COURSE STRUCTURE
AND
DETALLED SYLLABUS

II - B.PHARMACY - I & II - SEMESTERS

B - PHARMACY

FOR
B.PHARMACY FOUR YEAR DEGREE COURSE
[Choice Based Credit System (CBCS)]
R15 Regulations
(Applicable for the batches admitted from 2015-2016 Onwards)

ANURAG GROUP OF INSTITUTIONS
AUTONOMOUS
VENKATAPUR, GHATKESAR, HYDERABAD – 500 088, TELANGANA STATE.
# II YEAR I SEMESTER

## COURSE STRUCTURE

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<th>Subject Code</th>
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Note: All the end examinations (Theory and Practical) are of Three hours duration.

T – Tutorial  
P – Practical
PHARMACEUTICAL UNIT OPERATIONS – I

Objective: The student shall be exposed to various aspects of handling of materials, fluids, application of Extraction, Evaporation, Distillation, drying, size reduction, size separation and mixing in Pharmaceutical Industry.

UNIT-I
Unit operation: Definition of laboratory scale, pilot scale, and industrial scale operations. Unit processes, material and energy balance. Material handling systems. Handling of solids: Belt, screw, chain, pneumatic and bucket conveyers Hadling of liquids: reciprocating pumps, piston pumps Handling of gases: Fans, Reciprocating compressor, centrifugal blower

UNIT-II
Extraction: Theory of extraction, seed extraction, equipment, counter current extraction, leaching of solids and equipment.
Evaporation: Basic concept of phase equilibria, factors affecting the evaporation. Principle, construction, working, advantages, disadvantages and pharmaceutical applications of following evaporators, film evaporators, single effect and multiple effect evaporators.

UNIT-III
Distillation: Raoult's law, volatility, simple steam and flash distillations, principles of rectification, Azeotropes and extractive distillation.
Drying: Moisture content and mechanism of drying, rate of drying and time of drying calculations, classification and types of dryers. Principle, construction, working, advantages, disadvantages and pharmaceutical applications of tray dryer, Fluid bed dryer, spray dryer and freeze-dryer.

UNIT-IV
Size Reduction and size separation: Definition, objectives of size reduction, factors affecting size reduction, laws governing energy and power requirements of a mill, Principle, construction, working, advantages, disadvantages and pharmaceutical applications of ball mill, hammer mill, fluid energy mill. Official standards for powders, modes of motions in size separation. Sieve analysis: testing of powders, equipment for size separation: Rotex Screen, cyclone separator, Air separator, bag filter.

UNIT-V
Mixing: Theory of mixing, solid solid, solid liquid and liquid liquid mixing. Mixing of solids: Twin shell blender, double cone, Sigma blade, planetary mixer, ribbon blender; Mixing of liquids: silverson mixer, colloid mill; Mixing of semi solids: Triple roller mill.

Outcomes: Student will understand the concepts of fluid flow, parameters of Evaporation, Distillation, drying, size reduction, size separation and mixing. They also understand the safety factors and possess a sound knowledge of the above.
TEXT BOOKS
**PHARMACEUTICAL ORGANIC CHEMISTRY – III**

**Scope and Objective:** This course is designed to impart a very good knowledge about
a) The chemistry of highly complicated organic compounds like heterocyclic’s, carbohydrates, aminoacids, polypeptides and proteins along with their stereo chemical aspects; and
b) Some named organic reactions with mechanisms

**Note:** Definition, nomenclature, structure, acidity-basicity and characteristic reactions of the following heterocyclic compounds of Unit I. Few examples of drugs which contain the cited ring system.

**UNIT – I**
**Five membered and six membered ring systems with one hetero atom:**
Furan, Pyrrole and Pyridine.

**Fused ring systems with one hetero atom:**
Indole, Quinoline and Iso-quinoline

**Five membered and six membered ring systems with two hetero atoms:**
Pyrazole, Imidazole, Oxazole, Isoxazole, Thiazole and Pyrimidine.

