UNIT – I

UNIT – II
Mechanisms of Drug action: Introduction, Enzyme stimulation, Enzyme inhibition, Sulfonamides and Membrane – active drugs

Note: Introduction, definition, nomenclature, chemical classification, structure, synthesis, general mechanism, mode of action, SAR including physicochemical and stereo chemical aspects, metabolism and therapeutic uses of the drugs from each category shall be studied for the following units. An outline of synthetic procedure of only the drugs, which are official as per Indian Pharmacopoeia and British Pharmacopoeia and mentioned in each category.

UNIT – III
Drugs acting on CNS: A brief study of the chemistry of neurotransmitters.

Hypnotics and Anxiolytics – Phenobarbital, diazepam, alprazolam, glutethimide

Anti-psychotics – Chlorpromazine, haloperidol, clozapine, oxypentene.
Anti-epileptics – Phenytoin, valproic acid, carbamazepine, ethosuximide, meprobamate
Anti-depressants – Imipramine, fluoxetine, doxepine, sertraline.

UNIT - IV
Local anesthetic and General anesthetic agents: Benzocaine, procaine, bupivacaine and lidocaine, halothane, thiopental sodium and ketamine.

UNIT – V
Drugs affecting adrenergic mechanism: Introduction to adrenergic receptors, catabolism
Indirect acting sympathomimetics: Amphetamine, ephedrine, salbutamol, pseudoephedrine, dobutamine, dopamine.

UNIT – VI
Drugs affecting cholinergic mechanism:
Introduction to cholinergic system
Cholinergics - Carbachol, bethanichol
Anticholinesterase - Neostigmine, pyridostigmine
Antidotes for ach inhibitors - PAM (pralidoxime)
Cholinergic blockers - Propantheline, dicycloamine.
Neuromuscular blockers - Galamine, succinyl choline.

UNIT – VII
Anti-adrenergics:
α-blockers - Phenoxybenzamine, prazosine, tolazoline
β – blockers - Propranolol, atenolol, labetelol.

UNIT – VIII
Anti-cholinergics: Atropine, ipratropium bromide, dicyclomine, bipyridine, propantheline
TEXT BOOKS

2. An Introduction to Medicinal Chemistry by Graham. L. Patrick, Oxford University publishers.

REFERENCES

1. C. Hansch, Comprehensive medicinal chemistry, Vol 1 – 6 Elsevier pergmon press, Oxford
5. D. Lednicer, Organic drug synthesis, Vol, 1 – 6, J.Wiley N.Y.
UNIT-I
Capsules: Advantage and disadvantages of capsule dosage forms, material for production of hard and soft gelatin capsules, sizes of capsules, capsule filling, soft processing problems in capsule manufacturing, importance of base absorption and minimum/gm factors in soft capsules, quality control, stability testing and storage of capsule dosage forms.

UNIT-II
Microencapsulation: Types of microencapsulation and importance of microencapsulation in pharmacy, microcapsulation by coacervation phase separator, multi orifice centrifugal separation. Spray drying, spray congealing, polymerization complex emulsion, air suspension technique, and pan coating techniques, evaluation of microcapsules.

UNIT-III
Tablets: Introduction to different types of tablets, formulation of chewable tablets, sublingual tablets, medicated lozenges, effervescent tablets, sugar coated, film coated and enteric coated tablets. Granulation technology on large-scale by various techniques. Physics of tablet making. Types of tablet compression machinery and the equipments employed evaluation of tablets.

UNIT-IV
Coating of Tablets: Types of coating, coating materials and their selection, formulation of coating solution, equipment for coating, coating processes, evaluation of coated tablets.
UNIT-V
Parenteral Products
a. Preformulation factors, routes of administration, water for injection, treatment apyrogenicity, non-aqueous vehicles, isotonicity and methods of its adjustment.
b. Formulation details, container and closures and selection.
c. Prefilling treatment, washing and sterilization of containers and closures, preparation of solution and suspensions, filling and closing of ampules, vials, infusion fluids, lyophilization & preparation of sterile powders, equipment for large-scale manufacture and evaluation of parenteral products.

UNIT-VI
Aseptic techniques, sources of contamination and method of prevention. Design of aseptic area, laminar flow benches, services and maintenance.

