Theory : 36 Hours.

UNIT-I.

1. Unit Operations: Introduction, Basic laws.
2. Fluid Flow: Types of flow, Reynolds number, viscosity, concept of boundary layer, basic equations of fluid flow, valves, flow meters, manometers and measurement of flow and pressure.
2.(a) Material handling systems: Liquid handling, different types of pumps.
   (b) Gas handling: Various types of fans, conveyors, air compressors.
   © Solid handling: Bins, Bunkers, Conveyors, Air Transport.

3. Filtration and Centrifugation : Theory of filtration, filer aids, filter media, industrial filters including filter press, rotary filter, edge filter, factors affecting filtration, mathematical problems on filtration, optimum cleaning cycle in batch filters, principles of centrifugation, industrial centrifugal filters and centrifugal sedimenters.

4. Crystallization : Characteristics of crystals like purity, size shape, geometry, habit, forms, and factors affecting them, solubility curves, Super saturation theory and its limitations, Nucleation mechanisms, crystal growth.

<u>Study of various types of Crystallizers</u>: Tanks, agitated batch, Swenson Walker, simple vacuum, circulating magma and Krystal crystallizer, caking of crystals and its prevention, Numerical problems in yields.

UNIT-II

1. Dehumidification and humidity control- Basic concepts and definition, wet bulb and adiabatic saturation temperatures, psychorometric chart and measurement of humidity, application of humidity measurement in Pharmacy for dehumidification operations.

2. Refrigeration and Air conditioning: Principles and applications of refrigeration, air conditioning in Pharmacy.

3. Material of construction: General study of composition, corrosion, resistance, properties and applications of the materials of construction with special reference to stainless steel and glass.

4. Industrial hazards and safety precautions: Mechanical, chemical, electrical, fire and dust hazards, industrial dermatitis, accident records.

PRACTICAL-   36 HOURS.

1. Measurement of flow of fluids and their pressure, determination of Reynolds number and calculation of frictional losses.

2. Experiments to demonstrate applications of centrifugation.

3. Determination of humidity use of Dry Bulb and Wet Bulb, thermometers and psychometric charts.

4. Elementary Knowledge of engineering drawing-concept of orthographic and isometric views of elevation and third angle projection. Notation and abreviations used in engineering drawing.

5. Basic Engineering drawing practice-bolts, nuts, riveted fronts, screws, worm screws as per specification.

6. Drawing of simple pharmaceutical machinery part.

7. Any other experiments to substantiate the theory.

B.Pharm 3rd SEMESTER

1.3.2 : Pharmaceutical Chemistry-III
(Physical Chemistry)

Theory   36 Hours.

UNIT-I

1. Behaviour of Gases: Kinetic theory of gases, deviation from ideal behaviours and explanation.
2. The Liquid State: Physical properties (surface tension, parachor, viscosity, refractive index, optical rotation, dipole moments and chemical constituents)
3. Solutions: Ideal and real solutions, solutions of gases in liquids, colligative properties, partition coefficient, conductance and its measurement. Debye – Huckel Theory.
4. Thermodynamics: First, Second and third laws, Zeroth Law, absolute temperature scale, thermo chemical equations, phase equilibria and phase rule.
5. Adsorption : Fredlich and Gibbs adsorption, isotherms, Langmuir theory of adsorption

UNIT-II

6. Photochemistry: Consequences of light absorption, Jablinski diagram, Lamben-Beer Law, quantum efficiency.
7. Chemical Kinetics: Zero, first and second order reactions, complex reactions, theories of reaction kinetics, characteristics of homogeneous and heterogeneous catalysis, acid base and enzyme catalysis.
8. Electrochemistry- Electrolyte condition. Laws of Electrolysis, conductivity and its determination, Ionic mobility, transport number, different electrodes. Laws of mass action its application, chemical equilibrium.
9. Quantum Mechanics : Postulates of quantum mechanics, operators in quantum mechanics, the schrodinger wave equation.

Practical-   36 Hours.

1. Determination of physicochemical constants like Refractive Index, surface tension, viscosity, optical rotation, etc.

2. Determination of rate of reaction in zero, first order reactions.

3. Experiments based on Rauolt's law like depression of freezing point, elevation of boiling point etc. molecular weight determination.

4. Determination of partition coefficient of organic substances.

5. Buffer solutions, determination of p^H

6. Experiments based on absorption principles.

B. Pharm 3rd Semester

1.3.3. Pharmacognosy-I
Theory   36 Hours.

UNIT-I

1. Definition, history, scope and development of Pharmacognosy.
2. Sources of drugs: Biological, marine, mineral and plant tissue cultures as sources of drugs.
3. Classification of drugs: e.g. Alphabetical, morphological, taxonomical, chemical and pharmacological.
4. Plant taxonomy: Study of the following families with special reference to medicinally important plants- Apocynacae, Solanaccae , Rutaccae, Umbelliferac, Leguminosae, Rubiaccae, Liliaceae, Labiatae, Cruciferae, Papaveraccae.
5. Cultivation, collection, processing and storage of crude drugs: Factors influencing cultivation of medicinal plants. Types of soils and fertilizers of common use. Pest management and natural pest control agents. plant hormones and their application, Polyploidy, mutation and hybridization with reference to medicinal plants.

