

SOLAPUR UNIVERSITY, SOLAPUR**Bachelor of Pharmacy****(w. e. f. June 2010)****Structure of Teaching & Examination****Semester I**

Sub Code	Subject	Teaching scheme (Hours/week)	Semester Examination			Sessional examination		Maximum marks for the subject	Minimum marks for Passing the subject
			Duration (Hours)	Maximum marks	Minimum marks for passing	Duration (Hours)	Maximum marks		
1.1.1	Pharmaceutics -I	3	3	80	32	1	20	100	40
1.1.2	Pharmaceutical Inorganic Chemistry	3	3	80	32	1	20	100	40
1.1.3	Biochemistry-I	3	3	80	32	1	20	100	40
1.1.4	Anatomy, Physiology & Health Education -I	3	3	80	32	1	20	100	40
1.1.5	Pharmacognosy -I	3	3	80	32	1	20	100	40
PRACTICAL									
1.1.6	Pharmaceutics-I	3	3	80	32	3	20	100	40
1.1.7	Pharmaceutical Inorganic Chemistry	3	3	80	32	3	20	100	40
1.1.8	Biochemistry-I	3	3	80	32	3	20	100	40
1.1.9	Anatomy, Physiology & Health Education-I	3	3	80	32	3	20	100	40
1.1.10	Pharmacognosy-I	3	3	80	32	3	20	100	40
Total Marks for the Semester						: 1000			
Minimum marks for passing the semester -						500			

Semester II

Sub Code	Subject	Teaching scheme (Hours/week)	Semester Examination			Sessional examination		Maximum marks for the subject	Minimum marks for Passing the subject
			Duration (Hours)	Maximum marks	Minimum marks for passing	Duration (Hours)	Maximum marks		
1.2.1	Pharmaceutics – II	3	3	80	32	1	20	100	40
1.2.2	Modern Dispensing & Hospital Pharmacy	3	3	80	32	1	20	100	40
1.2.3	Organic Chemistry – I	3	3	80	32	1	20	100	40
1.2.4	Biochemistry –II	3	3	80	32	1	20	100	40
1.2.5	Anatomy, Physiology & Health Education – II	3	3	80	32	1	20	100	40
1.2.6	Communicative Skills In English *	2							
PRACTICALS									
1.2.7	Pharmaceutics – II	3	3	80	32	3	20	100	40
1.2.8	Modern Dispensing & Hospital Pharmacy	3	3	80	32	3	20	100	40
1.2.9	Organic Chemistry – I	3	3	80	32	3	20	100	40
1.2.10	Biochemistry – II	3	3	80	32	3	20	100	40
1.2.11	Anatomy, Physiology & Health Education-II	3	3	80	32	3	20	100	40
Total Marks for the Semester						: 1000			
Minimum marks -						500			

*The examination will be conducted by the colleges and the list of successful candidates shall be submitted to the University.

F.Y.B.PHARM. (SEMESTER I)

Semester- I

1.1.1 Pharmaceutics I (Theory) 3hrs/week

1. Introduction to Pharmaceutics, definition and scope, Pharmacy as a career, Evaluation of Pharmacy as a profession, Development of pharmacy profession and historical background. Development of pharmaceutical industries in India.
2. Introduction to Pharmacopoeia with reference to I.P., B.P., U.S.P, International and Extra pharmacopoeia.
3. Metrology: Imperial, metric and S.I. weights and measures, Inter-conversion.
4. Introduction and development of dosage forms. Classification of dosage forms, advantages and disadvantages, detailed study of sterile and non-sterile products, Solids, semisolids and liquid dosage form.
Pure water, Deionised water, distilled water and water of injections.
Aromatic waters, solutions, spirits, glycerites, syrups, elixir, lotions. mucilages, liniments.
5. Introduction to Preformulation studies
6. Introduction to good manufacturing practice and quality assurance
7. Introduction to alternative systems of medicine

Reference Books:

1. *Pharmaceutical Dosage and Drug Delivery System -Ansel Popovich & Allen (Williams & Wilkins)*
2. *American Pharmacy -Dittert (J.B. Lipincott)*
3. *Remington- The Science and practice of Pharmacy (Mack Publishing Co)*
4. *Bentleys Text Book of Pharmaceutics -Rawlins (ELBS)*
5. *Banker and Rhodes -Modern Pharmaceutics -(Dekker)*
6. *Groves -Parenteral Products -(William Heinemann Medical Books Ltd*
7. *Hanlon -Hand Book of Package Engg. (McGraw Hill)*
8. *Swarbrick & Boytan -Encyclopedia of Pharmaceutical technology (Dekker).*
9. *David Ganderton -Unit Processes in Pharmacy (William Heinernan)*

Semester- I

1.1.6 Pharmaceutics I (Practicals) 3 hrs/ week

Preparation of monophasic liquids

1. **Solutions:** 6 different types by referring to I.P., N.F., BPC
2. **Aromatic Water:** 5 different types by referring I.P. and BPC
3. **Glycerites:** 3 preparations of I.P.
4. **Linctus:** Simple linctus BPC

Reference Books:

1. *Pharmaceutical Dosage and Drug Delivery System -Ansel - Popovich & Allen - (Williams & Wilkins)*
2. *American Pharmacy -Dittert (J.B. Lipincott)*
3. *Remington : The Science and practice of Pharmacy–A. R. Gennaro (Mack Publishing Co)*
4. *Bentleys Text Book of Pharmaceutics -Rawlins (ELBS)*
5. *Banker and Rhodes -Modern Pharmaceutics -(Dekkar)*
6. *Groves - Parenteral Products -(William Heinemann Medical Books Ltd)*
7. *Hanlon -Hand Book of Package Engg. (McGraw Hill)*
8. *Swarbrick & Boytan -Encyclopedia of Pharmaceutical technology (Dekker).*
9. *David Ganderton -Unit Processes in Pharmacy (William Heinerman)*
10. *Herbal Pharmacopoeia of India*

Semester-I

1.1.2 Pharmaceutical Inorganic Chemistry (Theory) 3hrs/week

1. Introduction to the study of monographs of official compounds in I.P.2007.
2. Sources of impurities in pharmaceuticals and methods to control them.
Limit test for Chloride, Sulphate, Iron, Arsenic, Lead, Heavy metals.
Limits of insoluble matter, soluble matter, non-volatile matter, moisture, volatile matter, residual solvent, loss on drying, loss on ignition and ash value.
3. An outline of method of preparation, physical and chemical properties, test for identity and purity, uses, special storage condition if any of the following classes of inorganic pharmaceuticals included in IP 2007.
 - a. Major intra and extra cellular electrolytes-
 - i. Physiological ions- Sodium, potassium, calcium, magnesium, chloride, bicarbonate, phosphate.
 - ii. Electrolytes used for replacement therapy- Sodium chloride, potassium chloride, calcium gluconate.
 - iii. Electrolytes used in acid base balance- Potassium acetate, sodium bicarbonate, ammonium chloride.
 - iv. Electrolytes used for combination therapy- ORS
 - b. Essential and trace elements- Iron, copper, iodine.
 - c. Gastrointestinal agents
 - i. Acidifying agents- Dilute hydrochloric acid.
 - ii. Antacids- Aluminum hydroxide gel, calcium carbonate, tribasic calcium phosphate, light & heavy magnesium, carbonate, magnesium oxide, magnesium trisilicate, sodium bicarbonate.
 - iii. Protectives and adsorbents- Bismuth subcarbonate.
 - iv. Cathartics- Magnesium sulphate
 - d. Expectorants and emetics- Ammonium chloride, potassium iodide, copper sulphate.
 - e. Dental products- Sodium fluoride, strontium chloride, zinc chloride.
 - f. Antidotes- Sodium nitrite, sodium thiosulphate
 - g. Official gases- oxygen, carbon dioxide, nitrous oxide.
 - h. Topical agent-
 - i. Protectives- Talc, titanium dioxide, zinc oxide
 - ii. Anti Microbial- Hydrogen peroxide, potassium permanganate, iodine.
 - iii. Astringents- Boric acid, silver nitrate, yellow mercuric oxide, alum, zinc sulphate.

Semester-I

1.1.7_ Pharmaceutical Inorganic Chemistry (Practical) 3hrs/week

1. Limit test for chloride, sulphate, Iron, Arsenic.
2. Preparation of inorganic compounds (at least two).
3. Qualitative analysis of water soluble or Dil. Acid soluble inorganic mixture of 4 radicals. (At least five)
4. Identification of inorganic compounds

Reference Books:

1. *Vogel's Textbook of qualitative Inorganic Analysis; By Denny, Jeffery.*
2. *Practical Pharmaceutical inorganic chemistry, By Beckett & Stenlake.*
3. *Inorganic Medicinal & Pharmaceutical Chemistry By Block & Roche.*
4. *Text book of Pharmaceutical Chemistry, By Chatten L.G.(Dekker series)*
5. *Textbook of Pharmaceutical analysis By Connors K.A.*
6. *Text book of Pharmaceutical Analysis by Dr. H. N. More*
7. *Indian Pharmacopoeia*
8. *Remington's Pharmaceutical Sciences.*

Semester- I

1.1.3 Biochemistry- I(Theory) 3hrs/week

1. Structure & functions of cell components of eukaryotes- Plasma membrane, cytoplasm, nucleus, mitochondria, endoplasmic reticulum, Golgi apparatus, ribosomes, lysosomes, peroxisomes.

2. Cell membrane & transport mechanisms- Structure, composition, functions of membrane. Transport processes- Active, passive, facilitated transport, Na^+ , K^+ , H^+ pumps.

3. Carbohydrates

Definition, classification, functions, fundamentals of chemistry of carbohydrates, concept of ring structure & straight chain structure of common carbohydrates- Glucose, fructose, galactose, lactose, maltose, sucrose, starch, glycogen, cellulose, hyaluronic acid, heparin.

Metabolic pathways- Glycolysis, TCA cycle, gluconeogenesis, glycogenolysis, pentose phosphate pathway, gluconeogenesis.

4. Lipids

Definition, classification, functions of lipids. Types of fatty acids and its biological role.

Lipid metabolism- β -Oxidation of fatty acids, oxidation of unsaturated fatty acids.

Biosynthesis of fatty acids (Arachidonic acid) & cholesterol, HDLP, LDLP.

Semester- I

1.1.8 Biochemistry- I (Practical) 3hrs/week

1. Qualitative tests for carbohydrates (6 samples)
Molish test, Benedict's, Barfoed test, Iodine test, Confirmatory test by Osazone formation etc.
2. Qualitative tests for lipids (4 samples).

Reference Books:

1. *Textbook of Medical biochemistry, By Dr. Rana Shinde.*
2. *Outlines of Biochemistry, E.E.Cohn and P.K.Stumpf*
3. *Biochemistry by Albert Lehninger*
4. *Harper's Biochemistry, By R.K.Murry.*
5. *Practical Biochemistry by David T. Plummer*
6. *Jayaraman J, Laboratory manual in Biochemistry, Wiley Eastern Ltd.New Delhi.*

Semester- I

1.1.4 Anatomy Physiology & Health Education – I Theory 3 Hrs

1. Blood

- Haemopoietic system Composition and functions of blood.
- Haemopoiesis and disorders of blood & its components
- Definition of Disorders).
- Blood groups.
- Clotting factors and mechanism.
- Platelets and disorders of Coagulation.

2. Lymph and Lymphatic system –

- Composition, formation and circulation of lymph
- Disorders of Lymph and lymphatic system (Definitions only)
- Spleen: Physiology and function.

3. Cardiovascular system

- Anatomy of heart
- Physiology of heart, Blood vessels and Circulation,
- Pulmonary and systemic circulation
- Cardiac cycle and Heart Sounds,
- ECG, Blood pressure and its regulation.
- Definitions of the following disorders-
 - Hypertension, Hypotension, Arteriosclerosis, Angina, Myocardial Infarction, Congestive Heart failure and Cardiac arrhythmias.

4. Respiratory System

- Anatomy of respiratory organs and functions
- Mechanism and regulation of Respiration
- Physiology of respiration: transport of respiratory gases
- Respiratory volumes and vital capacity

5. Digestive System

- Anatomy of Gastro Intestinal Tract (GIT)
- Secretions functions and anatomy of
 - i) Salivary glands
 - ii) Stomach
 - iii) Liver
 - iv) Pancreas
 - v) Intestine
- Disorders of GIT (definitions only)
- Digestion and absorption

Semester- I

1.1.9 Anatomy Physiology & Health Education – I Practicals 3 Hrs

1. Microscopic study of permanent slides of:
 - a. Epithelial tissue, connective, nervous and muscular tissue.
 - b. Tongue, thyroid, testes, ovary, blood vessels, pancreas, liver, spleen, stomach, intestine, spinal cord, cerebrum, cerebellum, lungs.
2. Determination of total leukocyte count
3. Determination of total RBC count
4. Determination of differential leukocyte count
5. Estimation of hemoglobin content
6. Determination of bleeding time
7. Determination of clotting time
8. Determination of blood group

Reference Books:

