B.PHARM Vth SEMESTER
COURSE NO 501: DRUG STORE AND INDUSTRIAL MANAGEMENT & MARKETING

1. Drug Store Management: Selection of site, space, layout and legal requirements. Storage of drugs of various schedules and maintenance of records as per requirement. Hospital supplies, requirements for dispensing extemporaneous preparations. Importance and objectives of purchasing, selection of suppliers, credit information, tenders, contracts and price determination, removal of expired drugs. Patient counseling – maintenance of records.


3. Production, planning and control – scientific purchasing, quality control, problems of productivity, stores organization, location of stores, receiving, inspection of materials and issue from the store, control of stores and stocks, stores accounting and records. Personnel management – selection, appointment, training, transfer, promotion, demotion policies, remuneration, job evaluation, human relations.

4. Sales organization: Market, definition, different approaches to the study of marketing, institutional approach, market planning, product planning, method of marketing, wholesalers, retailers, functional approach, efficiency in marketing, commodity approach.
   Distribution policies: Selective and Exclusive distribution, pricing and discount policies, credit policies, trade indication marks, patent policies. Sales promotion policies – detailing to physician, professional persons, sampling, window and interior display, product advertising, sales promotion publicity.

5. Budgets and budgetary controls: Elements of accounting, double entry book keeping, books of accounts, trial balance, final accounts of business and profit, profit and loss accounts, appropriation accounts, balance sheets.

Suggested Book:

1. Remington’s Pharmaceutical Sciences.
2. Pharmaceutical marketing in India, concepts strategy cases by Subba Rao Chaganti Published by Pharma book syndicate.

COURSE NO 502: PHARMACEUTICAL BIOTECHNOLOGY

Unit-I : Biological Products

1. Animal products:
   I) Insulin – Extraction, Purification and types of formulations
   II) Preparation and uses of Pancreatin, Pepsin, Heparin, Thyroid and Liver preparations as per I.P.

2. Blood products & Plasma substitutes: Preparation, uses and storage of the following; Whole human blood, Dried human plasma, human gamma globulins, clinical dextran and absorbable haemostats.

3. Immunological products: Preparation & standardization of the following;
Vaccines – BCG, DPT, Poliomyelitis and Typhus.
Toxoids – Diphtheria and Tetanus.
Antitoxins – Diphtheria and Gas-gangrene

**Unit-II: Fermentation Products**

Introduction to fermentation, aerobic and anaerobic, surface, submerged and solid state fermentations and fermentation media. Design and operation of industrial fermenter. Fermentative production, recovery and uses of the following,

I) Antibiotics - Penicillin and Streptomycin
II) Organic acids - Citric and Lactic acids
III) Solvents - Alcohol
IV) Vitamins - Vitamin-B₁₂
V) Miscellaneous - Lactobacillus spores

**Unit-III: Testing methods**

1. Test for sterility: Sterility testing media, sampling, neutralization of various antimicrobial substances in dosage forms, conducting the tests for injections, surgical sutures (Catgut), cotton, tubings and bottles.

**Unit-IV: Enzymes, Enzyme immobilization and microbial transformations**

1. Enzymes: Sources and general methods of preparation. Preparation of fungal diastase. Applications in pharmaceutical industry, therapeutics and clinical assays
2. Immobilization: Advantages and limitations, techniques of immobilization of enzymes and cells.
3. Microbial transformations: Advantages, different types of microbial and steroid conversions

**Unit-V: Recombinant DNA technology**

1. Introduction to genetic engineering. Brief description of (a) Restriction of DNA (b) Ligation of DNA (c) Introduction into host cells (d) Recombinant selection (e) Use of the plasmids and bacteriophages as cloning vehicles, artificial plasmid vectors, cosmids and phasmids (f) Agarose gel electrophoresis, southern, northern and western blotting.
3. Bioinformatics: Introduction, scope and applications
COURSE NO 503: PHARMACEUTICAL BIOTECHNOLOGY – PRACTICALS

List of experiments:


Text books and Reference books:

1. Bentley’s text book of pharmaceutics by Herold Davis - 7th and Latest edition
2. The microbiological assay of Vitamin B-complex and amino acids by E. C. Barton – Wright, Sir Issac Pitman and Sons Ltd., London
3. Analytical microbiology by Kavanagh, Academic press
4. Tutorial pharmacy by Cooper and Gunn
6. Remington’s Pharmaceutical Sciences