UNIT-II

6. Quality control of crude drugs: Adulteration of crude drugs and their detection by organaleptic, microscopic, physical, chemical and biological methods of evaluation.
7. An Introduction to active constituents of drugs: isolation, classification and properties: Roots, Rhizomes, barks, leafs, flowers, wood, fruits, seed, drugs.
8. Systematic pharmacognostic study of following:

   (a) Carbohydrats and derived products: Agar, Guar gum, acacia, honey, isabgol, pectin, starch, sterculia and tragacanth.
   (b) Lipids: Bees wax, castor oil, cocoq butter, cod-liver oil, hydnocarpus oil, lard, linseed oil, rice bran oil, shark liver oil and wool fat.
   (c) Proteins – definition, classification study of collagen, gelatin.

Practical.   :   36 hours.

1. Morphological characteristics of plant families mentioned in theory.
2. Microscopic measurements of cells and cell contents : Starch grains, calcium oxalate crystals and phloem fibres.
3. Determination of leaf constants such as stomatal index, stomatal number, vein-islet number, vein-termination number and palisade ratio.
4. Identification of crude drugs belonging to carbohydrates and lipids.
5. Preparation of herbarium sheets.

1.3.4: Anatomy, Physiology and Health Education
(APHE-II)

Theory   36 Hours.

UNIT-I

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

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

3. Central Nervous System: Functions of different parts of brain and spinal cord. Neurohumoral transmission in the central nervous system, reflex action, electroencephalogram, specialized functions of the brain, cranial nerves and their functions.

4. Autonomic Nervous System: Physiology and functions of the autonomic nervous system, Mechanism of neurohumoral transmission in the A.N.S.

5. Urinary System: Various, structures and functions of the kidney and urinary tract, physiology of urine formation and acid base balance. Disease of the urinary system.

UNIT-II

6. Reproductive System: Male and female reproductive systems and their hormones, physiology of menstruation, coitus and fertilization. Sex differentiation, spermatogenesis and cogenesis, pregnancy its maintenance and parturition.

7. Endocrine System: Basic anatomy and physiology of pituitary thyroid. Parathyroid, Adrenals, Pancreas, Testes and ovary, their hormones and functions.

8. Sense Organs: Basic anatomy and Physiology of the eye(vision), ear(hearing), taste buds, nose smell) and skin (superficial receptors).

9. a) Concepts of health and disease: Disease causing agents and prevention of

b) Classification of food requirements: Balanced diet, nutritional deficiency disorders, their treatment and prevention, specifications for drinking water.

c) Demography and family planning: Medical termination of pregnancy.

d) Communicable diseases: Brief outline, their causative agents, modes of transmission and prevention(Chicken Pox, measles, influenza, diphtheria, whooping cough, tuberculosis, poliomyelitis, helminthiasis, malaria, filariasis, rabies, trachoma, tetanus, leprosy, syphilis, gonorrhoea and AIDS).

e) First Aid: Emergency treatment of shock, snake bites, burns, poisoning, fractures and resuscitation methods.

Practical.   36 hours.

1. Study of different systems with the help of charts and models.

2. Microscopic studies of different tissues.

3. Simple experiments involved in the analysis of normal and abnormal urine. Collection of specimen, appearance, determination of p^H , sugars, proteins, urea and creatinine.

4. Physiological experiments on nerve muscle preparations.

5. Determination of vital capacity, experiments on spirometry.

B.Pharm 3rd Semester

1.3.5. Advanced Mathematics & Bio-statistics

<u>Theory</u>   <u>36 Hours</u>.

UNIT-I

1. Differential equations: Revision of integral calculus, definition and formation of differential equations, equations of first order and first degree variation separable. Homogeneous and linear differential equations and equations reducible to such types, linear differential equations of order greater than one with constant coefficients, complementary mention and particular integral, simultaneous linear differential equations, pharmaceutical applications.

2. Laplace transforms : Definition, transforms of elementary functions, properties of linearity and shifting, inverse laplace transforms, transforms of derivatives, solution of ordinary and simultaneous differential equations.

UNIT-II

3. Biometrics : Significant digits bend rounding of numbers, data collection, random and non-random sampling methods, sample size, data organization, diagrammatic representation of data, bar, pie, 2-D and 3-D diagrams, measures of central tendency, measures of dispersion, Standard Deviation and standard error' of means, coefficient of variation, confidence (fiducial) limits, probability and events, Bayes' theorem, probability theorems, probability distributions, elements of binomial and Poisson distribution, normal distribution curve and properties, kurtosis and skewness, correlation and regression analysis, method of least squares statistical inference, student's and paired t-test, F-test and elements of ANOVA, applications of statistical concepts in Pharmaceutical Sciences.