

B.PHARM III SEMISTER

COURSE NO 301: HUMAN PHYSIOLOGY II

Learning objectives: <ol style="list-style-type: none">1. To impart the knowledge of the functions of endocrine glands and their role in various disease states and reproduction.2. To understand the physiology of respiration and functioning of kidneys.3. To develop the knowledge regarding functioning of central nervous system and peripheral nervous systems.4. The knowledge imparted should help the students to understand the pharmacology of drugs.		
Units	Contents	Hrs
Unit-1:	Endocrine glands: Adrenal, thyroid, parathyroid, pituitary, thymus and gonads, their hormones and physiology. Knowledge on Addison's disease, Hirsutism, Cretinism, Goiter, Myxedema, tetany, acromegaly.	08
Unit-2:	Physiology of male and female reproductive systems; Production of gametes, sex differentiation, fundamental knowledge on puberty, menstrual cycle, conception, parturition and menopause knowledge on common chromosomal abnormalities.	06
Unit-3:	Central nervous system (CNS): Membrane potentials, nerve excitation and conduction, neurons, neuronal transmission, receptors. Fundamentals of anatomy of brain and spinal cord. Reflex action and reflex arc.	10
Unit-4:	Functions of cerebrum, cerebellum, thalamus, hypothalamus, midbrain, pons, medulla oblongata and cranial nerves. spinal cord and spinal nerves	08
Unit-5:	Reticular activating system, limbic system and their functions, sleep, EEG, ventricles of the brain, cerebrospinal fluid (CSF) and its circulation, blood brain barrier, epilepsy, anxiety, schizophrenia, depression, sleep, insomnia, parkinsonism	07
Unit-6:	Autonomic nervous system (ANS): Parasympathetic and sympathetic divisions of ANS. Fundamentals of anatomy of ANS – Physiology of ANS. Neurotransmitters-Chemical transmission, cholinergic and adrenergic nerves. Organs of special senses- taste, smell, touch, hearing and vision. Glaucoma, mydriasis, miosis, conjunctivitis, deafness.	08

Unit-7:	Metabolism of carbohydrates, proteins, fats and minerals. Metabolic disorders- diabetes, thermoregulation- pyrexia, pain – inflammation- arthritis.	06
Unit-8:	Immune systems. Immuno component cells and their development – autoimmune disorders.	07

COURSE NO 302: HUMAN PHYSIOLOGY II PRACTICAL

Learning Objectives:

- **To impart knowledge practically on theory based aspects (tissues of various organ systems, microscopical knowledge, membrane potentials, nature of nerve and muscles, neurotransmitters and their role, Blood chemistry etc)**

List of Experiments:

1. Identification of permanent slides of heart ,liver ,lung ,pancreas ,stomach, small intestine, uterus, ovary ,testes ,skin ,eye, tongue, thyroid, adrenal gland ,T.S. of artery and vein ,kidney.
2. Microscopic examination of epithelial cells, muscular tissue, nerve fiber, cartilage.

Determination of following parameters in human blood and other experiments related on different organ systems:

3. Hemoglobin.
4. Blood group.
5. Coagulation time and bleeding time.
6. R.B.C.count.
7. W.B.C.count.
8. Differential leukocyte count.
9. Erythrocyte sedimentation rate (ESR)
10. Determination of fragility range of sheep R.B.C. in hypotonic saline.
11. Graphical recording of simple muscle twitch (SMT) with frog's gastrocnemius- sciatic muscle nerve preparation.
12. Effect of fatigue on SMT
13. Effect of cold Ringer(10 degrees centigrade) on SMT
14. Effect of warm ringer(forty degrees centigrade) on SMT
15. Genesis of tetanus on SMT
16. Determination of arterial blood pressure by Sphygmomanometer.
17. Determination of vital capacity of lungs.

18. Recording of normal heart beat of frog in situ

19. Recording of body temperature of humans with clinical thermometer.

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Suggested Books:

1. Shambu lingam- Essentials of Physiology

2 .Ross & Wilson- Anatomy & Physiology in health and illness-Anne Waugh, Allison Grant.