1. *AB Mc Naught and Callander R., "Illustrated Physiology", B.I. Churchill Living Stone, New Delhi, 1st edition, 1987.*
2. *Anne Waugh and Allison Grant, "Ross and Wilson Anatomy and Physiology in Health and Illness", Churchill Living Stone, Edinburgh, 9th edition, 2002.*
3. *Arthur C. Guyton and John E. Hall, "Text book of Medical Physiology" W.B. Saunders company, 10th edition, 2000.*
4. *Bhise S.B. and Yadav "Human Anatomy and Physiology", Nirali Prakashan, Pune (India), 8th edition, 2000.*
5. *C.C. Chatterjee, "Human Physiology" (Vol. I & Vol. II), Medical Allied Agency, Calcutta, 11th edition, 1985.*
6. *Chaudhry Sujit K., "Consise Medical Physiology", New Cenrtal Book Agency, Calcutta, 2nd Edition, 1993.*
7. *De Gruchy`s Clinical Haematology, "Clinical Haematology in Medical Practice, Blackwell Science publishers, 5th Edition, 1989.*
8. *Douglas E., Kelly, Richard Wood and Allen C. Enders, "Bailey`s TextBook of B.Pharm. Sci. Pg No.54 Microscopic Anatomy", Williams and Wilkins publishers, London, 18th Edition, 1984.*
9. *Elaine N. Marieb, "Human Anatomy and Physiology", Addison Wesley, New York, 4th edition, 1997.*
10. *Elaine N. Marieb, "Human Anatomy and Physiology", Benjamin / Cumings publishing company, 2nd edition, 1992.*
11. *Gerard J. Toratora, "Principles of Anatomy and Physiology", John-Wiley & sons New York, 10th edition, 2003.*
12. *Inderbir Singh, " Text Book of Human Histology with Colour Atlas, Jaypee Brothers, New Delhi, 4th edition, 2002.*
13. *Park J.E. and Park K., "Preventive and Social Medicine", Banarasidas Bhanot, India, 13th edition, 1991.*
14. *Thakaore Bhai, P. Gandhi and Harit R., Derasari, " Elements of Human Anatomy Physiology and Health Education" B.S. Shah Publishers, Ahmedabad, 4th Edition, 1991.*
15. *Anatomy and Physiology by Kimber - Grey - Stacktole`s*
16. *Practical Physiology and Biochemistry by Goel, Shah and Patel*
17. *Ranade V.G. – Text Book of Practical Physiology.*

Semester- I

1.1.5 PHARMACOGNOSY - I THEORY 3 Hrs

1. Introduction Definition, History, Scope of Pharmacognosy including indigenous system of Medicine.
2. Study of different tissues – Parenchyma, Collenchyma, Sclerenchyma, Xylem, Phloem, Medullary rays
3. Gross Morphology of different plant parts such as Woods, Bark, Leaf, Flowers, Seeds, Fruits, Roots & Rhizomes.
4. Sources of crude drugs of Natural Origin Vegetables, Mineral & Marine.
5. Various system of classification of drugs & Natural origin.
6. Adulteration and drug Evaluation by Pharmacopoeial & other official methods.
7. Cultivation, collection, processing & storage of crude drugs:-

Factors affecting cultivation of medicinal plants including both Endogenous & Exogenous factors.

Semester- I

1.1.10 PHARMACOGNOSY - I Practicals 3 Hrs

1. Microscopic measurement of cell & cell contents such as Linear & discrete particles
2. Determination of leaf contents such as
 - a) Stomatal number
 - b) Stomatal Index
 - c) Vein-Islet number
 - d) Vein – termination number
 - e) Palisade Ratio
3. Drug Evaluation Experiments as per I.P. and other official methods.

Reference Books:

1. *Indian Pharmacopoeia*
2. *Pharmacognosy : Tyler, Brady and Roberts (Lea Febiger)*
3. *Text Book of Pharmacognosy T.E. Wallis (CBS Pub. Delhi)*
4. *Text Book of Pharmacognosy, Trease & Evans (ELBS).*
5. *Text Book of Pharmacognosy - Kokate & Purohit - Pharmacognosy, (Nirali Publ).*
6. *Herbal pharmacopoeia – IDMA publication.*
7. *Ayurvedic formulary of India – Govt. of India publication.*
8. *Practical Pharmacognosy – C.K. Kokate.*
9. *Powdered Crude Drugs. – M. A. Iyengar.*
10. *Practical evaluation of Phytopharmaceuticals – Brain and Turner.*
11. *Anatomy of crude drugs.- M. A. Iyengar.*

F.Y.B.PHARM. (SEMESTER II)

Semester- II

1.2.1 Pharmaceutics II Theory 3 hrs

1. Mixing and Homogenization

Mechanism of mixing, fluid mixing, powder mixing, semisolid and solid mixing. Study of different type of mixers, Prevention of aeration and foams.

2. Clarification and Filtration

Definitions, theory and factors influencing filtration rate, types of filter media, filter aids and selection of filters. Study of different types of filters ,filter press, plate and frame filter, disc filter, edge filter, drum vacuum filter, precoat pressure filter, cartridge filter, Hydro extractors (Basket centrifuge).

3. Powders and Granules

Formulation and evaluation of various powders and granular products like dusting powder, oral rehydration and dry syrup formulations, talcum powder, tooth powders.

4. Granule manufacturing: Equipments used and different methods of dry and wet granulation.

5. Equipments used in the production of powders.

i] Size reduction. Factors influencing size reduction, Study of different types of mills, Ball mill, cutting mill, fluid energy mill, hammer mill, roller mill, colloid mill, selection of mill.

ii] Size separation, Sieves, sifting, size gradation, size distribution, methods for determination of size distribution.

6. Equipments used for manufacturing of liquids.

7. Packaging.

Equipments used for packaging. Primary and secondary packing materials. Components of packages. Selection of packing materials, Closures, pilfer proof enclosures, seals, package, wrapper, Tamper resistant packaging, film wrappers.

8. Surgical supplies:

Natural and synthetic absorbable and nonabsorbable sutures, manufacturing, sterilisation and quality control tests. Introduction to official surgical dressings, and bandages.

9. Pharmaceutical additives: Diluents, vehicles, bases, solvents, surfactants, organoleptic additives, applications of these additives, additives used in cosmetics and their sensitivity and irritation tests.

Semester- II

1.2.7 Pharmaceutics II Practicals 3 hrs

Powder preparations:

1. Oral rehydration powder
2. Dry syrup formulation for reconstitution
3. Talcum powder
4. Tooth powder
5. Effervescent granules

Liquid Cosmetics:

1. After shave lotion
2. Hair care lotion
3. Liquid shampoo
4. Nail lacquer

Syrups and elixirs:

1. Syrups: 2 preparations
2. Piperazine citrate elixir

Study of one monographs from the latest edition of Indian Pharmacopoeia and demonstration of equipments (working procedure) for

1. Size reduction and size separation
2. Mixing and homogenization
3. Clarification and Filtration
4. Evaporation, distillation and Percolation

Reference Books:

1. *B.M. Mittal: Textbook of Pharmaceutical Formulation, 4th Edition, Vallabh Prakashan, Delhi.*
2. *Banker and Rhodes. Modern Pharmaceutics, 4th ed 2002 Marcel Dekker Inc.*
3. *Disperse Systems, Vol. I, II, III, M. Decker.*
4. *E.A.Rawlins: Bentley's Textbook of Pharmaceutics, University Printing House, Oxford, 1988.*
5. *James Swarbrick and James C. Boylan: Encyclopedia of pharmaceutical Technology, Marcel Dekker Inc. New York.*
6. *L. Lachman, H. A. Lieberman and J. L. Kaing: The Theory and practice of Industrial Pharmacy, Vargheese Publishing House, Mumbai, 1987.*
7. *M. E. Aulton: Pharmaceutics, Science of Dosage Form Design.*
8. *Martin: Physical Pharmacy, Varghese Publishing House, Mumbai, 1991.*
9. *Pharmaceutical Dosage Forms and Drug delivery systems. and 7th Ed. Ansel, Lippincott Williams and Wilkins, PA, 1999.*
10. *Remington's "The Science and Practice of Pharmacy", 20th Ed; 2000, Lippincott. Williams and Wilkins.*

Semester- II

1.2.2 Modern Dispensing & Hospital Pharmacy Theory 3hrs

1. Scope of dispensing and compounding of drugs
2. Prescription: Definition, Parts and Types of prescription, Responding to prescription, Source of error, Pricing of prescriptions, refilling of prescriptions, Introduction to commonly practiced Latin terms in prescription, prepackaging.
3. Pharmaceutical Calculations: Posology; Factor influencing dosage, Calculation of child dose, Proportional calculations, Percentage calculations, alligation method, Isotonic solutions, Proof spirit, displacement value.
4. Incompatibilities: Physical, chemical and therapeutic incompatibilities, correction of incompatibilities.
5. Dispensing of
 - i) Sterile products: injectables, eye drops, insulin injections.
 - ii) New formulations: controlled/sustained release dosage forms, inhalers, t/d patches.
6. Hospital Pharmacy: Organisation of Hospital and Hospital Pharmacy, Pharmacy therapeutic committee, Hospital formulary, Purchase and inventory control, Central Sterile Supply (CSS) unit.
7. Hospital Pharmacist: Eligibility, duties and responsibilities
8. Drug distribution in hospital and OTC counter
9. Drug Information Services and Drug information bulletin :
Source, disease, treatment schedule, procurement, medication errors, retrieval of information, documentation, use of computer services
10. Maintenance of records and issue of narcotics, ward stock medicines, emergency drugs
11. Nuclear Pharmacy: Introduction to radio pharmaceuticals, Radiation hazards and their prevention, specifications of radioactive laboratory
12. Medical gases: Different gases and their application in therapeutics.
13. Surgical instruments, hospital equipments and health accessories: names and their uses