UNIT-VII
Packaging of Pharmaceutical products: Packaging components, types, specifications and methods of evaluation as per I.P. Factors influencing choice of containers, package testing, legal and other official requirements for containers, packing testing.

UNIT-VIII
Methods of packing of solid, liquid and semi-solid dosage forms, Factors influencing packing material, stability aspects of packaging.

TEXT BOOKS

REFERENCES
1. Shobha Rani, Text of Industrial Pharmacy, Hiremath Orient Longman

92
2. Sagarin & MS Balsam, Cosmetics Sciences & Technology Vol.1, 2 & 3 Wiley India Pvt. Ltd.
4. E.A. Rawlkins, Bentley’s Text Book of Pharmaceutics, Elbs publ
5. HC Ansel Introduction to Pharmaceutical Dosage forms 3rd Indian Ed; K M Varghese & Co., Bombay.
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
ANANTAPUR

B. Pharmacy III –II Semester

(9R01603) PHARMACOLOGY – II

UNIT-I
Pharmacology of Cardiovascular System - Hypertension & congestive heart failure
h. Digitalis and cardiac glycosides
i. Antihypertensive drugs.
j. Drugs used in the therapy of shock.

UNIT-II Pharmacology of Drugs used in coronary artery disease

UNIT-III Pharmacology of drugs used arrythmias

UNIT-IV
Drugs acting on hematopoietic system
a. Anti-coagulants, Anti-platelets & Thrombolytics.
b. Hematinics.

UNIT-V
Drugs acting on urinary system
a. Fluid and electrolyte balance
b. Diuretics

UNIT-VI
Autacoids
a) Histamine, 5-HT and their antagonists.
b) Prostoglandins, Thromboxanes and leukotriene
c) Pentagastrin, cholecystikinin, angiotensin, bradykinin and substance P.

UNIT-VII
Harmone and Harmone antagonists
a) Insulin, Oral hypoglaceamics agents
b) Thyroid and antithyroid drugs  
c) Adrenocortical steroids and their analogues  
d) Uterine stimulants and relaxants

UNIT-VIII  
Drugs Acting on the Respiratory System  
a. Anti-asthamatic drugs including bronchodilators.  
b. Anti-tussives and expectorants.  
c. Respiratory stimulants.

TEXT BOOKS


REFERENCE BOOKS

3. J. Crossland, Lewis‘s Pharmacology, Church living stone.  
UNIT – I

Opium alkaloids: Structural features of Morphine molecule – Peripheral groups. Modification of structure and effect on analgesic activity – SAR of morphine and morphine-like analgesics.

Narcotic antagonists: Nalorphine, Levallorphan. Anti-tussive agents: Noscapine, Dextromethorphan. Smooth muscle relaxants: Papaverine and related compounds like ethaverine, Dixoynline. Structures and uses of these compounds.

Tropane alkaloids: Structures of Atropine/hyoscyamine, Hyoscine, Hydrolytic products of these – Tropine and Scopine. Relationship between tropine & pseudotropine. Biological actions and uses of tropane alkaloids. Homatropine.

UNIT – II

Ergot alkaloids: Classification, structures, hydrolytic products, pharmacological actions, therapeutic uses and toxicity. Synthetic derivatives: Methylergonovine (Methylergometrine), LSD, ethysergide.

UNIT – III
Terpenoids: Volatile oils: Definition of terpenoids, Classification, isoprene, special isoprene and gem-dialkyl rules.

Citrals: Sources and structures, isomerism in citral, citral-a (Geranial), citral-b (Neral). Reduction of citral to citronellal, citronellol, geraniol and

**Alfa – Terpeniol:** Sources and structure. Conversion into p-cymene, 1,8-terpene, terpinolene, dipentene, dipentene dihydrochloride. Preparation of alfa-terpeneol from limonene/dipentene, 1,8-Terpin and pinene.

**UNIT – IV**

**Carvone:** Sources and structure. Conversion into Carvacrol. Reduction of Carvone with different reagents. Synthesis from Limonene/Dipentene and alfa – Terpeneol.

**Menthol and menthone:** Sources, structures and uses. Oxidation of menthol to menthone. Conversion of menthol into thymol.

