturated and unsaturated fatty acids, control of lipid metabolism, essential fatty acids and eicosanoids, metabolism of cholesterol.

5. Biological oxidation: Redox potential, enzymes and co-enzymes involved in oxidation reduction and its control, the respiratory chain, its role in energy capture and its
control, energetic of oxidative phosphorylation, inhibitors of respiratory chain and oxidative phosphorylation, mechanism of oxidative phosphorylation.

6. Metabolism of ammonia and nitrogen containing monomers: Nitrogen balance, biosynthesis of amino acids, catabolism of amino acids, conversion of amino acids to specialized products, assimilation of ammonia, urea cycle, metabolic disorders of urea cycle, metabolism of sulfur containing amino acids, porphyrin biosynthesis, formation of bile pigment, hyperbilirubinemia, purine biosynthesis, purine nucleotide interconversion, pyrimidine biosynthesis, and formation of deoxyribonucleotides.


**403P: PHARMACEUTICAL CHEMISTRY VI (BIOCHEMISTRY)**

1. Perform the separation of amino acids by two dimensional paper chromatography.
2. Perform the separation of amino acids by gel electrophoresis.
3. Perform the separation of serum proteins by electrophoresis on cellulose acetate.
4. Estimate amino acids quantitatively using ninhydrin reaction.
5. Estimate proteins quantitatively using Biuret method.
6. Identify C-terminal amino acid of a protein.
8. Estimate quantitatively amylase activity.
11. Estimate SGOT, SGPT, ALP and BRN in the serum.

**BOOKS RECOMMENDED**


404T: PHARMACOGNOSY II

1. Classification, cultivation, collection, commercial varieties, chemical constituents, substitutes, diagnostic macroscopic and microscopic features and specific chemical tests of following groups of drugs containing glycosides:
   a. Saponins - Liquorice, ginseng, dioscorea, and senega.
   b. Cardio active sterols- Digitalis, squill, strophanthus and thevetia.
   c. Anthraquinone cathartics - Aloe, senna, rhubarb and cascara.
   d. Others - Psoralea, ammi majus, ammi visnaga, gentian, saffron, chirata, and quassia.
2. Volatile oils: General method of obtaining volatile oils from plants, study of following volatile oil containing drugs as mentha, coriander, cinnamon, cassia, lemon grass, citronella, caraway, dill, clove, fennel, nutmeg, eucalyptus, chenopodium, cardamom, musk, palmrosa, gutheria and sandal wood.
3. Plant bitters and sweeteners.
4. Studies of following drugs: Amla, Shatavari, Tylophora, Bhilwa, Bach, Punarnava, Chitrak, Apamarga, Gokhru, Shankhpusphi, Brahmi, Adusa, Arjuna, Ashoka, Methi,
Lahsun, Palash, Guggal, Gynmema and Shilajit.
5. Biological sources, preparation, identification tests and uses of the following enzymes: Diastase, Papain, Pepsin, Trypsin and Pancreatin.

**404P: PHARMACOGNOSY II**

1. Study of morphological characters of liquorice and dioscorea.
2. Study of morphological characters of senega root.
3. Study of morphological characters of digitalis and squill.
4. Study of morphological characters of senna and rhubarb.
5. Study of morphological characters of gentian and saffron.
7. Study of organoleptic characters of aloe.
8. Perform morphology and microscopy of mentha leaf.
10. Perform morphology and microscopy of clove and cinnamon.
11. Perform morphology and microscopy of dill and eucalyptus.
12. Study of morphological characters of amla and kantakari.
13. Study of morphological characters of shatavari and tylophora.
15. Study of morphological characters of punarnava and chitrak.
16. Study of morphological characters of apamarg and gokhru.
17. Study of morphological characters of adusa and guggul.
18. Study of morphological characters of arjuna and ashoka.
19. Study of morphological characters of methidana and nagarmotha.

**BOOKS RECOMMENDED**

6. Indian Pharmacopoeia, Ministry of Health and Family Welfare, Govt. of India, New Delhi.

**405T: PHARMACEUTICAL JURISPRUDENCE & ETHICS**

1. Introduction
   a) Pharmaceutical Legislations – A brief review.
   b) Drugs and pharmaceutical industry with special reference to India.
   c) Code of pharmaceutical ethics – A brief review.

2. An elaborate study of the following:
   a) Pharmacy Act 1948.
   b) Drugs and Cosmetics Act 1940 and Rules 1945.
   c) Medicinal & Toilet Preparations (excise duties) Act 1955.
   e) Drugs Price Control Order 1995.

3. A brief study of the following with special reference to the main provisions.
   a) Poisons Act 1919.
   b) Drugs and Magic Remedies (objectionable advertisements) Act 1954.
   e) States Shops & Establishments Act & Rules.
   f) Insecticides Act 1968.
   g) AICTE Act 1987.
   h) Factories Act 1948.

4. A brief study of the various marketed pharmaceutical products from the following categories: (i) Antibiotics  (ii) Vitamins  (iii) Antihypertensive  (iv) Anti-diabetics
(v) NSAIDs

Note: The teaching of all the about Acts should cover the latest amendments.

BOOKS RECOMMENDED


406 P: COMMUNICATION SKILLS & PERSONALITY DEVELOPMENT-IV

1. Technical writing: Purpose and characteristics of technical writing, technical writing process, technical writing style, formatting technical documents for function and effectiveness, some forms of technical writing: Technical descriptions, summaries, instructions, technical proposals, user manuals.
2. Communicating through reports: Essentials of good report writing, classification of reports, planning, organizing, and writing the report, report formats, formal and informal (short and long), structure and formatting of short informal reports and memo reports.

Technical reports: structures of a technical report, techniques that help the process of writing technical reports, editing and revising technical reports for style and usage, for grammar and punctuation, some common informal technical reports, progress reports, lab reports, feasibility reports, incident reports, problem-solving reports and reports identifying cause-and-effect relationship.
BOOKS RECOMMENDED

2. Gerson, S.J. and Gerson, S.M., Technical Writing, Pearson Education Asia, Hong Kong.
5. Rutherford, A.J. Basic Communication Skills for Technology, Pearson Education Asia, Hong Kong.