3. First Aid to the injured- Published by Saint John Ambulance Association.

4. A Treatise on Hygiene and Public Health, B.N. Ghosh, Calcutta Scientific Publishing Company.

Reference Books:

1. Text Book of Medical Physiology-Arthur.C.Guyton

2. Samson Wright's Applied Physiology

COURSE NO 303: PHARMACEUTICAL ANALYSIS –I (THEORY)

Learning objectives:		
<ol style="list-style-type: none">1. To emphasize the importance of quality in drugs & pharmaceuticals.2. To establish the fundamental conventional methods of drug analysis used in laboratories.3. To provide the knowledge regarding the principles of titrimetry and gravimetric techniques.4. To give the basic principles of other analytical techniques used in analytical chemistry.5. To teach applications of these analytical methods to drugs & pharmaceuticals.		
Units	Contents	Hrs
Unit-1:	A general introduction to pharmaceutical analysis and general aspects of standardization of pharmaceutical chemicals and formulated products mentioned in Indian pharmacopoeia. Importance of proper sampling and general books for pharmaceutical standards like pharmacopoeias, National formularies. computation of analytical results, significant numbers, rejection of doubtful values with reference to volumetric and gravimetric analysis, sources of errors and calibration of analytical equipment used in volumetric and gravimetric analysis.	06
Unit-2:	Acid-Base titrations: theoretical basis of neutralization reactions including electrolytic dissociation, application of law of mass action, relative strength of acids and bases, hydrolysis of salts and buffer solutions, theory of neutralization indicators and factors involved in the selection of indicators for different types of acid-base titrations. Procedures involved in different types of titrations using strong acid, weak base, strong base, weak base and back titration with blank determination.	10
Unit-3:	Oxidation-reduction titrations: theoretical considerations including standard potentials, calculation of redox potentials, redox indicators, principle and procedure involved in different types of redox titrations using potassium permanganate, iodine. Titrations of released iodine and back titration of excess iodine, potassium iodate, ammonium ceric sulphate and titanous chloride. Precipitation titrations: principles and procedures involved in argentimetry, use of silver nitrate and ammonium thiocyanate. Indicators used in precipitation titrations including adsorption indicators, Mohr's and volhard's methods with examples.	10
Unit-4:	Complexometric titrations: basic principles of complexometric analysis including theories of complex ions, chelating agents, properties of metal complexes with particular reference to EDTA. Basic principles of complexometric analysis including theories of	08

	complex formation. Werner's coordination number and structure of complex ions, chelating agents, properties of metal complexes with particular reference to EDTA, various examples of titrations of metal ions using disodium acetate, indicators and end point detection using indicators and by physical methods, masking and demasking agents, pharmaceutical applications of complexometry with particular reference to I.P.	
Unit-5:	Non-aqueous titrations: principles, advantages and pharmaceutical applications, solvents reagents and indicators used in nonaqueoustitrimetry, other methods of detecting end points. Examples of titrations of alkali metal and alkaline earth metal salts of organic acids, primary, secondary and tertiary amines, halogen acid salts of bases, titration of acidic substances.	08
Unit-6:	Principles and procedures involved and application of nitrite titrations, titrations using 2, 6-dichlorophenol-indophenol. Aquametry including use of Karl-fisher reagent and moisture balances. Drying and distillation, oxygen flask combustion method of analysis.	06
Unit-7:	A detailed study of gravimetric analysis including principles involved, critical factors and typical methods involving precipitation, coagulation, digestion, filtration and incineration procedures with suitable examples. Advantages and disadvantages, sources of errors and their elimination in gravimetric analysis.	06
Unit-8:	Gas analysis: principles of gas analysis, use of hempel's gas burette and pipette, nitrometer, haldome's and orset's gas analysis apparatus and their operations. Examples of gas analytical methods of pharmaceutical significance.	06

Text books:

1. Indian pharmacopoeia
2. practical pharmaceutical chemistry by A.H. Becket and stenlake

COURSE NO 304: PHARMACEUTICAL ANALYSIS –I (PRACTICAL)

Acid-base titrations

1. Standardization of HCl
2. Standardization of H₂SO₄
3. Standardization of NaOH
4. Assay of boric acid
5. Assay of sodium bicarbonate
6. Assay of borax
7. Assay of calcium hydroxide
8. Assay of zinc oxide
9. Assay of calcium carbonate
10. Assay of acetyl salicylic acid
11. Assay of formaldehyde
12. Assay of NaOH in presence of sodium carbonate.