**1,8-cineole:** Sources and structure. Preparation from Cis-terpin. Mention of 1,4-cineole.

**Camphor:** Source, properties, commercial method of preparation from α-pinene and uses. Oxidation to camphoric acid and camphoronic acids, conversion into p-cymene. Reduction of camphor to Borneol & isoborneol. Source, structures, uses of isoborneol. Oxidation of borneols to camphor.

**UNIT – V**


**UNIT – VI**

**Steroidal Anti-Inflammatory drugs:** Classification, structures, SAR, uses & toxicity.

Cardiac glycosides: structures of glycosides from Digitalis, Strophanthus, Squill and Bufo. Enzymatic and acid hydrolytic reactions of the glycosides. Mechanism of action, SAR, therapeutic uses and toxicity.

**Bile acids:** Names, structures and functions.

**UNIT – VII**

**Hormones: Sex Hormones:** Male and female sex hormones.


UNIT – VIII

Adrenal Cortex Hormones:


Glucocorticoids: Cortisone & Hydrocortisone – Structure, biological actions, uses.

Hormones of Pancreas:


NOTE:

1. Structure elucidation of compounds is not included in the syllabus.
2. Structural features like the basic nucleus; presence of substituent groups will be discussed.
3. Simple reactions like hydrolysis, selenium dehydrogenation, oxidation, reduction etc., will be taught wherever applicable.

TEXT BOOKS

1. Text Book of Pharmacognosy and Phytochemistry by Prof. B. Duraiswamy, Dr. G.S. Kumar and Prof. K.N.Jayaveera. S.Chand & Co 2010
2. JB Harborne, Phyto Chemical methods. Springer.

REFERENCES

1. RT Morrison and R.N Boyd, Organic chemistry, Allyn and Bacon, Inc., Boston
4. RM. Acheson, an introduction to the chemistry of heterocyclic compounds, Interscience NY.
5. Duquesn & others, Practical pharmacognoccy, CBS Publ.
UNIT-I
Introduction
a. Pharmaceutical Legislations - A brief review
b. Drugs & Pharmaceutical Industry - A brief review
c. Pharmaceutical Education - A brief review.
d. Pharmaceutical ethics & policy

An elaborate study of the following

UNIT-II
Pharmacy Act 1948

UNIT-III
Drugs and Cosmetics Act 1940 and Rules 1945

UNIT-IV
Medicinal & Toilet Preparations (Excise Duties) Act 1955

UNIT-V
Narcotic Drugs & Psychotropic Substances Act 1985 & A.P. N. D. P.S Rules 1986

UNIT-VI
Drugs (Prices Control) Order 1995.

UNIT-VII

UNIT-VIII
A study of the salient features of the following.
c. Factories Act 1948.
d. WTO, GATT and The Indian Patents Act 1970
Note: The teaching of all the above Acts should cover the latest amendments.

TEXT BOOKS

1. B.M.Mithal, Text book of Forensic Pharmacy, publ by Vallabh Prakashan

REFERENCE BOOK

1. Bare Acts and Rules Publ by Govt of India/state Govt from time to time.
2. Pharmaceutical policy of India
3. Notification from NPPA
4. Vijay Malik, Drugs & Cosmetics act 1940 and Rules, Eastern Law House Co. Delhi, Kolkata.
1. Introduction

The Advanced English Language Skills Lab introduced at the 3rd year B.Tech level is considered essential for the student for focusing on his/her career. At this stage it is imperative for the student to start preparing for the ever growing competition in the job market. In this scenario, in order to be on par with the best, he/she needs to improve his/her Communication and soft skills.

This course focuses on the practical aspects of English incorporating all the four (LRSW) skills relevant to the requirements of the prospective employers in view of globalization. The proposed course will enable the students to perform the following:

- Intensive reading to improve comprehension and communication
- Attentive listening for better understanding
- Write project/research/technical reports
- Write Resume’ to attract attention
- Discuss ideas / opinions for better solutions
- Face interviews confidently
- Gather information, organize ideas, and present them effectively before an audience
- To help the students cultivate the habit of reading passages from the computer monitor, thus providing them with the required ability to face computer-based competitive exams such GRE, TOEFL, CAT, GMAT etc.
2. Objectives:
Keeping in mind the previous exposure of the student to English, this lab focuses on improving the student’s proficiency in English at all levels. The lab intends to train students to use language effectively, to participate in group discussions, to help them face interviews, and sharpen public speaking skills and enhance the confidence of the student by exposing him/her to various situations and contexts which he/she would face in his/her career.