**Fused ring systems with two hetero atoms:** Benzimidazole, Phenothiazine

**UNIT – II**
**Stereochemistry of Carbon compounds:** Optical rotation, plane polarized light, optical activity, chirality, notations (assignment of configuration), relative configuration (Fischer DL configuration) and absolute configuration (R&S), sequence rules with examples, enantiomers, meso compounds, racemic mixture and resolution of racemic mixtures, Elements of symmetry.Stereochemistry of alkenes: Concept of E & Z configurations.

**UNIT-III**
**Carbohydrates:** Definition, classification, nomenclature, study of glucose structure, mutarotation, oxidation-reduction reactions, osazone formation, epimerization, Lobry De Bruyn – Van Ekenstein reaction, structure of the disaccharide sucrose, glycosidic linkage, structural components of starch and cellulose.
A brief account on pharmaceutical importance of various carbohydrates.

**UNIT-IV**
a) **Amino acids:** Definition, classification, essential amino acids, configuration, three important methods of preparation, Zwitter ionic nature, isolectric point. A brief account
on the pharmaceutical importance of amino acids.

b) **Polypeptides and proteins**: Definition, Classification, denaturation, C-terminal and N-terminal concept, Peptide synthesis. A brief account of the pharmaceutical importance of Polypeptides and proteins.

c) **Lipids (oils and fats)**: Definition, fatty acids, characterization of lipids (Saponification value, acid value and Iodine value), hydrogenation and rancidity of oils and fats.

**UNIT - V**

a) Definitions of nucleic acids, nucleotides, nucleosides. A brief account on structure of DNA and RNA.

b) **A study of the mechanism and application in synthesis of the following named reactions**

A. Beckmann rearrangement  
B. Birch reduction  
C. Mannich reaction  
D. Michael addition reaction

**Outcome**: as the structural and stereo chemical aspects and chemistry of organic compounds are discussed, it would help the students to have a good command over structural composition of organic compounds to evaluate and analyse the chemistry of these compounds.

**TEXT BOOKS**


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B.Pharmacy II year I Sem.

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BIOSTATISTICS

LEARNING OUTCOMES
After studying this course, the student will
1. Understand the basic concepts and terminology of biostatistics, including the various kinds of variables, frequency, measurement, and measurement scales.
2. Understand the probability and distributions and how to use them to calculate probabilities in real-world problems.
3. be able to calculate and interpret parametric and non-parametric statistics for making statistical inferences.
4. Understand how regression and correlation differ and when the use of each is appropriate.
5. able to calculate and interpret the epidemiological concepts of relative risk, odds ratios.

Unit-1: INTRODUCTION TO BIOSTATISTICS: Introduction, Some Basic Concepts (Data, Statistics, Sources of Data, Biostatistics, Variable (Quantities, Qualitative, Random, Discrete and Continuous), Population, Sample), Measurement and Measurement Scales (Nominal, Ordinal, Interval, Ratio), Sampling (random and non-random), The Scientific Method and the Design of Experiments

DESCRIPTIVE STATISTICS: Introduction, Measures of Central Tendency, Descriptive Statistics: Measures of Dispersion


ANALYSIS OF VARIANCE: Introduction, the Completely Randomized Design, the Randomized Complete Block Design, Latin Square Design.

Unit-4: SIMPLE LINEAR REGRESSION AND CORRELATION: Introduction, the Regression Model, the Sample Regression Equation, Evaluating the Regression Equation, the Correlation Model, the Correlation Coefficient.


Reference Books:
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B.Pharmacy II year I Sem.  

PHYSICAL PHARMACY-I

Objective: The student shall know important physical properties of drug molecules, phase value & its importance. Different law of thermodynamics, electrolyte and non-electrolyte solutions, importance of pH and drug research.

UNIT-I

Intermolecular forces and states of matter: Binding forces between molecules, the states of matter, the gaseous state, the liquid state, solids and the crystalline state.

Phase equilibria and the phase rule: Systems containing one, two and three components. Physical properties of Drug Molecules: Dielectric constant induced polarization, dipole moment, refractive index and molar refraction, optical rotatory dispersion.

UNIT-2

Thermodynamics: The first law of thermodynamics. Thermochemistry. The second law of thermodynamics. The third law of thermodynamics, Free energy functions and applications.

UNIT-3

Solutions of Non electrolytes: Concentration expressions, ideal and real solutions, colligative properties, molecular weight determinations.


UNIT-4

Ionic equilibria: Modern theories of acids, bases and salts, Sorensen's pH scale, specific concentration as a function of pH, calculation of pH, acidity constants.

Buffers and buffered isotonic systems: The buffer equation, buffer capacity, buffers in pharmaceutical and biological systems, buffered isotonic solutions, methods of adjusting tonicity and pH (relevant numerical problems).

UNIT-5

Micromeritics: Particle characteristics, Particle size and size distribution, methods for determining particle size, powder characteristics, methods for determining surface area, pore size, particle shape and surface area, Porosity, derived properties of powders.

Outcomes: Student will know about the physical properties of molecules, particle size & distribution. Three laws of thermodynamics, properties of electrolytes and non electrolytes, pH and buffers. They also understand the importance of these studies in the physical pharmaceutics & formulation development.

Text Books

Objective: This subject is designed to impart fundamental knowledge on the structure and functions of the various systems of the human body. It also helps in understanding both homeostatic mechanisms and homeostatic imbalances of various systems of the body. Since a medicament, which is produced by the pharmacist, is used in various disease conditions to correct the abnormal functioning of the body systems, the basic knowledge of this subject is must for a student to understand how drugs act on various systems/organs in correcting the disease state of organs/systems. Thus it becomes a prerequisite subject for the pharmacy course.

UNIT-I


UNIT-II

A. Urinogenital system: Various parts, structures and functions of the kidney and urinary tract. Physiology of urine formation and acid base balance, Male and Female reproductive systems, physiology of menstruation, coitus and fertilization. Sex differentiation, spermatogenesis.

B. Pathophysiology of following diseases:
Renal failure, Glomerulonephritis, Renal calculi, Urinary Tract Infections (UTI), Infertility, Sexually transmitted diseases (STD), Dysmenorrhea

UNIT-III

A. Digestive System: Gross anatomy of the gastro intestinal tract, functions of its different parts including those of the liver, pancreas and gall bladder, various gastrointestinal secretions and their role in the absorption and digestion of food.

B. Pathophysiology of following diseases:
Peptic ulceration, Zollinger – Ellison’s Syndrome, Inflammatory Bowel Disease, Jaundice, Hepatitis

UNIT-IV

A. Respiratory System: Anatomy and functions of respiratory system, mechanism and regulation of respiration, respiratory volumes and vital capacity.

B. Pathophysiology of following diseases:
Asthma, COPD, Tuberculosis
UNIT-V

**Hormones and functions in Health and disease:** Basic anatomy and physiology of pituitary, thyroid, parathyroid, adrenals, pancreas, testes and ovary, their hormones and functions.

**Outcome: Upon completion of the course the student shall be able to**

1. Understand the gross morphology, structure and functions of various organs of the human body. Understand the various homeostatic mechanisms and their imbalances.
2. Identify the various tissues and organs and study the pathophysiology of different systems of human body.
3. Appreciate coordinated working pattern of different organs of each system
4. Appreciate the interlinked mechanisms in the maintenance of normal functioning (homeostasis) of human body.
5. Perform the simple urine analysis for normal and abnormal constituents and also record human body temperature, pulse rate and Body Mass Index etc...

**TEXT BOOKS**

Objectives:
1. This course will give the importance of maintenance of ecological balance for sustainable development.
2. Understanding the impacts of developmental activities and mitigation measures.
3. Understanding of environmental policies and regulations

UNIT-I:
The Multidisciplinary nature of environmental studies:
Definition, scope and importance.
Natural Resources:
a. Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.
b. Water resources: Use and over-utilization of surface and ground water, floods, drought, dams-benefits and problems.
c. Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
d. Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-agrochemicals problems, water logging, salinity, case studies.
e. Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources, case studies.
f. Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

UNIT-II:
Introduction, types, characteristic features, structure and function of the following ecosystem:
a) Forest ecosystem b) Grassland ecosystem, c) Desert ecosystem, d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

UNIT-III:
Biogeographically, classification of India. Value of biodiversity: consumptive use, productive use, and social, ethical, aesthetic and option values, biodiversity at global, national and local
levels. India as a mega-diversity nation. Hot spots of biodiversity. **Threats to biodiversity:**
Habitat loss, poaching of wildlife, man-wildlife conflicts. Endangered and endemic species of India.