Redox titrations:

13. Standardization of iodine
14. Standardization of KMnO₄
15. Assay of ferrous sulphate
16. Assay of hydrogen peroxide
17. Assay of sodium nitrate
18. Estimation of ascorbic acid with 2,6-dichlorophenol indophenol
19. Assay of mercuric chloride
20. Assay of sodium metabisulphite
21. Assay of copper sulphate

Precipitation titrations

22. Standardization of silver nitrate
23. Assay of potassium chloride
24. Assay of ammonium thiocyanate
25. Assay of mercuric oxide

Complexation titrations

26. Standardization of EDTA
27. Assay of calcium gluconate injection/tablets
28. Assay of aluminium sulphate

Non-aqueous titrations

29. Assay of thiamine hydrochloride

Gravimetry

30. Determination of sulphate as barium sulphate
31. Estimation of magnesium as magnesium pyrophosphate
32. Determination of thiamine as silico tungstate

Limit tests

33. Limit test for chlorides
34. Limit test for sulphates
35. Limit test for iron

COURSE NO 305: PHYSICAL PHARMACY – II

A study of the applications of physico – chemical properties to pharmacy with special reference to the following

Learning objectives:		
<ol style="list-style-type: none">1. To acquaint the students with the fundamental principles & their applications with reference to Pharmacy.2. To study the Solubility, distribution and interfacial phenomena of liquids.3. To impart the knowledge on the rheology and micromeritics.4. To study kinetics and methods of stabilization and accelerated stability.		
Units	Contents	Hrs
Unit-1:	Solubility and distribution phenomena: Solvent – solute interactions, solubility of gases in liquids, liquids, solids – factors influencing solubility – methods of increasing solubility, distribution coefficient significance of distribution coefficient.	08
Unit-2:	Complexation: Types of complexes, methods of analysis, Complexation and drug action.	06
Unit-3:	Kinetics: Rates and orders of reactions, determinations of order of a reaction influence of temperature and other factors on reaction. Decomposition of medicinal agents. Methods and principles of stabilization. Accelerated stability analysis – principles and methods. An introduction to ICH guidelines.	08
Unit-4:	Interfacial phenomena: Liquid interfaces, adsorption at liquid interfaces. Surface active agents classification, properties, applications HLB. Adsorption at solid interfaces. Electric properties at interfaces – Zeta potential and its importance.	08
Unit-5:	Colloids: Types, methods of preparation, properties, protective colloid action, Solubilization. Gels, Structure, properties and applications.	07
Unit-6:	Coarse dispersions: Emulsions, Suspensions and semisolids. Suspensions – interfacial properties of suspended particles, setting in suspensions. Formulation and evaluation of flocculated and deflocculated suspensions. Emulsions: Theories of emulsification, physical stability of emulsions, preservation of emulsions, rheological properties of emulsions, suspensions and semisolids.	09

Unit-7:	Rheology: Newtonian systems. Thixotropy measurement and its applications in pharmacy. Determination of viscosity, viscometer.	06
Unit-8:	Micromeritics: Particle size and size distribution, methods of determining particle size particle shape, particle number, surface area – methods of determining surface area, derived properties of powders – their significance.	08

Text Books:

1. Physical Pharmacy by Alfred Martin; 2. Tutorial Pharmacy by Cooper and Gunn, edited by S.J. Carter; 3. Remington's Practice of Pharmaceutical Sciences.