Semester- II

1.2.8 Modern Dispensing & Hospital Pharmacy Practicals 3hrs

1. Orientation of dispensing and compounding:
Introduction to the laboratory equipment, weighing methodology Precision of weighing and error evaluation, mixing, filtration, Various devices used for accurate dosage measurements, general instructions
2. Concept of modern dispensing practice:
Handling of prescription, Prescription reading, checking, labeling and pricing of prescriptions (At least 20 prescriptions from clinical practice.)
3. Patient Counselling: Steps involved. Patient counselling aids: Medication record, pictograms, product information leaflets. Patient counseling about diseases and medicines: Acidity, Diabetes, Asthma, Hypertension, OTC medicines. Computerized dispensing service.
4. Dispensing of prescriptions involving pharmaceutical calculations and tonicity, Calculation of dosage for paediatrics and geriatrics.
5. Dispensing of prescriptions of following category. (at least 25 prescriptions)
Oral solutions, Mouth washes, ear drops and enemas.
Suspension: Diffusible and Indiffusible type, inhalations
Emulsion: Liniment, lotion
Semisolid: Ointment, Gel, Paste, Cream, Jelly
Lozenges
Suppositories
Powders: Bulk powder, Divided powder, Dusting powder, Granules
Pre formulated dosage forms: Tablets / Capsules
6. Study of different types of Incompatibilities:
Physical, Chemical and Therapeutic with examples, Methods to correct the incompatibilities.
7. Study of current patent and proprietary products:
A study of current patent and proprietary products, Students should be trained in patient counseling by discussing specific problems in major classes of patent and proprietary products. Study of the important classes of patent and proprietary products, generic and selected brand names, indications, contraindications, adverse drug reactions, available dosage forms, dose and packing of the same

Reference Books:

1. *Prescription pharmacy - sprowls*
2. *Dispensing for pharmacy students - cooper & gum - 12th edition*
3. *Pharmaceutical practice - Collet & Alton*
4. *Dispensing of medication – Hoover*
5. *Modern Dispensing Pharmacy by A.P.Pawar. & R.S.Gaud , Career Publication*
6. *The extra pharmacopoeia - Martindale*
7. *Remingtons Pharmaceutical calculations - Bradly*
8. *Remingtons Pharmaceutical calculations - Joel L. Zatz.*
9. *Remingtons Pharmaceutical sciences.*

Semester-II

1.2.3 Organic Chemistry- I Theory 3 hrs

1. Chemical bond, wave equation, molecular orbitals, bonding & anti-bonding, intramolecular, intermolecular forces, polarity of bonds, electronegativity and polarity of molecules.
2. Factors affecting electron availability in bonds & at individual atoms- Inductive effect, resonance effect, electromeric effect, hyperconjugation & steric effect.
3. Acids & Bases- Theories, ionization constant, factors affecting acid-base strength.
4. Reaction intermediates & mechanisms-
Bond cleavage, Reaction intermediates- carbocations, carbanions, carbenes & free radicals (Structure, generation, stability & reactions). Classes of reagents, Types of organic reactions, Energy profile diagram.
5. IUPAC nomenclature
 - a) Alkanes, Alkenes, alkynes, alkyl halides, alcohols, ethers, aldehydes & ketones, phenols, carboxylic acids, esters, acid halides, amides, anhydrides, cyanides, amines, sulphonic acids.
 - b) Compounds containing more than one functional group.
6. Alkyl halides- General methods of preparations & reactions of it. SN_1 & SN_2 reaction mechanism. Factors affecting nucleophilic substitution reactions.
7. Alkenes- General methods of preparations & reactions. E_1 & E_2 elimination reaction mechanism. Saytzeff, Hofmann, Markovnikov's & anti-Markovnikov's rules.
8. Dienes- Definition & types, conjugated dienes- e.g. 1, 3-Butadiene- method of preparations & reactions. (1, 2 & 1, 4-addition reaction & Diels-alder reaction)
9. Alkynes- General methods of preparations & reactions.
10. Alcohols & ethers
Alcohols- General methods of preparations & reactions, qualitative tests for alcohols.
Ethers- General methods of preparations and reactions.