**Conservation of biodiversity:** In-situ conservation of biodiversity

**UNIT-IV**

**Environmental Pollution: Definition, causes, effects and control measures of:**
a) Air pollution, b) Water pollution, c) Soil pollution, d) Marine pollution, e) Noise pollution, f) Thermal pollution and g) Nuclear hazards.

**Solid and liquid waste Management:** Causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution. Pollution case studies.

**Disaster management:** Floods, earthquake, cyclone and landslides.

**UNIT-V**

**Social Issues and the Environment:** From unsustainable to sustainable development. Urban problems related to energy. Water conservation, rain water harvesting, watershed management Resettlement and rehabilitation of people; its problems and concerns.

**Case studies. Environmental ethics:** Issues and possible solutions. Climate change, global warming, acid rain, ozone layer depletion, nuclear Accidents and holocaust.


**Human population and the Environment**


**TEXT BOOKS**

7. K. C. Agarwal (2008), Environmental Biology, Bikaner, Nidi Publishers Ltd,
I. Synthesis of some heterocyclic compounds.
   a. Benzotriazole from O-phenylene diamine.
   b. 2,3-Diphenyquinoxaline from O-phenylene diamine.
   c. Piperazine-2,5-dione from Glycine.
   d. 1,4-dihydro pyridine from ethyl acetoacetate.

II. Molecular rearrangements and named reactions
   a. Benzimidazole from o-phenylenediamine (Phillip’s Reaction).
   b. Benzanilide from benzophenone oxime (Beckmann’s rearrangement)
   c. Preparation of 2-phenylindole from Phenyl hydrazine by Fischer’s method.

III Analysis of oils & fats
   a. Determination of Acid value of a fixed oil.
   b. Determination of Saponification value of a fixed oil.
   c. Determination of Iodine value of a fixed oil.

IV. Systematic analysis of organic binary mixtures

REFERENCES

5. Indian Pharmacopoeia. – 2010.
ANURAG GROUP OF INSTITUTIONS
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B.Pharmacy II year I Sem

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COMPUTER APPLICATIONS LAB

1. Sample programs in C: Program to calculate simple and complex arithmetic expressions, program using structures, program using loops and nested loops, program using functions and simple programs using arrays.
2. Operating systems like WINDOWS, UNIX, etc
3. Software packages like MS-WORD, EXCEL, ACCESS and POWER POINT.
1. Molecular weight – Rast-camphor method
3. Calibration of pH Meter
4. pH Estimation – pH meter
5. Phenol water system – CST
7. Determination of Refractive index of liquids.
8. Preparation of Buffers and Buffer Capacity Determination.
11. Percent composition – polarimeter & refractometer
12. Lower consolute temperature – Tea and Water
13. Effect of particle size and effect of glidant on angle of repose
14. Microscopic size analysis.
15. Determination of particle size by Andreason Pippette
Health Education and Pathophysiology Lab

1. Study of reproductive system with the help of charts and models – 2 Experiments.
2. Study of Various devices used in Family planning like Copper T, Lippers loop, Pills, Diaphragm and Condom.
4. Microscopic studies of abnormal tissue sections – 4 Experiments.
5. Simple experiments involved in the analysis of normal and abnormal urine; collection of specimen, appearance, determination of pH, sugars, proteins, urea and creatinine – 4 Experiments.
7. Determination of tidal volume & vital capacity.

REFERENCES
PHARMACEUTICAL UNIT OPERATIONS-II

Objective: The student shall be taught on operations like Filtration, Centrifugation, Crystallization, Industrial hazards and safety precautions.