COURSE NO 306: PHYSICAL PHARMACY – II – PRACTICAL

1. Determination of solubility of drugs in single and mixed solvents; 2. Construction of phase diagram for the system of methyl salicylate – isopropanol water; 3. Determination of partition coefficient of benzoic acid in peanut oil – water system; 4. Influence of additives (glycerol in aqueous phase) on the partition coefficient; 5. Study of Complexation of copper and glycine by pH titration method; 6. Determination of rate constant of a first order reaction; 7. Determination of rate constant of second order reaction; 8. Determination of surface and interfacial tensions; 9. Determination of CMC of a surfactant by capillary rise principle; 10. Determination of HLB of a surfactant; 11. Determination of Cloud and Kraft point; 12. Study of adsorption of oxalic acid on charcoal – construction of adsorption isotherms; 13. Influence of suspending agent on the sedimentation parameters in a suspension; 14. Determination of degree of flocculation in a suspension; 15. Determination of particle size by gravity sedimentation Andreason's Apparatus; 16. Determination of globule size and size distribution in an emulsion; 17. Study of physical stability of selected emulsions; 18. Preparation of colloids 9 (lyophilic and lyophobic) and study of protective colloidal action; 19. Determination of bulk and true density (by liquid displacement method) of crystalline solids; 20. Micromeritic studies on tablet granulations – determination of bulk and granule densities, angle of repose, compressibility index, influence of glidants on flow properties.

COURSE NO 307: PHARMACEUTICAL CHEMISTRY-III (ORGANIC-II) THEORY

Learning objectives:		
<ol style="list-style-type: none"> 1. To develop the linkage between organic molecules and their transformation to the drug molecule. 2. To develop the ability to name drugs having various structural features. 3. To expose students towards different chemical classes of compounds and their relationships according to their biological activity. 		
Units	Contents	Hrs
Unit-1:	Benzene and aromaticity: Modern structure of benzene aromaticity. Huckels rule, Nomenclature of benzene derivatives, Electrophilic substitution reactions – mechanisms of nitration, halogenation, sulphonation and Friedel-crafts alkylation, Theory of reactivity and orientation in mono substituted benzenes, preparation and uses of gamma benzene hexachlorilide, saccharine and chloramines-T.	10
Unit-2:	Aldehydes and Ketones: Nomenclature, general methods of preparation, structure versus reactivity, Nucleophilic addition reactions, acidity of alpha-hydrogens and carbanion addition reactions. Haloform reaction of methyl ketones. Preparation and uses of formaldehyde, paraformaldehyde, acetaldehyde, paraldehyde, acetone, chloral hydrate, benzaldehyde, cinnamaldehyde, vanillin.	10
Unit-3:	Sulphonic acids: Methods of preparation and uses of alkyl and aryl Sulphonic acids – sodium lauryl sulphate.	05
Unit-4:	Functional derivatives of carboxylic acids – Nucleophilic acyl substitution reactions; preparation of acid chlorides, amides, anhydrides and ester from acids. Nucleophilic acyl substitution reactions – preparation and uses of ethyl acetate, diethyl phthalate, methyl salicylate, ethyl acetate and aspirin. Preparation and synthetic uses of malonic ester and aceto acetic ester.	08
Unit-5:	Phenols: General methods of preparation, acidity, characteristic reactions. Preparation and uses of phenol, catechol, resorcinol, hydroquinone and pyrogallol. Aryl-halides – Nucleophilic aromatic substitution. General methods of preparation, reactivity of aryl halides, nucleophilic aromatic substitution reactions.	08
Unit-6:	Amines: General methods of preparation, basicity of amines, characteristic reactions of amines, separation of different classes of amines, Ring substitution in aromatic amines, quaternary ammonium compounds, preparation and uses of ethonamine, aniline, acetanilide, urea and tetrabutyl ammonium hydroxide, cetyltrimethyl	08

	ammonium bromide.	
Unit-7:	Diazonium compounds: preparation, reactions and uses. Polynuclear aromatic compounds: structure and reactions of naphthalene, anthracene and phenanthrene.	06
Unit-8:	Name reactions: Mannich reaction. Micheal addition, Beckmann rearrangement. Fries rearrangement, Bayer-villiger oxidation.	05

TEXT BOOKS:

2. Organic chemistry by Morrison and Boyd
3. Bently and Dirver's Textbook of pharmaceutical Chemistry
4. Organic Chemistry, Vol. I, by I.L. Finar.