3 Syllabus
The following course content is prescribed for the Advanced Communication Skills Lab:

Reading Comprehension -- Reading for facts, guessing meanings from context, speed reading, scanning, skimming for building vocabulary (synonyms and antonyms, one word substitutes, prefixes and suffixes, idioms and phrases.)

Listening Comprehension -- Listening for understanding, so as to respond relevantly and appropriately to people of different backgrounds and dialects in various personal and professional situations.

Technical Report Writing—Types of formats and styles, subject matter, organization, clarity, coherence and style, data-collection, tools, analysis

Resume’ Writing—Structure, format and style, planning, defining the career objective, projecting one’s strengths, and skills, creative self marketing, cover letter

Group Discussion-- Communicating views and opinions, discussing, intervening, providing solutions on any given topic across a cross-section of individuals,(keeping an eye on modulation of voice, clarity, body language, relevance, fluency and coherence) in personal and professional lives.
Interview Skills—Concept and process, pre-interview planning, mannerisms, body language, organizing, answering strategies, interview through tele and video-conferencing

Technical Presentations (Oral)— Collection of data, planning, preparation, type, style and format, use of props, attracting audience, voice modulation, clarity, body language, asking queries.

4. Minimum Requirements
The English Language Lab shall have two parts:

The Computer aided Language Lab for 60 students with 60 systems, one master console, LAN facility and English language software for self-study by learners.
The Communication Skills Lab with movable chairs and audio-visual aids with a P.A System, a TV, A digital stereo-audio and video system, Camcorder etc

System Requirement (Hardware Component):
Computer network with LAN with a minimum of 60 multimedia systems with the following specifications:
P-IV Processor, Speed-2.8 GHz, RAM_512 MB minimum, Hard Disk-80 GB, Headphones

Prescribed Software: GLOBARENA

Books Suggested for English Language Lab Library (to be located within the lab in addition to the CDs of the text book which are loaded on the systems):

9. **From Campus To Corporate** by KK Ramachandran and KK Karthick, Macmillan Publishers India Ltd, 2010
10. **English Language Communication : A Reader cum Lab Manual**
    Dr A Ramakrishna Rao, Dr G Natanam & Prof SA Sankaranarayanan, Anuradha Publications, Chennai 2008.
I. **Synthesis of some medicinal compounds and their analogues.**
   i. Barbituric acid from Diethyl Malonate.
   ii. Phenytion from Benzoin or Benzil.
   iii. Paracetamol from \textit{para}-nitro phenol or \textit{para}-aminophenol.
   iv. Diphenyl quinaoxaline.
   v. Butamben
   vi. Sulfanilamide from acetanilide
   vii. Isoniazid from \(\gamma\)-picoline.
   viii. Antipyrine from ethyl aceto acetate.
   ix. Benzocaine from PABA.
   x. 4-hydroxy coumarin from resorcinol

II. **Monograph analysis of the following compounds**
   i. Acetazolamide
   ii. Aminopyrine
   iii. Ascorbic acid
   iv. Caffiene
   v. Sulfanilamide
   vi. Paracetamol
   vii. Atropine sulfate
   viii. Aspirin
   ix. INH

**REFERENCES**
1. Practical Medicinal Chemistry (Synthesis & Analysis) by Prof. K.N.Jayaveera; S.M.Enterprises.

LIST OF MINIMUM EQUIPMENT REQUIRED
1. Water bath
2. Suction pumps
3. Analytical/physical balance
4. Triple beam balance
5. Reflux flask with condenser
6. Hot plates
7. Refrigerator
8. Mechanical and magnetic stirrer with thermostat
9. Distillation unit
10. Oven
11. Adequate glasswares
1. Manufacturing of tablets:
   a. Ordinary compressed tablets by wet granulation.
   b. Tablets prepared by direct compression
   c. Soluble tablets/dispersible granules
   d. Chewable tablets
   e. Effervescent tablets.

2. Evaluation of tablets (Weight variation, hardness, friability, disintegration and dissolution)


4. Parenterals:
   a. Manufacturing of parenterals (Ampule sealing (Pull sealing and tip sealing))
   b. Evaluation of parenterals (Clarity test, pyrogen free test (LAL), sterility test and leaking test).