UNIT –I
Fluid Flow: Types of flow, Reynold's number, viscosity, concept of boundary layer, basic equations of fluid flow, valves, flow meters, manometers and measurement of flow and pressure. Concept of fluid statics and dynamics, Bernoulli’s theorem.
Convection: - Natural and forced convection, temperature gradients in forced convection, surface and over all coefficients. Parallel current and counter current flow.
Radiation: -black body, Stefan Boltzaman law, and gray body. Heaters, heat interchangers, scraped surface exchangers, extended surface equipment.
Steam as heating medium: - properties and uses of steam traps, vacuum pumps, condensers, entrainment separators, foam and its prevention.

UNIT-II

UNIT-III

UNIT-IV
Dehumidification and Humidity control :Basic concepts and definition, wet bulb and adiabatic saturation temperature. Psychrometric chart and measurement of humidity, application of humidity measurement in pharmacy, equipments for dehumidification operations.

UNIT-V
Industrial hazards and safety precautions: Mechanical, Chemical, Electrical, fire and dust hazards. Industrial dermatities, accident records.
**Outcome:** Students will be familiar with concepts of Filtration, Centrifugation, Crystallization, Industrial hazards and safety precautions and understand the pharmaceutical applications in industry.

**TEXT BOOKS**
Objective: The basic concepts and analytical techniques of various pharmaceuticals are discussed in a detailed manner.

UNIT–I
Computation of analytical results, significant figures, concept of error, precision, accuracy, standard deviation, rejection of doubtful values with special reference to volumetric analysis. Calibration of analytical equipment used in volumetric analysis.
A) Theory of Neutralization Titration: Acidimetry, Alkalimetry and pH indicators.
B) General Principles and theory of oxidation-reduction methods. An account of the indicators used in these titrations.
Application of the above methods in the analysis of drugs.

UNIT–II

B) Non-aqueous Titration: Theory, types, solvents used and application in pharmaceutical analysis.
C) Precipitation Titration: Theory, types and application in pharmaceutical analysis.

UNIT–III
A) Potentiometry: Types of Electrodes Potentiometric titrations, applications in pharmaceutical analysis.
B) Conductometric titrations: Basic concepts, different types of conductometric titrations, applications in pharmaceutical analysis.
C) Polarography: Apparatus and principles, general Applications in pharmaceutical analysis.

UNIT – IV
A) Differential Scanning Calorimetry & Differential Thermal Analysis
B) Radio Immuno Assay & Enzyme Linked Immunosorbent Assay
C) Principle, instrumentation and applications involved in the following
   i) Refractometry
   ii) Polarimetry
UNIT-V
Study of separations and determinations involving the following techniques and their applications in pharmacy.
B) Thin layer chromatography: Theoretical consideration, preparation, procedure, detection of compounds.
C) Paper chromatography: Theory of partition, different techniques employed, filter papers used, quantitative and qualitative detection.
D) Introduction to paper electrophoresis.

Outcome: The knowledge gained upon the detailed study of the analytical techniques will be useful to analyze the pharmaceutical substances in a systematic, qualitative and quantitative manner.

TEXT BOOKS

REFERENCE BOOKS
3. Indian Pharmacopoeia 2014
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B.Pharmacy II year II Sem.  L  T/P  C
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PHARMACOGNOSY – I

Objectives: To know the medicinal and pharmaceutical importance of drugs obtained from the natural sources and to acquire the knowledge on crude drugs by studying them under a suitable pharmacognostic scheme.

Systematic Pharmacognosy study, which includes sources (Biological and Geographical) macroscopic characters, microscopic characters, chemical constituents, chemical tests, uses, substituent and adulterants of the crude drugs mentioned in the following units.

UNIT-I
INTRODUCTION TO PHARMACOGNOSY


NATURAL SOURCES OF DRUGS WITH EXAMPLES

Plant source, Animal source, Mineral source, Marine source and microorganisms. Organized and unorganized crude drugs with examples.

UNIT-II
Cultivation, collection, harvesting, drying, garbling, packing, storage and preservation of medicinal plants. Factors influencing cultivation of medicinal plants.
Plant hormones and their applications. Definitions and examples for Polyploidy, mutation and hybridization with reference to medicinal plants.