B.PHARM IV SEMESTER

COURSE NO 401: APPLIED STATISTICS

Learning objectives:		
<ol style="list-style-type: none">1. To provide the knowledge on the applications of statistics.2. To impart the knowledge in performing general calculations involved in various disciplines of Pharmacy using spread sheet.3. To provide the information on correlation and regression4. To provide the knowledge on the probability and its distributions.5. To enable students to understand about the hypothesis testing, utilization of parametric and non parametric tests.		
Units	Contents	Hrs
Unit-1:	A study of the following with reference to Pharmaceutical Sciences Applications of statistics in pharmaceutical sciences Scales of measurement (nominal, ordinal, interval, ratio)	08
Unit-2:	Definitions, Concept, Applications, merits and demerits of mean, median, mode, standard deviation, relative standard deviation, variance, coefficient of variation, skewness, kurtosis.	10
Unit-3:	Definition and concept of precision, accuracy, mean error, relative error, significant numbers. Concept, applications, properties, calculations involved in correlation (Pearson's correlation coefficient, Spearman's rank correlation coefficient) and regression (linear regression, least square method)	10
Unit-4:	Probability: Definitions (Random event, Elementary event, Exhaustive event, mutually exclusive events, complementary events, independent events, classical and modern definitions of probability, random variable.)	07
Unit-5:	Addition theorem, Multiplication theorem, Baye's theorem	05
Unit-6:	Probability distributions such as normal, binomial and poisson distributions. Sampling distribution, standard error, confidence limits.	06
Unit-7:	Elements of sampling theory: Definitions and concepts of population, sample, discrete variable, continuous variable, different sampling methods	07
Unit-8:	Testing of hypothesis: Definition and concept of null hypothesis, types of error, level of significance, criterion value, Z test and t test	07

Text Books:

1. Comprehensive Statistical Methods, by P.N.Arora, SumeetArora, and S. Arora (S. Chand & company)
2. Miller & Freund's Probability and statistics for engineers by Richard A. Johnson, (Pearson Education Publishers)
3. Statistics – Theory, Methods and Application by DC Sancheti and VK Kapoor()(Sulthan and chand&sonsPublishers)

Reference Book:

1. Pharmaceutical Statistics by S. Bolton
2. Biostatistics and computer applications by G.N.Rao and N.K Tiwari published by pharma book syndicate.

COURSE NO 402: PHARMACEUTICAL ENGINEERING – I

A study of the following topics with particular reference to pharmaceutical industry.

Learning objectives:		
<ol style="list-style-type: none"> 1. To create awareness regarding the unit operations involved in Pharmaceutical industry. 2. To provide overview of Pharmaceutical machineries. 3. To enable students in selecting proper equipment for material processing in Pharma. Industry 4. To educate learners about hazards and safety aspects in industrial environment. 		
Units	Contents	Hrs
Unit-1:	Fluid Flow: Definitions, Material balance, energy balance, Bernoulli's equation, stream line and turbulent flow, Reynolds number, roughness of pipe surfaces, energy loses in flowing fluids through pipes. Measurement of pressure and fluid flow. Different types of manometers, orifice meter, venture meter, pilot tube and Rotameter. Solutions to simpler numerical problems.	08
Unit-2:	Transportation of fluids: Pipe fittings and valves. Pumping equipment, reciprocating pumps, diaphragm pumps, centrifugal pumps, rotary pumps and compressors. Use of compressed air, air lift pumps, screw pumps, monopump and peristaltic pump. Water supply and maintenance of water at different temperatures.	08

Unit-3:	Heat transfer: Introduction, conduction, Fourier's law, conduction through plain and cylindrical surfaces, compound resistances. Heat transfer from condensing vapours. Drop wise and film type condensation. Properties of steam, Heat exchangers. Parallel and counter current flow. Radiation, Stephan's and Kirchoff law, Physical nature of surfaces. Heat conservation and insulation. Requirements of a good conductor.	10
Unit-4:	Evaporation: General principles, methods of supply of heat, types of evaporators, jacketed evaporators, film evaporators, forced circulation evaporators, evaporator accessories, wet and dry condensers, vacuum pumps, gauzes, steam traps.	06
Unit-5:	Distillation: Theory applied to binary mixtures, boiling point and equilibrium diagrams, constant boiling mixtures, equilibrium distillation, differential distillation, steam distillation, rectification, distillation stills, automatic water stills, molecular distillation and its application.	08
Unit-6:	Filtration: Filtration media and filter aids, types of filters, filter presses, rotary continuous filter and Meta filters. Sterile filtration of liquids, air filters. Filter operation, effect of pressure and temperature on rate of filtration, compressibility of filter cake, elementary theory of filtration, solutions of simpler numerical problems. Centrifuges, theory and equipment and applications.	08
Unit-7:	Materials of construction: Consideration of mechanical properties, corrosion and contamination. Consideration of ferrous metals and their alloys. Non – ferrous metals like copper, tin, lead, nickel, zinc, silver and platinum.	06
Unit-8:	Non – metallic materials like stone ware, wood, glass, rubber and plastics. Materials of Pharmaceutical packaging; Industrial hazards and safety precautions; Mechanical, chemical, electrical, fiber and dust hazards. Safety requirements, fire extinguishers, industrial dermities.	06