**LIST OF MINIMUM EQUIPMENT REQUIRED**

1. Hot air oven
2. Roche’s friabilator
3. Pfizer’s hardness and Monsanto hardness meter
4. Tablet punching machine
5. Mortar and pestle
6. Sieves with different grades
7. Empty ampoules
8. Clarity test apparatus
9. Ampoule filling machine
10. Ampoule sealing machine
11. Digital balance
12. Disintegration apparatus
13. Dissolution apparatus
14. Adequate Glasswares
15. LAL test diagnostic kit
1. Introduction to Experimental Pharmacology
   Preparation of different solutions for experiments.
   Drug dilutions, use of molar and w/v solutions in experimental
   Pharmacology.
   Common laboratory animals and anesthetics used in animal studies.
   Commonly used instruments in experimental pharmacology.
   Some common and standard techniques.
   Bleeding and intravenous injection, intragastric administration.

2. Experiments on intact preparations:
   Study of different routes of administration of drugs in mice/rats.

3. Experiments in Central Nervous system:
   Recording of spontaneous motor activity, locomotor activity, anti-
   depressant, stereotype, analgesia, anticonvulsant activity,
   anti-inflammatory activity,
4. To study the effect of autonomic drugs on rabbit’s eye
5. To study the effects of various agonists and antagonists and their
   characterisation using isolated preparations like frog's rectus abdominus
   muscle and isolated ileum preparation of rat & guinea pig.

   Experiments on Isolated Preparations:
   a. To record the concentration response curve (CRC) of acetylcholine
   using rectus abdominus muscle preparation of frog.
   b. To study the effects of physostigmine and d-tubocurarine on the crc of
   acetylcholine using frog rectus abdominus muscle preparation of frog.
   c. To record the CRC of 5-HT on rat fundus preparation.
   d. To record the CRC of histamine on guineapig ileum preparation.
ii. a. To study the inotropic and chronotropic effects of drugs on isolated frog heart.
   b. To study the effects of drugs on normal and hypodynamic frog heart.

6 Experiments pertaining to analgesia, anti-convulsant activity, anti-inflammatory activity.

NOTE: CPCSEA approval to obtained for experiments on animals

Text Book:
1. Experimental Pharmacology and Toxicology By Dr. B. M. Vrushabendra Swamy and Prof. K. N. Jayaveera, S. Chand & Co.,

LIST OF MINIMUM EQUIPMENT REQUIRED

1. Sherrington’s kymograph machine
2. Sherrington’s drum
3. Student organ bath
4. Aerators
5. Dissection trays and boards
6. Hemostatic artery forceps
7. Hypodermic syringes and needles of size 18, 24 and 26G
8. Standard graphs of various drugs
9. Actophotometer
10. Analgesiometer (Eddy’s hotplate and radian heat method)
11. Convulsometer
12. levers, canula
13. Plethysmograph
14. Rotarod apparatus
15. Pole climbing apparatus
1. Preparation of different alkaloid testing reagents like Dragendorff, Mayer’ Wagner’s, etc. and testing some alkaloids and plant extracts using these reagents.
2. Identification of alkaloids by specific colour tests.
3. Tests for steroids, steroidal glycosides and cardiac glycosides. Liberman- Burchard test, Salkowski reaction, Kedde reaction, etc.
4. Tests for flavanoids and their glycosides. Shinoda Test (Mg /Hcl test), FeCl₃ test.
5. TLC end examination of alkaloids, steroids, steroidal glycosides and cardiac glycosides.
7. Extraction of caffeine from tea leaves.
8. Extraction of lactose from milk.
9. Extraction of nicotine from tobacco.
10. Extraction of piperine from black pepper.
11. Extraction of lycopene from tomatoes.
12. Extraction of beta - carotene from carrots.
13. Volatile oil production by steam distillation (Demonstration only)

TEXT BOOKS

1. Practical Pharmacognosy by Prof.B.Durai Swamy and Prof.K.N.Jayaveera. S.Chand & Co.,
2. Indian Pharmacopoeia – 1996.
LIST OF MINIMUM EQUIPMENT REQUIRED

1. Soxhlet extraction apparatus
2. Heating mantle
3. Steam distillation apparatus
4. TLC kit
5. Water bath
6. Hot plates
7. Oven
8. Adequate glasswares.