UNIT-III
SYSTEMATIC PHARMACOGNOSTIC STUDY OF CARBOHYDRATES AND DERIVED PRODUCTS

Acacia, Agar, Guar gum, Starch, Pectin, Isabgol and Honey.

SYSTEMATIC PHARMACOGNOSTIC STUDY OF FOLLOWING FIBERS

Cotton, Jute, Wool, and Silk.

UNIT-IV
SYSTEMIC PHARMACOGNOSTIC STUDY OF THE FOLLOWING LIPIDS

Plant sources: Castor oil, Linseed oil, Coca butter, and Olive oil.
**Animal sources:** Cod liver oil, Shark liver oil, Bees wax, Wool fat, Spermaceti wax, Lard and Emu bird oil.

**UNIT-V**

**SYSTEMIC PHARMACOGNOSTIC STUDY OF THE FOLLOWING VOLATILE OILS**

Coriander, Cinnamon, Clove, Fennel, Cedar wood oil, Gaultheria, Lavender, Patchouli, Artemesia, Taxus, Coleus and Crocus.

**Outcome:**

At the end of semester the student shall be aware of different sources of crude drugs, cultivation aspects of medicinal and aromatic plants, evaluation methods of crude drugs, the medicinal importance and the role of crude drugs as excipients in various pharmaceutical dosage forms.

**TEXT BOOKS**

Objective: The student shall be taught on industrial phenomenon of liquids, rate & order of reactants, micromeritics, flow of liquids and type of colloids and their properties.

UNIT-I
Introduction to phenomena of diffusion: Ficks first law and second law.

UNIT-2
Complexation: Metal complexes, organic molecular complexes in inclusion complex, and methods of analysis,

UNIT-3
Interfacial Phenomena: Liquid interfaces, measurement of surface and interfacial tensions, adsorption at liquid interfaces. Spreading coefficient Surface-active agents and systems of hydrophilic lipophilic classification, Solubilization, Wetting phenomena and detergency, Adsorption at solid interfaces. Electrical properties of interfaces. (Electrical Double Layer-Concept),

UNIT- 4
Colloids: Introduction, types of colloidal systems, solubilization, Stability of colloids, purification of colloidal dispersions, Gold number, optical properties, kinetic properties, electrical properties and Donnan Membrane equilibrium.

UNIT- 5
Polymers: Definition, Types of Polymers, Water Soluble and Water Insoluble Polymers; Pharmaceutical Application of Polymers.
Outcomes: Student will know about the influence of temperature and other factors on rate of reactants, interfacial phenomena, Newtonian and non-newtonian flows.
Text Books
Objective: The objective of the course is to expose the students all the laws and roles, which are vогes in the country. The scope of the course is extended to update all the laws and roles including recent amendments taken place.

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
e) Pharmaceutical policy 2002

UNIT-II
Drugs and Cosmetics Act 1940 and Rules 1945

UNIT-III
a) Pharmacy Act 1948
b) Drugs (Prices Control) Order 1995.
c) Drugs and Magic Remedies (Objectionable Advertisements) Act 1954 and Rules 1955

UNIT-IV
a) Medicinal & Toilet Preparations (Excise Duties) Act 1955
b) Narcotic Drugs & Psychotropic Substances Act 1985 & A.P. N. D. P.S Rules 1986

UNIT-V
A study of the salient features of the following
c) Factories Act 1948.
d) WTO,
e) The Indian Patents Act 1970

Outcome: The outcomes which are expected from the students at the end of the course are: Familiarization of the students with all the legal tenets and enforceable in the country, besides Pharmaceutical ethics and policies.
TEXT BOOKS


REFERENCES

5. Dr.B.Suresh, 2011, Forensic pharmacy (Forensic Pharmacy), 14th ed, Birla publications Pvt. Ltd, Delhi.
GENDER SENSITIZATION

Course Objectives:

1. To develop students sensibility with regard to issues of gender in contemporary India.
2. To provide a critical perspective on the socialization of men and women.
3. To introduce students to information about some key biological aspects of genders.
4. To expose the students to debates on the politics and economics of work.
5. To help students reflect critically on gender violence.
6. To expose students to more egalitarian interactions between men and women.