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Text Books:

1. Introduction to Chemical Engineering by Water L. Badger and Julius T. Bancher; 2. The Theory and Practice of Industrial Pharmacy by Leon Lachman, H.A Lieberman and Joseph L. Kanig; 4. Tutorial Pharmacy – Cooper and Gunn 5. Pharmaceutics, The Science of Dosage Form Design, edited by Michael E.Aulton.

COURSE NO 403: PHARMACEUTICAL MICROBIOLOGY

Learning objectives:		
<ol style="list-style-type: none"> 1. To emphasize microbiological aspects of Pharmaceutical importance. 2. To deal with the various aspects of microorganisms, their classification cultivation, identification etc. 3. To provide the thorough knowledge of disinfection and sterilization methods. 4. To give an idea regarding immunological aspects, their significance. 5. To outline the importance of subject in useful diagnostic tests. 6. To provide the knowledge about the use of microbiological techniques in quantification/standardization of selected Pharmaceuticals. 7. To help in providing idea about infectious diseases diagnosis and their control. 		
Units	Contents	Hrs
Unit-1:	History, branches of microbiology and importance of pharmaceutical Microbiology. Contribution of Antony Van Leeuwenhoek, Robert Koch, Louis Pasteur and Alexander Fleming. Microscopy – Principle and description of light microscopes and electron microscope	06
Unit-2:	Structure of procaryotic and eucaryotic cells and their comparison. Theory of staining, simple, Gram's, acid fast, negative, flagella and spore staining methods. Study of morphology, broad classification of bacteria, yeasts, actinomycetes, fungi, viruses and life cycle of bacteriophage. Types and preparation of media for bacterial, fungal and actinomycete cultures.	08
Unit-3:	Different methods of isolation and preservation of microbial cultures. System of identification of bacteria – preliminary criteria for identification, some biochemical tests – Fermentation of carbohydrates, nitrate reduction, starch hydrolysis and gelatin liquefaction, H ₂ S production. Study of bacterial growth – Growth, generation time, growth rate and growth curve. Techniques for quantitative measurement of bacterial growth (viable and total counts). Synchronous and continuous growth. Effect of UV light, temperature, pH, osmotic pressure, salt concentration and metal ions on bacterial growth.	10
Unit-4:	Sterilization methods: Moist heat, dry heat, filtration, gaseous and radiation methods. Sterilization indicators. Principle and significance of test for sterility. Concept of asepsis and maintenance of aseptic conditions. General principles of antibiotics, clinically useful antibiotics, mode of action, sensitivity tests and antibiotic resistance. Dynamics of disinfection, merits and demerits of different disinfectants, commonly used disinfectants, their mechanism of action. Evaluation of	10

	disinfectants (Rideal Walker and Chick Martin coefficients and their limitations)Introduction to microbiology of water and milk. Bacteriological examination for assessment of the quality of milk and water.Microbial limit tests for <i>E. coli</i> and <i>Pseudomonas</i> .	
Unit-5:	Immunity: Definition of antigen and antibody, types of antigens and antibodies, classification of immunoglobulins, types of immunity. Antigen-antibody reactions (agglutination, precipitation, neutralization and complement fixation). Hyper sensitive types of reactions. Definition of infection, non-specific defence mechanisms, bacterial toxins, virulence and virulence factors and attenuation.	07
Unit-6:	Methods of transmission of communicable and infectious diseases, carriers, vectors and reservoirs.General methods of immunization against diseases.	06
Unit-7:	Study of etiology, diagnosis, sources of infection, mode of transmission, immunization methods, prevention and control of the following diseases, Bacillary dysentery, typhoid, cholera, amoebiasis, syphilis, gonorrhoea, AIDS, tetanus, diphtheria, tuberculosis, leprosy, food poisoning and infective hepatitis.	07
Unit-8:	Genetic recombination – Bacterial conjugation, transformation and transduction. Mutation, mutagens, mechanism of mutation, types of mutations, isolation of nutritional and antibiotic resistant mutants.	06

COURSE NO 404: PHARMACEUTICAL MICROBIOLOGY - PRACTICALS

List of experiments:

1.Preparation of nutrient broth; 2. Preparation of nutrient agar; 3.Inoculation of bacteria; 4.Isolation of pure cultures; 5.simple staining; 6. Gram's staining; 7.Motility of bacteria; 8.Spore staining; 9.Oligodynamic action of copper; 10.Liquefaction of gelatin; 11. Starch hydrolysis; 12. Nitrate reduction;13. H₂S production 14.Phenol coefficient; 15.Chick Martin coefficient;16.Viable count; 17.Fermentation of carbohydrates; 18.Microbiology of water; 19.Microbiology of milk; 20.Antibiotic sensitivity test; 21. Morphology of yeast, fungi and actinomycetes

Text books and Reference books:

1. Microbiology by Pelczar, M.J. Reid, R.D. and Chan, E.S. Tata McGraw Hill Publishing Co. Ltd.;

2. Medical microbiology edited by Robert Cruick Shank. ELBS edition;
3. Bentley's text book of pharmaceuticals
4. Pharmaceutical microbiology by Harrish M. Baillere, Tindal and Co., London;
5. Tutorial Pharmacy by Cater S.J. Kothari Book Depot, Bombay;
6. Pharmaceutical microbiology edited by Hugo and Russel, P.g. publishing company Ltd., New Delhi

COURSE NO 405: APPLIED BIOCHEMISTRY

Learning objectives:		
<ol style="list-style-type: none"> 1. To impart broad understanding of molecular level of chemical process associated with living cells. 2. To develop the knowledge regarding enzymes and its related issues. 3. To provide idea about metabolic processes involved in illnesses. 		
Units	Contents	Hrs
Unit-1:	Brief chemistry of carbohydrates, lipids, proteins and nucleoproteins and detailed metabolism of the above.	10
Unit-2:	Outlines of the mechanism of protein synthesis, metabolism and genetic regulation	08
Unit-3:	Outlines of biochemistry of cell division and metastasis	06
Unit-4:	Biochemistry of important body fluids	06
Unit-5:	Principles involved and apparatus used in the analysis of blood and urine and interpretation of results.	06
Unit-6:	Enzymes: Classification, mode of action, factors affecting the enzyme action and co-enzymes.	10
Unit-7:	Brief outline of energy and phosphate metabolism and detoxification mechanisms of the body. Principles involved in biological oxidation.	08
Unit-8:	The biochemical role of vitamins and hormones-principles of nutrition and dietetics	08

Books suggested:

1. Review of Physiological Chemistry by Harold, A. Harper;
2. Textbook of Biochemistry by West, Todd, Manson, Van Bruggen.

Reference Books:

1. Hawk's Physiological Chemistry by Bernard L. Oser;
2. Biochemistry by Albert Lehninger.

COURSE NO 406: APPLIED BIOCHEMISTRY PRACTICAL

1. General tests for identification of carbohydrates, proteins and lipids;
2. Qualitative examination of urine for normal and abnormal constituents;
3. Quantitative estimation of glucose in urine
5. Quantitative estimation of glucose in blood ;
8. Quantitative estimation of cholesterol in blood;
9. Estimation of triglycerides in blood ;
10. Estimation of blood urea nitrogen;
11. Estimation of SGPT and SGOT in blood ;
12. Estimation of bile pigments in blood ;
13. Effect of temperature, pH and inhibitors on amylase enzyme activity

COURSE NO 407: PHARMACOGNOSY AND PHYTOCHEMISTRY-I

Learning objectives:		
1. To train the students in medicinal plants cultivation, collection, processing and storage of crude drugs. 2. To introduce the microscopical and morphological characters, chemical nature, tests for identification, adulterants, substituents and uses of the following drugs Leaves, Flowers, Barks and seeds		
Units	Contents	Hrs
Unit-1:	Introduction ,development, present status and future scope of pharmacognosy; Classification of crude drugs : Alphabetical, morphological, taxonomical, chemical and therapeutic; Cultivation, collection, processing and storage of crude drugs, Factors influencing cultivation of medicinal plants. Types of soils and fertilizers of common use.	12
Unit-2:	A study of mineral drugs, fossil organisms, Diatomite, chalk, kaolin, bentonite, Fuller's earth. A study of commercial fibers, their sources, preparation, characters, chemical tests, uses, etc.-Cotton, cellulose, regenerated cellulose, Jute, Wool, Silk, Nylon; Starch – manufacture and general characteristics of wheat, potato, maize and rice starches, soluble starch, dextran.	08
Unit-3:	Microscopical and macroscopical characters, varieties, cultivation, collection, principal, constituents, chemical nature, tests for identification, adulterants, substituents and uses of the following drugs. Leaves: Eucalyptus, senna, adhatoda, digitalis, squill and datura..	06
Unit-4:	Microscopical and macroscopical characters, varieties, cultivation, collection, principal, constituents, chemical nature, tests for identification, adulterants, substituents and uses of the following drugs Flowers: Cloves, pyrethrum, saffron	06
Unit-5:	Microscopical and macroscopical characters, varieties, cultivation, collection, principal, constituents, chemical nature, tests for identification, adulterants, substituents and uses of the following drugs Fruit : Fennel, cumin, coriander, ajowan, dill, caraway, orange, lemon and capsicum.	08
Unit-6:	Powders of natural occurrence: Lycopodium,pollen,kamala,lupulin; Entire organisms:Carrageenan,ergot,penicillin,ephedra,belladonna,lobelia,pepper mint,vinca and leech.	07
Unit-7:	Microscopic characters, cultivation, collection, commercial varieties, adulterants, chemical constituents and uses of the following drugs. Barks : Cinchona, cinnamon, cascara segrada, kurchi, wild cherry,quillaia.	06
Unit-8:	Microscopic characters, cultivation, collection, commercial varieties,	07

	adulterants, chemical constituents and uses of the following drugs Seeds: Nux vomica, strophanthus, linseed, ispaghula, castor,areca nut, colchicum.Woods: Quassia, Sandal.	
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Recommended Books:

1. Atal,CK and Kappor,BM.Cultivation and Utilisation of Medicinal Plants.
3. Trease,CE and Evans,WC. Textbook of Pharmacognosy.11th to 14th Editions. Tindal L. U.K.
4. Tyler,VC Brady, LR and Robers JE.Pharmacognosy.8th Edition, Lea &Febeger, Philadelphia.
5. Wallis,TE. Textbook of Pharmacognosy,5thEdition,J&A,ChurchillLimited,U.K.
6. Kokate,CKPurohit,AP. And Gokhale,SB.Pharmacognosy.

COURSE NO 408: PHARMACOGNOSY AND PHYTOCHEMISTRY-I PRACTICAL

Organoleptic examination, description and microscopical examination of the drugs mentioned below.

Powders: Lycopodium, Kamala; Starches: Wheat, potato, rice and maize; Leaves: Eucalyptus, senna, datura, adhatoda and digitalis; Barks:Cinnamon,cinchona,cascara and kurchi; Wood: Quassia;Seeds: Nux-vomica, linseed; Fruit: Fennel, coriander, cumin, cloves.

Identification of crude drugs studied in theory in their “entire” and “broken” condition by their gross characters and by qualitative tests.

Books Recommended:

- 1.Wallis,TE.AnalyticalMicroscopy,J&A,ChurchillLimited,U.K.
2. Kokate,CK. Practical Pharmacognosy.
- 3.Lalla,PK. Practical Pharmacognosy,Lina,Calcutta,1981.