Semester-II

1.2.9 Organic Chemistry- I Practical 3 hrs

1. Hazards & safety in chemistry laboratory.
Explosion & fire Hazards- General aspects, explosive compounds, potentially dangerous mixtures, fire Hazards.
Reactive inorganic reagents- Strong acids, strong bases, halogens, reactive halides, chromium trioxide, chromates & dichromates.
Hazards due to toxic chemicals.
Carcinogenic substances.
Substances with very harmful cumulative effects.
2. Qualitative analysis of organic compounds & their derivatization. (Ten Compounds)
3. Separation of organic binary mixtures. (Five mixtures)

Reference Books:

1. *Advanced Organic Chemistry, Ed. 4 –Jerry March.*
2. *Fundamentals of Organic Chemistry Vol. I & II Finar I.L.*
3. *Organic Chemistry by Pine*
4. *Advanced Organic Chemistry by Solomans*
5. *Organic Chemistry : Morrison & Boyd*
6. *A Guidebook to reaction mechanism in Organic Chemistry: Peter Sykes*
7. *Advanced Organic Chemistry: Bahl B.S. & Bahl A.*
8. *Organic Chemistry by Jain M.K.*
9. *Reaction Mechanisms and Reagents : Gurudeep Chatwal.*
10. *Vogel's Textbook of practical organic chemistry*
11. *Practical Organic Chemistry –Mann and Saunders*
12. *Qualitative Analysis in Organic Chemistry-Nadkarni V.V. and Fernades P.S.*
13. *A Laboratory handbook of Organic qualitative analysis and separations-Kulkarni V.S. and Pathak S.P.*

Semester- II

1.2.4 Biochemistry- I (Theory) 3hrs/week

1. Amino acids & protein

Amino acids- Structure, classification, physicochemical properties, essential & non-essential amino acids.

Protein- Definition, classification, biological functions of proteins.

Primary, secondary, tertiary & quaternary structure of proteins.

Determination of primary structure of protein.

Protein metabolism- Decarboxylation of amino acids, transamination (SGOT & SGPT), Deamination, urea cycle.

2. Protein biosynthesis

Diagrammatic presentation of protein biosynthesis: initiation, elongation, termination, role of DNA & different types of RNA.

3. Nucleotides & nucleic acids

Nucleotides (including natural & synthetic), DNA & RNA structure, biochemical functions, replication, genetic code, gene, genome.

4. Enzymes & coenzymes

Definition, classification, structure of enzymes. Co-factor, active sites, K_m , V_{max} , double reciprocal plot, effect of active substrates, pH, ionic strength, concentration, temperature on rate of enzyme reactions, mechanism of enzyme action.

Enzyme inhibition- Reversible, irreversible, Allosteric. Concept of antimetabolites.

Enzyme induction & isozymes. Coenzymes like ATP, UDP & s-adenoyl methionine etc.

5. Electron transport chain

Biological oxidation, redox potential, energy rich compounds, respiratory chain & oxidative phosphorylation.

Semester- II

1.2.10 Biochemistry- I (Practical) 3hrs/week

1. Qualitative test for amino acids & proteins (6 samples)
2. Isolation of casein from milk.
3. Activity of enzymes.

Reference Books:

1. Textbook of Medical biochemistry, By Dr. Rana Shinde.
2. Outlines of Biochemistry ,E.E.Cohn and P.K.Stumpf
3. Biochemistry by Albert Lehninger
4. Harper's Biochemistry, By R.K.Murry.
5. Practical Biochemistry By David T. Plummer
6. Jayaraman J, Laboratory manual in Biochemistry, Wiley Eastern Ltd.New Delhi.

Semester-II

1.2.5 Anatomy Physiology & Health Education – II Theory 3hr

1 Urinary system

- Parts of urinary system and gross structure of the kidney.
- Structure of nephron.
- Formation of urine.
- Renin angiotensin system juxta-glomerular apparatus. Acid base balance.

2 Skeletal muscles

1. Histology
2. Physiology of muscle contraction
3. Physiological properties of skeletal muscle performance (definition of the disorders)
- 4 Sports Physiology

3 Nervous systems:

- Definitions and classification of nervous system
- Central Nervous System
 - Functional areas and functions of cerebrum
 - Cerebellum
 - Pons and medulla
 - Thalamus and hypothalamus
 - Basal ganglion
 - Spinal cord: structure and reflexes-mono-poly-plantar
 - Cranial nerves-names and functions
- Autonomic Nervous System-anatomy and functions of sympathetic and parasympathetic nervous system.

4 Endocrine system

- Pituitary gland
- Adrenal gland
- Thyroid and parathyroid gland
- Pancreas and gonads.

5 Reproductive system

1. Male and female reproductive systems
 2. Their hormones – physiology of menstruation
 3. Spermatogenesis and oogenesis
 4. Sex determination (genetic basis)
5. Pregnancy and its maintenance and parturition
 6. Contraceptive devices
- 5 Sense organs: structure and functioning of eye, ear, skin, nose and tongue.

6 Health Education-

Definition of Health (Physical & Mental) and Health Education,
Objectives of Health Education.

Family Planning- Principles underlying various family planning methods.

7 Communicable and non communicable diseases:-

Causative agents modes of transmission, symptoms, treatment and prevention of chicken pox, small pox, measles, mumps, rubella, influenza, diphtheria, whooping cough and tuberculosis, tetanus, hepatitis, cholera, typhoid, malaria, filariasis, kala azar, syphilis, gonorrhoea, aids. Non communicable diseases: diabetes, hypertension, cancer, and heart diseases.

Semester-II

1.2.11 Anatomy Physiology & Health Education – II Practical 3 Hrs/Wk

1. Study of Models

Different models covering, Heart, Respiratory system, Digestive system, Urinary system, Reproductive system, Nervous system, Sense organs, etc.

2. Study of Histological Slides

Different histological slides based on the different chapters covered in theory to be studied (eg. Basic tissues & Organs of the systems)

3. Study of family planning devices

Like condoms, copper 'T', foam tablets, contraceptive pills, etc.

4. Osteology

- Study of bones of the human skeletal system.

5. Blood Pressure measurement

6. Measurement of vital capacity by Spirometer.

7. ECG.

1. Demonstration:- (Through video or through experimentation)

- i) Effect of Acetylcholine/ Adrenaline/ Excess Ca^{++} and Excess K^+ on isolated heart of Frog.
- ii) Effect of temperature and successive stimuli on simple muscle twitch recorded on Frog gastrocnemius muscle – sciatic nerve preparation.

Text Book

1. Ranade V.G. – *Text Book of Practical Physiology*

Reference Books:

2. AB Mc Naught and Callander R., “*Illustrated Physiology*”, B.I. Churchill Living
3. Stone, New Delhi, 1st edition, 1987.
4. Anne Waugh and Allison Grant, “*Ross and Wilson Anatomy and Physiology in Health and Illness*”, Churchill Living Stone, Edinburgh, 9th edition, 2002.
6. Arthur C. Guyton and John E. Hall, “*Text book of Medical Physiology*” W.B. Saunders company, 10th edition, 2000.
8. Bhise S.B. and Yadav “*Human Anatomy and Physiology*”, Nirali Prakashan, Pune (India), 8th edition, 2000.
10. C.C. Chatterjee, “*Human Physiology*” (Vol. I & Vol. II), Medical Allied Agency, Calcutta, 11th edition, 1985.
12. Chaudhry Sujit K., “*Concise Medical Physiology*”, New Central Book Agency, Calcutta, 2nd Edition, 1993.
14. De Gruchy's *Clinical Haematology*, “*Clinical Haematology in Medical Practice*, Blackwell Science publishers, 5th Edition, 1989.
16. Douglas E., Kelly, Richard Wood and Allen C. Enders, “*Bailey's TextBook of B.Pharm. Sci. Pg No.54*
18. *Microscopic Anatomy*”, Williams and Wilkins publishers, London, 18th Edition, 1984.
19. Elaine N. Marieb, “*Human Anatomy and Physiology*”, Addison Wesley, New York, 4th edition, 1997.
21. Elaine N. Marieb, “*Human Anatomy and Physiology*”, Benjamin / Cummings publishing company, 2nd edition, 1992.
23. Gerard J. Toratora, “*Principles of Anatomy and Physiology*”, John-Wiley & sons New York, 10th edition, 2003.
25. Inderbir Singh, “*Text Book of Human Histology with Colour Atlas*, Jaypee Brothers, New Delhi, 4th edition, 2002.
27. Park J.E. and Park K., “*Preventive and Social Medicine*”, Banarasidas Bhanot, India, 13th edition, 1991.

1.2.6 COMMUNICATIVE SKILLS IN ENGLISH (Theory) [2hrs/Week]

I. Role and importance of communication, Verbal and non-verbal communication, Group communication, effective communication, barriers to communication, communication media, participating in discussions, conduct of seminars, conferences etc., making presentations through collection, evaluation, organizing the information, interacting with learners and teachers, Role of wit and humor in communication.

II. Spoken English Vs Written English, reading method, formal /informal English (one way /two way); British/American/Indian Englishes; how to introduce one self and others; how to tender apology; how to thank in different ways; greetings, some polite expressions; agreement and disagreements; how to use a dictionary; how to use a thesaurus; vocabulary development; synonyms and antonyms; one word substitutes; comprehension.

III. Communication through letters; official and personal letters; letters of complaint; letters of enquiries; and responses; writing memos, circulars and notices; what to avoid while writing; paragraph writing; scientific/technical report writing; drafting and delivering a speech, resume writing and interview techniques.

IV. Grammar: Sequence of tenses, voice, articles, direct and indirect speech; degrees of comparison; common errors in English made by Indian learners of English. Concepts of learning and listening: types and methods of learning and listening; learning and listening of knowledge, attitudes, skills, and practices.