Course Outcomes:

1. Students will have developed a better understanding of important issues related to gender in contemporary India.
2. Student will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.
3. Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
4. Students will acquire insight into the gendered division of labour and its relation to politics and economics.
5. Men and women students and professionals will be better equipped to work and live together as equals.
6. Students will develop a sense of appreciation of women in all walks of life.
7. Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the textbook will empower students to understand and respond to gender violence.

Unit-I:
UNDERSTANDING GENDER:

Gender: Why Should We Study It? (Towards a World of Equals: Unit-1)
Socialization: Making Men Making Women (Towards a World of Equals: Unit-2)
Unit-II:
GENDER AND BIOLOGY:


Unit-III:
GENDER AND LABOUR:


Unit-IV:
ISSUES OF VIOLENCE:


Unit-V
GENDER STUDIES:

Note: Since it is Interdisciplinary Course, Resource Persons can be drawn from the fields of English Literature or Sociology or Political Science or any other qualified faculty who has expertise in this field.

Reference Books:
PHARMACEUTICAL UNIT OPERATIONS-II LAB

1. Measurement of flow of fluids and their pressure, determination of reynold's number and calculation of frictional losses.
2. Evaluation of filter media, determination of rate filtration and study of factors affecting filtration including filter aids.
3. Determination of Humidity use of Dry Bulb and Wet Bulb thermometers and Psychometric charts.
5. Determination of rate of evaporation.
6. Determination of rate of drying, free moisture content and bound moisture content.
7. Experiments to illustrate the influence of various parameters on the time of drying.
8. Experiments to illustrate principles of size reduction, Laws governing energy and power requirements of a size reduction.
9. Experiments to illustrate solid solid mixing, determination of mixing efficiency using different types of mixers.
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B. Pharmacy II year II Sem.  

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PHARMACEUTICAL ANALYSIS – I LAB

1. Assay of Pharmaceutical compounds based on chemical methods such as
   a) acid base
   b) oxidation-reduction
   c) non-aqueous
   d) Complexometric titration methods.
2. Conductometric determination of end point of titration of HCl with NaOH.
3. Potentiometric determination of end point.
4. Separation and Identification of drugs by Ascending paper chromatography.
5. Separation and Identification of drugs by Circular paper chromatography.
7. Quantitative determination by Polarimeter.

TEXT BOOKS
3. Indian Pharmacopoeia 2011
PHYSICAL PHARMACY-II LAB

1. Determination of viscosity using Ostwald viscometer.
2. Percent composition – Capillary Flow method
3. Determination of bulk density, true density and percentage porosity.
4. Determination of Surface tension using Stalagmometer
5. Determination of CMC of a surfactant.
6. Partition coefficient determination.
7. Determination of sedimentation volume and degree of flocculation.
8. Determination of Order of reaction – First order.
10. Effect of addition of Salt/pH/cosolvent on the solubility
11. HLB value estimation of surfactants.
12. Preparation of Multiple emulsion - Demonstration.
13. Demonstration of Brook field viscometer.
14. Calculation of Zeta potential – Demonstration
PHARMACOGNOSY - I LAB

1. Spotting of crude drugs mentioned in the theory.
2. Collection of natural herbs and preparation of herbarium / laminated photos for five drugs.
4. Isolation and determination of volatile oil content in caraway fruit/clove.
5. Measurement of size range of phloem fibers in Cinnamon powder.
6. Chemical test for identification and detection to adulteration in acacia, tragacanth, agar and honey.
7. Determination of Swelling factor of isabgol seeds
8. Perform the Transverse section of following crude drugs Fennel, coriander, clove, cinnamon.
9. Perform the physical evaluation of olive oil/castor oil (Solubility, density and viscosity)
10. Perform the chemical methods of evaluation of crude drugs containing fixed oils and lipids, methods mentioned in IP for Castrol oil, Olive oil, Kokum butter, bees wax.
11. Extraction of pectin from orange peels.

TEXT BOOKS
2. Kokate, C. K., Practical Pharmacognosy, 2004, Delhi, Vallabh Prakashan, 4\textsuperscript{th} edition.