COURSE NO 504: PHARMACEUTICAL CHEMISTRY-IV (MEDICINAL- I) THEOREY

1. History, introduction and development of medicinal chemistry, nomenclature of drugs.
2. Heterocyclic compounds: Nomenclature and numbering of heterocyclic systems, general methods of preparation and important reactions of five membered and six membered heterocyclic systems-pyrrole, furan, thiophene, pyridine, quinoline, isoquinoline and indole
3. Acquaintance with the following heterocyclic systems commonly encountered in therapeutic agents with suitable examples. Aziridine, thiadiazole, oxazole, isoxazole, thiazole, imidazole, pyrazole, pyridazine, pyrimidine, piperazine, piperidine, benzothiazole, purine, benzimidazole, indole, benzothiadiazone, pteridine, pthalazine, quinazoline, quinoline, isoquinoline, benzopyran, benzodiazepines, phenothiazine, acridine, thiaxanthene
A study of the classification, mode of action, structural activity realationship (wherever applicable) and synthesis of specified members of the following classes of drugs.

5. Sedatives and hypnotics: Phenobarbital, buspirone, diazepam, alprazolam.
6. Anticonvulsants: phenytoin, valproic acid, etho suximide, carbamazepine.
7. Central voluntary muscle relaxants: mefenicin, methocarbamol.
10. Analpeptics: Nikethamide, picrotoxin, pentelene tetrazole, ethamiban, doxapram.
11. Antipsychotic agents: chlorpromazine, promethazine, thiohexene and haloperidol.
13. Antithyroid drugs: Hormones of the thyroid gland and antithyroid drugs
15. Local anaesthetics: benzocaine, procaine, lignocain and dibucaine.
17. Antidiabetic agents: Insulin and its preparations, tolbutamide and glibenclamide.

COURSE NO 505: PHARMACEUTICAL CHEMISTRY-IV (MEDICINAL- I)

Section 1.10 PRACTICAL

1. Preparation of drugs including heterocyclic compounds involving two or more steps like: Benzimidazole, 3,4-dihydroxy-4-oxo-phthalazine, Benztriazole, 1,2,3,4-tetrahydrocarbazole, 6-methyl uracil, 7-hydroxy-4-methyl coumarin, 3-methyl-1-phenyl-5-pyrazolone, Benzoin, Diphenylhydantoin, Chlorbutol.
2. Identification tests for selected drugs.
3. Analysis of formulations containing selected drugs like meprobamate, phenytoin, ibuprofen, chlorpromazine, lignocaine, oxyphenbutazone, diphenhydramine.

TEXT BOOKS:
1. Wilson and Gisvold, Textbook of organic, Medicinal and Pharmaceutical Chemistry
2. Bently and Driver’s Textbook of Pharmaceutical Chemistry
4. Medicinal chemistry by Nadendla Rama Rao Published by Pharma book syndicate.
**Reference Books**
2. Essentials of Medicinal Chemistry by Karlkovas
4. Indian Pharmacopoeia.

**COURSE NO 506: PHARMACEUTICAL ENGINEERING – II**

A study of the following unit operations as applied to Pharma Industry.


II. Crystallization: Crystal forms and Crystal habit – supersaturation and formation of crystals and crystal growth, Mier's supersaturation theory of Crystallization and its limitations, solubility curves.


V. Size separation: Screens and screening equipment – air and hydraulic separators, sedimentation, particle size distribution and its measurement – representation of data.


VII. Extraction: Principles of solid – liquid and liquid – liquid extraction, equipment, diffusion batteries – extraction of towers – Podbielniak extraction.

**Text Books**
1. Introduction to Chemical Engineering by Walter L. Badger and Julius T. Banchero.
2. Elementary Chemical Engineering by Max S. Peters.
3. The theory and practice of Industrial Pharmacy by Leon Lachman, H.A. Lieberman and Joseph L. Kanig.
4. Pharmaceutical engineering by K.Sambamurthy published by New age international (P) LTD. Publishers
5. 

COURSE NO 507: PHARMACEUTICAL ENGINEERING – II

PRACTICAL

I. Determination of radiation constant of brass, iron, unpainted and painted glass (4 experiments).
II. Steam distillation – To calculate the efficiency of steam distillation.
III. To determine the overall heat transfer coefficient.
IV. Construction of drying curves (for calcium carbonate and starch).
V. Determination of moisture content and loss on drying.
VI. Determination of humidity of air – i) From wet and dry bulb temperatures – use of humidity chart, II) Dew point method.
VII. Surface evaporation – To calculate the mass transfer coefficient from water to air.
VIII. Size analysis by sieving – To evaluate size distribution of tablet granulations – construction of various size frequency curves including arithmetic and logarithmic probability plots.
IX. Size reduction : To verify the laws of size reduction using ball mill.
X. Demonstration of colloid mill, fluidized bed dryer, freeze dryer and such other major equipments.

Text books: