J.J. COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS), PUDUKKOTTAI.

DEPARTMENT OF BIOCHEMISTRY

B.Sc Biochemistry

Proposed Course Structure under Autonomous Status

Under Choice Based Credit System

(Applicable for the candidates admitted from academic year 2016-2017 onwards)

SEM	Part	Course Code	Course Title	Hrs/ Week	Credit	Exam Hours	Marks		Total Marks
							Int	Ext	
I	I	U1RTL1	Language Course – I	6	3	3	25	75	100
	II	U1REL1	English Language Course – I	6	3	3	25	75	100
	III	U1RBCCC1	CC-I Biomolecules	6	5	3	25	75	100
			Major Practical I (Covering CC-I)	5	*	-	-	-	-
		U1RCHAC1	Allied Chemistry-I	4	3	3	25	75	100
			Chemistry Practical-I	3	*	-	-	-	-
TOTAL				**30**	**14**	**-**	**-**	**-**	**400**
II	I	U2RTL2	Language Course – II	5	3	3	25	75	100
	II	U2REL2	English Language Course – II	5	3	3	25	75	100
	III	U2RBCCC2P	Major Practical-I(Covering CC-I)	3	5	3	40	60	100
		U2RBCCC3	Human Physiology	5	5	3	25	75	100
		U2RCHAC2P	Allied Practical-I(Covering AC-1 and AC-3)	3	3	3	40	60	100
		U2RCHAC3	Allied Chemistry-II	4	3	3	25	75	100
	IV	U2RES	Environmental Studies	3	2	3	25	75	100
		U2RVE	Value Education	2	2	3	25	75	100
TOTAL				**30**	**26**	**-**	**-**	**-**	**800**

SEM	Part	Course Code	Course Title	Hrs/ Week	Credit	Exam Hours	Marks		Total Marks
							Int	Ext	
III	I	U3RTL3	Language Course – III	5	3	3	25	75	100
	II	U3REL3	English Language Course III	5	3	3	25	75	100
	III	U3RBCCC4	Enzymology	5	5	3	25	75	100
		U3RBCCC5	Analytical Biochemistry	5	5	3	25	75	100
			Major Practical-II(Covering CC-4 and CC5)	3	-	-	-	-	-
		U3RBCAC4	Biostatistics	4	3	3	25	75	100
			Allied Practical-II(Covering AC-4 and AC6)	3	-	-	-	-	-
TOTAL				**30**	**19**	**-**	**-**	**-**	**500**
IV	I	U4RTL4	Language Course – IV	5	3	3	25	75	100
	II	U4REL4	English Language Course – IV	5	3	3	25	75	100
	III	U4RBCCC6P	Major Practical-II (Covering CC-4 and CC5)	3	5	3	40	60	100
		U4RBCCC7	Intermediary Metabolism	5	5	3	25	75	100
		U4RBCAC5P	Allied Practical-II(Covering AC-4 and AC6)	3	3	3	40	60	100
		U4RBCAC6	Allied Microbiology	5	3	3	25	75	100
	IV	U4RBCSBE1	Skill Based Elective Course –I Sports Biochemistry	4	2	3	25	75	100
TOTAL				**30**	**24**	**-**	**-**	**-**	**700**

SEM	Part	Course Code	Course Title	Hrs/ Week	Credit	Exam Hours	Marks		Total Marks
							Int	Ext	

V	III	U5RBCCC8	Clinical Biochemistry	5	5	3	25	75	100
		U5RBCCC9	Cell and Molecular Biology	5	5	3	25	75	100
		U5RBCCC10	Biotechnology and Genetic Engineering	5	5	3	25	75	100
			Major Practical-III(Covering CC8)	3	*	-	-	-	-
			Major Practical-IV(Covering CC13)	3	*	-	-	-	-
		U5RBCMBE1	Pharmaceutical Biochemistry	5	4	3	25	75	100
	IV	U5RBCSBE2	Dairy Biochemistry	2	2	3	25	75	100
		U5RBCIDC1	Microbes in human welfare	2	2	3	25	75	100
TOTAL				**30**	**23**	**-**	**-**	**-**	**600**
VI		U6RBCCC11P	Major Practical-III(Covering CC8)	3	5	3	40	60	100
		U6RBCCC12P	Major Practical-IV(Covering CC13)	3	5	3	40	60	100
		U6RBCCC13	Endocrinology	5	5	3	25	75	100
		U6RBCCC14	Immunology	5	5	3	25	75	100
		U6RBCMBE2	Plant Biochemistry and Plant Therapeutics	5	4	3	25	75	100
		U6RBCMBE3	Nanomaterial and Bioscience	5	4	3	25	75	100
	IV	U6RBCSBE3	Applied Biochemistry	2	2	3	25	75	100
		U6RBCIDC2	Mushroom Technology	2	2	3	25	75	100
	V	U6RGS	Gender Studies		1	3	25	75	100
			Extension activities	-	1	-	-	-	-
TOTAL				**30**	**34**	**-**	**-**	**-**	**900**
GRAND TOTAL				**180**	**140**	**-**	**-**	**-**	**3900**

**Carried Over Paper – Exam at the End of the Next Semester

CC-Core Course / AC – Allied Course /MBE – Major Based Elective / SBE – Skill Based Elective/ IDC – Inter Disciplinary Course/P – Practical* / T – Theory

Total Credit – 140 / Total Marks – 3900

Extension Activities Shall Be Outside The Instruction Hours.

LIST OF ALLIED COURSES:

GROUP-I: Chemistry (Compulsory)

GROUP-II: 1. Biostatistics
2. Microbiology

LIST OF SKILL BASED ELLECTIVE COURSES:

1. Sports Biochemistry
2. Dairy Biochemistry
3. Applied Biochemistry
4. Plant and Animal Biotechnology
5. Nanobiotechnology
6. Biophysics

LIST OF MAJOR BASED ELLECTIVE COURSES:

1. Pharmaceutical Biochemistry
2. Plant Biochemistry and Plant Therapeutics
3. Nanomaterial and Bioscience
4. Nutrition and Dietitics
5. Introduction to Biomaterials

LIST OF INTERDISCIPLINARY COURSES:

1. Public health and Hygiene
2. First Aid Management and Safety Measures
3. Tannery technology

SEMESTER I
SUBJECT TITILE: CORE COURSE I
BIOMOLECULES - (U1RBCCC1)

OBJECTIVE:

To have a detailed knowledge about

- **The structure and function of biomolecules**
- **The properties of biomolecules.**
- **The importance of biomolecules.**

Unit I

Carbohydrates

Definition,Nomenclature and Classification-Monosaccharides, oligosaccharides and polysaccharides.Stereochemistry, structures, properties and anomeric forms. Haworth projections, Biological functions. Blood group polysaccharides.

Unit II

Amino acids

Structure, classification, physical and chemical properties. Titration curves of aminoacids. Colour reactions of Amino acids. Peptides: Amides and peptides, peptide bond, peptide synthesis, biologically important peptides. Proteins: classification and Biological importance. Primary structure, Secondary, tertiary and quaternary structure- forces stabilizing the structure of proteins. Denaturation, isolation and characterization. Precipitation by salts, separation by solubility differences- isoelectric pH, salting out. Purification of proteins.

Unit III

Nucleic acids

Components of mono nucleotides, pyrimidines and purines.Nucleotides, nucleosides, Polynucleotides: DNA and RNA. Composition and structure- their biological importance hydrolysis of nucleic acids by acids, bases and enzymes. Denaturation and renaturation. Isolation, separation and purification of DNA and RNA.

Unit IV

Lipids

Nomenclature, classification and Biological significance. Simple lipids: types of fatty acids, triglycerides, waxes, steroids, prostaglandins and their properties. Compound lipids: Phospholipids, sphingolipids and glycolipids. Lipoproteins. Analysis of oils: Reichert-Meisel value, Iodine number, saponification value, acid number and acetyl value.

Unit V

Vitamins and Minerals

Source, biological role, daily requirement and deficiency manifestation of the fat soluble vitamins and water soluble vitamins. Minerals: requirement, essential micro and macro minerals, sources and functions.

Text Books

1. Nelson,D.L. and Cox,M.M. 2013**.** Lehninger Principles of Biochemistry, 6th Edition, W.H. Freeman & Co.
2. Berg,J.M. *et al.,* 2012. Biochemistry, 7th Edition, W. H. Freeman & Co.
3. Voet,D. *et al.,* 2012. Fundamentals of Biochemistry: Life at the Molecular level, 4th Edition, John Wiley and Sons.

Reference Books

1. Zubay,G.L. 1998. Biochemistry, Wm.C. Brown Publishers.
2. Sinden,S.R. DNA structure and function, First Edition**,** Academic Press, 1994.
3. Carl Branden and John Tooze, Introduction to Protein Structure, Second Edition, Garland Publishing, 1999.
4. Garrett,R. and Grisham,C. 2010. Biochemistry, 4th Edition, Saunders College Publishing.

SEMESTER I
SUBJECT TITILE: ALLIED COURSE I
ALLIED CHEMISTRY I – (U1RCHAC1)

Objectives

- To understand the concept of periodic properties and molecular orbital theory
- To know the chemistry of biomolecules
- To study the concept of polymer and stereochemistry
- To learn the principles of separation techniques
- To understand the electrochemistry and corrosion

Unit I

Periodic properties

Ionization potential, electron affinity and electro negativityvariation in the periodic table. Molecular Orbital Theory: Some important basic concepts of molecular orbital theory - LCAO. Bonding, anti-bonding orbital and bond order – application of MO theory to H_2, He_2, N_2, O_2, and F_2 molecules. Industrial Chemistry: Fuel gases – Water gas, Producer gas, L.P.G. Gobar gas and Natural gas. Fertilizers – N.P.K and mixed fertilizers. Soap and detergents – An elementary idea of soap and detergent. Cleansing action of soap and detergents.

Unit II

Carbohydrates

Classification – Glucose and fructose – Preparation and properties – Sucrose –Manufacture and properties – Starch and cellulose – Properties and uses. Amino Acids and Proteins: Amino acids – Classification, preparation and properties. Peptides (Elementary treatment) – Proteins – Classification based on physical properties and biological functions. Nucleic acid: DNA and RNA – functions - Structure of DNA and RNA.

Unit III

Synthetic polymers

Teflon, Alkyl and Epoxy resins, Polyesters – definitions anduses Types of polymerization – Thermosetting and thermoplastics.Heterocyclic compounds – Furan, thiophene, and pyridine – Preparation and properties. Stereoisomerism: Optical isomerism – lactic and tartaric acid – Racemic mixture andresolution – Geometrical isomerism –maleic and fumaric acid.

Unit IV

Chromatography

principles of column, paper and thin layer chromatography. Photochemistry: Photochemical reaction – Lambert's law, Beer's law – Absorbtion, Extinction Coefficient – The law of Photochemical equivalence, Quantum efficiency, Some of Photochemical and their quantum yield. Phase Rule:Phase, Component, Degree of freedom, Phase Rule – Definition. One component system –Water system

Unit V

Electrochemistry

Specific and equivalent conductance – their determination – Effect of dilution on conductivities – An elementary idea about ionic theory – Ostwald'sDilution Law, Kohlrausch Law, Conductometric titrations. pH and Buffer: Importance of pH and buffers in the living systems. pH determination by colorimetric and electrometric methods. Corrosion: Types of corrosion, Prevention.

Text books

1. R.D. Madan, J.S. Tiwari and G.L. Mudhara. A Textbook of First Year B.Sc. Chemistry,S.Chand and Co.
2. P.L. Soni "Text book of Inorganic Chemistry. S. Chand & Co., New Delhi (1999).
3. P.L. Soni and H.M. Chawla "Text Book of Organic Chemistry" 28th Ed., (1999) - Sulthan and Chand company, New Delhi.
4. B.R. Puri, L.R. Sharma and M.S. Pathania, "Principles of Physical Chemistry", Vishal Publications, Jalandhar, 2002.

References Books

1. Bahl and Arun Bahl – "Advanced Organic Chemistry" 19th Ed., (2005) Sulthan and Chand company, New Delhi.
2. M.K. Jain.Organic Chemistry,12th Ed., (2003) Sulthan and Chand Company, NewDelhi.
3. R.L. Madan, G.D. Tuli, "Simplified Course in Physical Chemistry", 5th revised and enlargedEd., S.Chand & Co., New Delhi, 2009.

SEMESTER I AND II

SUBJECT TITLE: MAJOR PRACTICAL-I (CORE COURSE COVERING -I) QULATITATIVE AND QUANTITATIVE ANALYSIS OF BIOMOLECULES

I. Qulatitative Analysis

1. Analysis of Sugars

a) Monosaccharides-Glucose,Fructose,Galactose,Mannose,Pentose
b)Disaccharides-Sucrose,Maltose And Lactose
c)Polysaccharides-Starch And Dextrin

2.Analysis of Amino Acids

a)Histidine b)Tyrosine c)Tryptophan
dMethionine e)Cysteine f) Arginine

3. Lipid Analysis

a)Saturated and Unsaturated fatty acids
b)glycerol
c)cholesterol

II. Preparation

1.Preparation of Starch From Potatoes
2.Preparation of Casein From Milk

III. Quantitative Analysis

1.Estimation of Reducing Sugar by Benedicts Titrimetric Method
2.Estimation of Amino Acids by Formal Titration Titration method

3.Estimation of Ascorbic Acid by Titrimetric Method Using 2,6-Dichlorophenol-Indophenol Dye.
4.Determination of Acid Number of an edible oil.
5.Determination of Saponification number
6.Determination of Iodine number

References

1.David T.Plummer,An Introduction to Practical Biochemistry
2.Pattabiraman,Laboratory Manual in Biochemistry
3.J.Jayaraman,Practical Biochemistry

SEMESTER II
SUBJECT TITLE: ALLIED COURSE II (COVERING AC-1 AND AC-3)
ALLIED CHEMISTRY PRACTICAL I -(U2RCHAC3)

I. Volumetric Analysis

1. Estimation of HCl by NaOH using a standard oxalic acid solution
2. Estimation of Na_2CO_3 by HCl using a standard $Na_2\ CO_3$ solution
3. Estimation of oxalic acid bu $KMnO_4$ using a standard oxalic acid solution
4. Estimation of Iron (II) sulphate by $KmnO_4$ using a standard Mohr's salt solution.
5. Estimation of Ca (II) by $KmnO_4$ using a standard oxalic acid solution.
6. Estimation of $KmnO_4$ by thio using a standard $K_2Cr_2O_7$ solution.
7. Estimation of Fe (III) by using $K_2Cr_2O_7$ using a standard Mohr's salt solution using internal and external indicators.
8. Estimation of copper (II) sulphate by $K_2Cr_2O_7$ solution
9. Estimation of Mg (II) by EDTA solution
10. Estimation of Ca (II) by EDTA solution

II .Organic Analysis:

a) Identification of acidic, basic, phenolic and neutral organic substances
b) Detection of N, S and halogens
c) Test for aliphatic and aromatic nature of substances.
d) Test for saturation and unsaturation.
e) Identification of functional groups
   i. Carboxylic acid
   ii. Phenols
   iii. Aldehydes
   iv. Ketones
   v. Esters
   vi. Carbohydrates
   vii. Primary amines
   viii. Amides
   ix.

Reference Books

1. Sundaram, Krishnan, Raghavan, Practical Chemistry (Part II), S. Viswanathan Co. Pvt., 1996.
2. N.S. Gnanapragasam and G. Ramamurthy, Organic chemistry – Lab manual, S. Viswanathan Co. Pvt. Ltd., 1998.
3. J.N. Gurtu and R. Kapoor, Advanced Experimental Chemistry(Organic), S. Chand and Co., 1987

SEMESTER II
SUBJECT TITLE: CORE COURSE III
HUMAN PHYSIOLOGY – (U2RBCCC3)

Objectives

- To describe the structure and funcation of different organs found in the body systems
- Explain concisely basic physiological principles effect of hormone on body funcation , electrical siignalling via the nervoures system, movement of blood gases, respiratory orgns, digestion of food, Urinary system in homestosis and excretion.

UNIT I

Ciruculation and Blood and Body fluids

Composition and function , Red blood cells, Hemoglobin, white blood cells and platelets.Erythropoiesis, Blood coagulation, blood groups and blood transfusion.. Circulation: Structure of heart and blood vessels,cardiac cycles, cardiac facter controlling blood pressure, electrocardiogram, Function of heart.

UNIT II

Digestion

Anatomy of digestive system, secretion, composition and functions of digestive jusices-salivary, gastric, biliary, Digestion and absorption of carbohydrates, proteins and nucleic acids.

UNIT III

Respiratory system

Structure of lungs-mechanism and regulation of respiration. Transport of blood gases - O_2 and CO_2. Acid-base balance - role of buffers, erythrocytes, respiratory system and kidneys. Fluid electrolyte balance - regulation of water balance and sodium balance -. Metabolic and respiratory acidosis and alkalosis - role of renin-angiotensin and ADH and Composition and function of lymph,CSF

UNIT IV

Excretory System and Body fluids

Structure of Kidney and Nephron- glomerular filtration, tubular reabsorption, tubular secretion. Mechanism of formation of urine, composition of urine, Micturition-Renal regulation of acid balance, hormone of the kidney

UNIT V

Skeletal Muscle and Nervous system

Structure of skeletal muscle, contraction of muscle fiber, chemical changes during muscle contraction, Structure of neuron, resting potential and action potential, Propagation of nerve-impulses, Synaptic transmission (electrical and chemical theory). Structure of Neuro muscular junction and mechanism of neuro muscular transmission, neuro transmitters and cAMP.

Text Books

1.Chatterjee ,C.C- Human Physiology-Volume I&II,III, & IV
2.Saradha Subramaniam.Text book of human physiology.Unit V
3.Guyton,Text book of Medical physiology. Unit II and III.
4.K. Sembulingum, Prema Sembulingum,Essentials of Medical Physiology,Second Edtion.Unit I,II, III & IV

References

1.Chatterjee. C. Text book Medicinal Chemistry
2.Agarwal G.R. & Agarwal B.P. Text book of Biochemistry (Agarwal physiological Chemistry)
3.Murray.R.G. Harper `s Biohemistry 24 th Edition
4.Lecture notes on human physiology, M,M Muthiah Vol II, 1991.

SEMESTER II
SUBJECT TITILE: ALLIED COURSE III
ALLIED CHEMISTRY II – (U2RCHAC3)

Objectives

- To understand the types of chemical bonding and the importance of coordinationcompound
- To have knowledge of types for organic reaction and aromaticity
- To study the importance of solids and colloids
- To know the concept of chemical equilibrium and catalysis

Unit I

Coordination Chemistry: Nomenclature of mononuclear complexes – Werner, Sidgwick and Pauling'sTheory.Biological role of Haemoglobin and Chlorophyll. Application of complexesin qualitative and quantitative analysis. Metallic Bond:Electron gas, Pauling and Band Theories. Semiconductors - Intrinsic, n andp-type.Compounds of Sulphur: Peracids of sulphur and sodium thiosulphate.

Unit II

Electron Displacement Effects- Inductive effect – Relative strength of aliphaticacid and alkyl amines. Resonance – Condition for resonance - Consequences ofresonance - Hyper conjugation – definition and examples- steric effect . Aromaticity – Conditions – Huckel's rule - aromaticity of benzene.Substitution reactions- Nitration, halogenation, sulfonation and alkynation of benzene.

Unit III

Halogen containing compounds: Preparation and uses of Dichloromethane,Chloroform, Carbon tetrachloride, DDT, and BHC. Chemotherapy: Structure and uses of Sulpha drugs – Sulpha pyridine,Sulpha thiazole and sulpha diazine –Antibiotics - Struture and uses of penicillin –Gand Chloromycetin.Name reactions: Benzoin, Perkin, Cannizaro, Claisen, Haloform, Carbylamine reactions – Biuret reaction.

Unit IV

Solid State: Typical crystal lattice – Unit cell. Elements of symmetry. Bragg's equation, Weiss indices, Miller indices, Simple, Body centered and face centered cubes.Colloids:Types of colloidal systems — Classification of colloidal systems, Lyophilic andLyophobic Sols — properties of colloidal system – Dialysis – Electro-dialysis, Ultrafiltration. Emulsion –types-preparation- emulsifier- Deemulsification- Gelstypes.

Unit V

Chemical Equilibrium: Criteria of homogeneous and heterogeneous equilibria. Decomposition of HI and PCl_5.Chemical Kinetics:Order, Rate, Molecularity of the reaction

and rate constant, Determination of orderof the reaction – Activation energy, Effect of temperature on reaction rate. Catalysis– Types-Importance of catalysis, types of catalysis - Homogeneous andheterogeneous catalysis (Industrial catalyst – catalyst carrier, catalyst promoter,catalyst inhibitor, catalytic poison, activity of catalyst). Theory of catalysis - Intermediate complex theory – concept of acid-base and enzyme catalysis.

Text books:

1. P.L. Soni "Text book of Inorganic Chemistry. S. Chand & Co., New Delhi (1999).
2. P.L. Soni and H.M. Chawla "Text Book of Organic Chemistry" 28thEd., (1999)Sulthan and Chand company, New Delhi.
3. B.R. Puri, L.R. Sharma and S. Pathania – Principles of Physical Chemistry: Shoban LalNagin Chand and Co., New Delhi
4. A.K. Srivastava "Organic Chemistry" 1st Ed.,(2002) New Age International Publishers, New Delhi.

References Books:

1. R.D Madan – "Modern Inorganic Chemistry" (1987), S. Chand & Co Pvt Ltd.
2. B.R. Puri and L.R. Sharma – Principles of Inorganic Chemistry: Shoban Lal Nagin Chand andCo., New Delhi (2000).
3. R.L. Madan, G.D. Tuli, "Simplified Course in Physical Chemistry", 5th revised and enlargededition, S.Chand & Co., New Delhi, 2009.

SEMESTER III
SUBJECT TITLE: CORE COURSE IV
ENZYMOLOGY (U3RBCCC4)

Objectives

- To impart through knowledge about enzymes and enzyme kinectics.
- To study the applications of enzymes in various industries

Unit I

Introduction,definition,international classification of enzymes,numbering and nomenclature.enzyme units,definition of active sites.theories proposed – lock and key or template model and induced fit model,ordered and and random binding of substrate.enzyme specificity-group specificity,optical specificity

Unit II

Extraction,purification and characterization of enzymes

Source and extraction procedures.criteria of purity of enzymes.characterization:using ultracentrifugation-molecular exclusion chromatography,SDS gel electrophoresis,amino acid sequence determination by sangers method.

Unit III

Enzyme kinectics and enzyme inhibitors

Factors influencing enzyme activity.enzyme kinectics:derivation of michaleis-menten equation,transformation of MM equation,line-weaver burk plot and eadie hoffstie plot,turn over number of enzymes.Enzyme inhibition**:** competitive,non-competitive and uncompetitive inhibition.regulatory enzymes,allosteric enzymes with references to aspartate transcarbomoylase,covelent by modulate enzyme and iso enzymes. ribozymes, abzymes. feedback inhibition.

Unit IV

Coenzymes

Definition,structure and functions of TPP,NAD,NADP,FAD,FMN,Coenzyme A,metal cofactors.multienzyme complex:pyruvate dehydrogenase.mechanism of enzyme action:general acid base catalysis,covelent catalysis,proximity orientation.mechanism of action of lysozyme and chymotrypsin.

Unit V

Enzyme technology

Immobilized enzymes: source and technique of immobilization. Effect of immobilization on enzyme activity. Applications of immobilized enzymes. Industrial production of enzymes: amylase, protease, pectinases.industrial uses of enzymes. Enzyme engineering: Artificial enzymes.Enzymes used in diagnosis and various diseases with abnormal values,antioxidant enzymes.

Text books

1.Trevor palmer,3rd edi,1991.understading enzymes.Ellis horwood limited.Unit III, IV and V

2.Renuka harikrishnan,4th edition,introduction to biomolecules and enzymes, indiraji pathipagam unit I,II and V.

References

1. Enzymes-dixon and webb
2. Enzyme technology- chapline & bucke.
3. Alam Welshman, 2nd edition,hand book of enzyme biotechnology.

SEMESTER III

SUBJECT TITLE: CORE COURSE V

ANALYTICAL BIOCHEMISTRY-(U3RBCCC5)

Objectives

- The impart analytical knowledge in Biochemistry and Molecular Biology of the students
- To study the biochemical characters for beneficial manipulation
- To equip student with knowledge in relevant and recent advance in application in Biochemistry

UNIT I

Biophysics

Introduction: Acid- Base and Buffers, Principle and Application of Oxygen electrode, pH meter-pH scale, Henderson-Hassalbach equation, Buffer solutions, Buffer systems of blood-Hb, Protein and Phosphate buffer system. Various ways of expressing and conversion of concentration of solutions – molality,molarity, normality, mole fraction. Simple problems to be worked out.

UNIT II

Chromatography

Principle, materials, methods & applications of paper chromatography, TLC,Column, Molecular sieve, Adsorption, Ion –exchange, Affinity chromatography.HPLC and GLC

UNIT III

Electrophoresis and Centrifugation

Principle, instrumentation and application of paper electrophoresis, agar gel, PAGE,SDS-PAGE, immunoelectrophoresis, isoelectric focusing, ELISA, Centrifuge-Bench top, high speed, Ultra centrifuge. Principle and description of Analytical Centrifuge. Determination of Molecular weight by sedimentation velocity method- Density gradient method. Separation of cell Organelles by differential centrifugation.

UNIT IV

Spectrometry

Principle, Instrumentation and application of Colorimeter, Beer-Lambert's Law, Measurement of molar extinction, calibration curve. Spectrophotometer-Absorption Spectra, Fluorimetry and Flame photometry. Atomic absorption, NMR, ESR and Mass Spectrometry.

UNIT V

Radioisotopes

Tracer and other Techniques-Radioactive decay, types of radioactive decay, units of Radioactivity. Radioactive isotopes-detection and measurement of Radioactivity- GM counter, Scintillation counter, Auto radiography. Applications of Radio isotopes in biological and medical sciences.

Text Books

1.Keith Wilson, Kenneth H. Goulding, 3rd Edition 1992, A Biologists guide to principles and Techniques of practical Biochemistry. Cambridge University Press. Unit III & V
2.Uphadhay & Uphdhynath. Biophysical Chemistry

Reference Books

1.Sharma B.K. (1981) 11 th Edition. Instrumental method of chemical analysis.
2.Kudesia V.P. Sawhaney H., (1989) Instrumental method of chemical analysis
3.David T. Plummer,3 rd Edition (1998), An Introducation to practical Biochemistry
4.Leslie Cromwell, Fred J, Weibell, Erich A, Pfeiffer, Biomedical instrumentation and Measurement- 2nd Edition.

SEMESTER III
SUBJECT TITLE: ALLIED COURSE IV
BIOSTATISTICS - (U3RBCAC4)

Objectives

- Update and expand the basic knowledge of mathematics.
- To review the basic concepts and knowledge in collection of Data
- Develop the skills pertinent to practice Measures of central tendency.
- The students will collect and analyze data using biological materials.

Unit I

Introduction to Biostatistics

Biostatistics: Definition- Developments – Applications- Role- Definition of Statistics – Characteristics – Limitations.

Unit II

Collection and Presentation of Data

Collection of data : Data collection-Primary data – secondary data, Classification. Sampling: Sampling method- types of sampling.Classification and Tabulation: - Types of classification - Tabulation of data - Parts of a table - types of tabulation.Diagrammatic representation : Rules, limitations - Bar diagram (Simple, multiple, component / staked, proportional / percentage) - pie diagram.Graphical representation : rules, limitations - difference between diagram and graphs - histogram - frequency polygon - frequency curve - Ogive curve

Unit III

Measures of Central Tendency

Measures of central tendency: Introduction - characteristics - Arithmetic mean - Median - Mode - Geometric mean, Harmonic Mean (definition, merits and demerits, problems based on raw, discrete and continuous data)

Unit IV

Measures of Dispersion

Measures of dispersion: Definition - Characteristics - Range - Mean derivation - Standard deviation - Coefficient of variation (definition, merits & demerits, problems based on raw data only)

UNIT V

Skewness and Kurtosis

Skewness : Definition, Types, Karl Pearson coefficient of Skewness, Bowley's coefficient of Skewness - Related problems, Kurtosis & moments (concept only).

Text Books

[1] "Biostatistics" - P.N. Arora, P.K.Malhan, Himalaya Publishing House.(2014).
[2] "Fundamentals of Biostatistics" - Veer BalaRastogi, Ane Books Pvt. Ltd. (2008).

Reference Books

1. "Introduction to Biostatistics" – Sokaland Rohlf – Toppan Co. Japan
2. "Primer of Biostatistics" – Stanton A. Clantz – The McGraw Hill Inc. Newyork.

SEMESTER III & IV

SUBJECT TITLE: CORE COURSE VI – MAJOR PRACTICAL II

BIOCHEMICAL TECHNIQUES AND ENZYMOLOGY (U4RBCCC6P)

I.Biochemical Techniques

1. Preparation of Buffer and Its pH Measurements Using pH Meter.
2. Separation of Aminoacids and Sugars by TLC, Paper Chromatography
3. Separation of Pigments by Column Chromatography
4. Separation of Serum Proteins by Electrophoresis
5. Titratable Acidity of Amino Acids

II. Enzyme Analysis

1. Determination of specific activity (saturation method),pH,temperature,enzyme concentration and substrate concentration of amylase ,alkaline phosphatase,acid phosphatase and catalase.

References

1.Manuals in Biochemistry,DrJ.Jeyaraman
2.Practical Biochemistry,Warley
3.Practical Biochemistry,Plummer
4.Practical clinical Biochemistry,Herald varley

SEMESTER III & IV
SUBJECT TITLE: ALLIED PRACTICAL II
BIOSTASTICS AND MICROBIOLOGY (COVERING AC-4 AND AC-6)

Biostastics

1. Calculation of arithmetic mean, median and mode for ungrouped and grouped data.
2.calculation of quarterile deviation and standard deviation.

Microbiology

1.Cleaning,preparation and sterilization of glasswares
2.Preparation of media for bacteria,fungi and actinomycetes
3.Inoculation methods
4.Isolation of pure culture by streak plate,pour plate method
5.Preservation of cultures-stab and slant cultures
6.Staining of microorganism-gram stain,acid fast,methylene blue,Indian ink
7.Hanging drop preparation
8.Bacteriological examination of soil and milk
9.Growth culture
10.Serial dilution method
11.Antibiotic disc assay
12.Enumeration of coliform organism.

References

1.James G.cappucina,Natalie Sherman(1996) microbiology-laboratory manual.the Benjamin(cummings publishing company)
2.Mackie and McCarthey(1989) practical medical microbiology,Churchill Livingston.
3.Albert Balows,Hens G.Truper,Martin Dworkin,Wim.Hardes,Karl Heinz, Schoeifer (Eds)(1192).A Hand Book On The Biology Of Bacteria,Eco-Physisology, Isolation, Identification And Applications,Springer Verlag.

SEMESTER IV
SUBJECT TITLE: CORE COURSE VII
INTERMEDIARY METABOLISM (U4RBCCC7)

Objectives

- To understand the various concepts of bioenergetics
- To know the interrelationships between different metabolisms.

UNIT I

Bioenergetics

Laws of Thermodynamics, High energy phosphates and their role in redox reaction. Enzymes involved in biological oxidation- redox potential, Role of respiratory chain in mitochondria; in energy capture; respiratory control. Mechanism of Oxidative phosphorylation ;Chemiosmotic theory; uncouplers of oxidative phosphorylation. Inhibitors of electron transport chain and oxidative phosphorylation.

UNIT II

Metabolism of carbohydrates

Fate of absorbed carbohydrates. Glycolysis pathways and energetics: oxidation of pyruvate to acetyl CoA. TCA Cycle: - pathway and energetics: anaplerotic reaction . Gluconeogenesis; Glycogenesis and glycogenolysis. Pentose phosphate pathway. Glucuronic acid cycle and glyoxylate cycle pathways.

UNIT III

Metabolism of lipids

Oxidation of fatty acid - Carnitine cycle; beta oxidation . Alpha oxidation and omega oxidation. Biosynthesis of saturated fatty acids, degradation- lecithin, triacylglycerol and plasma lipoproteins. Cholesterol metabolism and Ketogenesis.

UNIT IV

Metabolism of Amino acids

Overview of Amino acid biosynthesis.Catabolism of amino acid: Oxidative deamination, non-oxidative deamination,transamination, amino acid decarboxylation, catabolism of carbon skeleton of amino acids. Catabolism of glycine and tyrosine. Urea cycle, Branched chain amino acid metabolism.

UNIT V

Integration and Nucleotide metabolism

Interrelation between carbohydrates, fat and protein metabolism in well fed state and starvation conditions. Metabolic integration between organs. Metabolism of purines : de novo synthesis, salvage pathways ; catabolism .metabolism of pyrimidines ; de novo synthesis, salvage pathways.

Text books:

1.Lehninger et al.Principles of Biochemistry.2nd edition CBS Publishers,1993.
2. Murray et al.Harpers Biochemistry,21st edition,1998,Mc Graw Hill publication

Reference Books :

1.Mathews,Freeland and Miesfeld-Biochemistry-a short course.wiley & sons.1996.
2.Garrett and Grisham-Biochemistry.Saunders college publishers,1995.

SEMESTER IV
SUBJECT TITLE: ALLIED COURSE V
GENERAL MICROBIOLOGY - (U3RBCAC4)

OBJECTIVES:

- To have a brief knowledge about the microbial world.
- To study the ultra structure of microbes.
- To learn the various methods of isolation and preservation of microbes.

UNIT – I

History and Scope of Microbiology

Spontaneous generation theory – Contribution of Leuvenhoek, Louis Pasteur, Robert Koch, Edward Jenner, Joseph Lister, Winogradsky, \Waksman, John Tyndall clasification of micro organisims - Haeckl's threekingdom concept,Whittaker's Five kingdom concept.

UNIT – II

Microscopy and Staining

Microscopy – Principles and application – Bright field, Dark field, Phase contrast, Fluorescence, SEM & TEM- Specimen preparation for electron microscopy –freeze etching .

UNIT – III

Sterilization and Disinfection

Principles- Methods of Sterilization – Physical methods – Dry heat- Moist heat, Filtration (Membrane & HEPA) - Radiation – Chemical Sterilization -Chemical agents, Mode of action – Phenol coefficient test- Sterility testing.

UNIT – IV

Ultra structure of bacteria

Sub cellular structures and cell envelop-slime, capsule, cell wall , Pili, flagella, cell inclusions. General characteristics of Archaebacteria, Eubacteria, Cyanobacteria, Mycoplasmas, Rickettsiae,Chlamydias, Spirocheates , Actinomycetes,Protozoa,Algae,Fungi,and Viruses.

UNIT – V

Types of culture media

Simple, defined, enriched, differential and transport media with specific examples for each type. Methods of maintenance and preservation of microbes. Microbial culture collection centres.

Text Books

1. Prescott, L.M J.P. Harley and C.A. Klein 1995. Microbiology 2nd edition Wm, C. Brown publishers(All Units)
2. Michael J. Pelczar, Jr. E.C.S. Chan, Moel : Microbiology Mc Graw Hill Book R. Krieg, 1986
Company(All Units).
3. Text Book of Microbiology R.C.Dubey and Maheswary. S.Chand and company (P)LTD.

References

1. Salle A.J. : Fundamental Principles of Bacteriology 7th edition, Tata Mc Hill Publishing Company Ltd.,

2. Michael J. Pelczar, Jr. E.C.S. Chan, Moel : Microbiology Mc Graw Hill Book R. Krieg, 1986
Company
3. Stainer R.Y. Ingraham J.L. Wheolis H.H and Painter P.R. 1986 The Microbial world, 5th edition. Eagle Works Cliffs N.J. Prentica Hall..
4. William claus. G.W. 1989. Understanding Microbes – A Laboratory textbook for Microbiology,W.H. Freeman and Co., New York.
5. Wilson. K and Goulding. K.H. 1986. A Biologist's Guide to Principles and Techniques of Practical Biochemistry, ELBS, London
6. Tauro P., Kapoor, K.K. Yadav,K.S.An introduction to Microbiology first Edition ,New Age International Publishers.

SEMESTER IV
SUBJECT TITLE: SKILL BASE ELECTIVE COURSE - I
SPORTS BIOCHEMISTRY – (U4RBCSBE 1)

OBJECTIVES

- Learning about Yoga
- To know about physiology
- Importance of nutrients on health

Unit I

Sports, Exercise and Games

Introduction, calisthenics, Gymnastics, combative and swimming; - Yogasana and its importance – Padmasana, Vajrasana, Dhunurasana, and Suryanamaskar; - Track and field events – Running and jumping Team events – Kabaddi.

Unit II

Skeletal muscle system and metabolic systems in Exercise

Skeletal muscle types; -relation with different types of activities; strength, power and endurance of muscles;Muscle metabolic systems in exercise; Recovery of muscle metabolic systems after exercise.

Unit III

Cardio respiratory system

Muscle blood flow and cardiac output during exercise: Oxygen consumption and pulmonary ventilation in exercise; Hypoxia and hypercapnia.

Unit IV

Physical fitness assessment

Blood composition; body fat percentage by skin fold method; BMI; Idea weight and assessment of muscle mass.

Unit V

Nutrition for sports and Exercise

Nutritional considerations for sports person:- Carbohydrate: Energy source for sports and exercise; carbohydrates composition for pre-exercise, during and recovery period.Fat: Role as an energy source: effect of fasting and fat ingestion. Protein: Peotein requirement during exercise, recovery process and protein supplement. Vitamins: Role of B-Complex vitamins. Minerals: Role of potassium and sodium.

Reference Books

1.Health and Physical Education by B.N. Dash, Neelkamal Publications Pvt Ltd.
2.Human physiology and mechanism of disease by Guyton, 5th Edition, W.B. Saunders Publication.
3.Essentials of food and Nutrition by M. Swaminathan Vol I-II.
Food, Nutrition and Diet therapy by Kraure and mohan, 6th Edition, W.B. Sounders company.

SEMESTER V
SUBJECT TITLE: CORE COURSE VIII
CLINICAL BIOCHEMISTRY AND DIAGNOSTIC TOOLS - (U6RBCCC8)

Objectives

- To explore the molecular mechanisms of diseases.
- To study the various diagnostic tools available for the diseases.

UNIT I

Disorders of Carbohydrate Metabolism

Normal Sugar Level in Blood, Renal Thereshold and Regulation of Blood Glucose Concentration. Hypoglycemia and Hyperglycemia. Introduction, Aetiology, Types, Clinical Pathology,Diagnosis, Acute and Chronic Complications of Diabetes Mellitus-Differential Diagnosis, Fructosuria, Galactosemia and Glycogen Storage Diseases.

UNIT II

Disorders of Lipid Metabolism

Introduction, Types: Hyperlipoproteinemia,Hypolipolipoproteinemia.Tangiers Disease and LCAT Deficiency. Atheroscelerosis. Fatty Liver. Hypercholestrolemia, Lipidosis, Diabetic ketoacidosis,Obesity. Lipid Storage Diseases:Tay-Sachs Disease, Niemann-Pick Disease, Farber's disease and gaucher's disease.

UNIT III

Disorders of Aminoacid Metabolism

Plasma Protein Abnormalities: Fibrinogen,Albumin,pre-albumin and globulins. Abnormal non-protein nitrogen, urea, uric acid, creatinine and ammonia,porphyria. Disorders of aminoacid metabolism: cysteinuria, phenylketonuria, maple syrup urine disease, alkaptonuria,albinism and hartnup's disease. Disorders of purine and pyrimidine metabolism:hyperurecemia and gout,hypourecemia-xanthinuria and lithiasis.orotic aciduria.

UNIT IV

Gastric,pancreatic and intestinal function tests.

Gastric function: the insulin stimulation test, determination of gastrin in serum and tubeless gastric analysis. Pancreatic function: Introduction, tests of serum amylase and lipase. Intestinal function: Introduction, test of monosaccharide absorption by Xylose excretion test and determination of total protein by Lowry's method.

UNIT V

Liver Funtion Tests.

Introduction, Bilirubin Metabolism and Jaundice, Estimation of Conjugated and Total Bilirubin in Serum.Detection of Bilirubin and Bile in Urine. Thymol Turbidity Test,

Prothrompin Time. Serum Enzymes in Liver Disease- Serum alanine transaminase, aspartate transaminase and Lactate Dehydrogenase. Kidney Function Test: Renal Blood Flow and Filtration Fraction,Inulin Clearance,Creatinine Clearance Test and Urea Clearance Test.

Text books

1.Chatterjee C.Text Book Of Medical Biochemistry,2nd edition
2.Philip DM.clinical chemistry in diagnosis and treatment,ELBS publications,6th edition,1994

Reference

1.Teitz NW.,fundamentals of clinical chemistry,W.B.saunders company,second edition,1994
2.Montgometry,Conway,spector,biochemistry-A case oriented approach.the C.V.moshby company,5th edition, 1990.

SEMESTER V
SUBJECT TITILE: CORE COURSE IX
CELL AND MOLECULAR BIOLOGY –(U5RBCCC9)

OBJECTIVE:

- **To have a detailed knowledge about the structure and function of cell and the organelles.**
- **To know about the gene and its function**
- **Aquiring knowledge about the various regulatory factors involved in the functioning of the cell.**

UNIT I

CELL

Cell as a basic unit of life. Cell organization of prokaryotic and eukaryotic cells. Structural and functional capitalization of cell –mitochondria, chloroplast, lysosomes, golgi bodies, plasma membrane and cytoskeleton, cell wall, nucleus.

UNIT II

Cell cycle

Cell division - mitosis and meiosis.Chromosome structure, gene, gene number, gene clusters and Pseudogene. Polytene and lampbrush chromosomes. Packing of DNA, supercoiled DNA, nucleosome, Inverted repeats, repetitive DNA sequence, satellite DNA. Cell trafficing.

UNIT III

Molecular Biology

Identification of DNA as genetic material-Aveng, Merlead, Maccarty experiments-Griffith experiment. Genomic organization-Histone and Non histone protein, coding and Non coding DNA replication: semi conservative mode of replication. Enzyme machinery for DNA replication-topoisomerase. Polymerase, ligase-super coiling of DNA. DNA damage and repair, photo reactivation excision and post replication –repair.

UNIT IV

Transcription

RNA polymerase, stages of transcription, inhibitors of RNA synthesis, reverse transcription. Post transcriptional modification of tRNA, rRNA, and mRNA.

UNIT V

Translation

Genetic Code and Wobble hypothesis. Gene-Cistron, recon, muton. Translation-structure of prokaryotic and eukaryotic ribosomes. Mechanism of translation, inhibitors, post translational modifications. Gene expression in prokaryotes and in eukaryotes. The operon hypothesis-Lac, trp operons.

Text Books

1. Sundara Rajan- Cell and Molecular Biology, Anmol publication PVT., LTD., 2003.
2. Rastogi S.C- Cell and Molecular Biology, New age International publisher, 3rd edition, 2011.
3.Dr. P. Asokan-Molecular Biology, Chinnaa publications, 1st edition, 2005.

Reference Books

1 Lewis J. Kleinsmith, Valerie M.Kish - Principles of Cell and Molecular Biology, Harpercollins College Publishers, 2nd edition, 1995.
2 Lodish et-al., Molecular Cell Biology,W.H.Freeman and company, 3rd edition, 1995.
3 David Freifelder-Molecular Biology,Narosa publishing house, 2nd edition, 2008.
4 Gerald Karp - Cell and Molecular Biology, John Wiley and Sons, Inc., 5th edition, 2008

SEMESTER V
SUBJECT TITILE: CORE COURSE X
BIOTECHNOLOGY AND GENETIC ENGINEERING – (U5RBCCC10)

Objective

After the completion of the course the student will

- Acquire knowledge about various biological scissors.
- Develop skills in biotechnological methods.
- Have a brief knowledge about the industrial applications of biotechnology

UNIT I

Biotechnology

Definition and scope, Genetic engineering tools - Restriction endo nucleases, SI nucleases, DNA ligases, Alkaline phosphatase, Reverse transcriptase, DNA polymerase, poly nucleotide kinase, terminal transferase. Use of Linkers and Adapters. Cloning vectors: Plasmid, Cosmid, Phage, YAC, Binary vector, Shuttle vector and Expression vectors.

UNIT II

Methods of gene transfer

Transfection, electroporation. Recombinant selection and screening methods, Insertional inactivation. Techniques of cloning - Southern, Northern and Western blotting techniques, DNA hybridization techniques. Gene amplification PCR.

UNIT III

Plant tissue culture

Media composition, nutrients, growth regulators, initiation and differentiation. Callus and suspension culture. Micro propagation, Somatic embryo genesis and somoclonal variation. Protoplast isolation, protoplast fusion and regeneration of plants.

UNIT IV

Equipment and requirements for animal cell culture

Laminar flow, CO2 incubator, natural media, synthetic media, substrate for cell culture, substrate treatment, desegregations of tissues, establishment of cell culture

UNIT V

Transgenic plant and transgenic animal

Herbicide resistant, stress resistant, pesticide resistant and insect resistant, transgenic plant, transgenic fish and transgenic sheep. Valuable product from animal cell culture - Tissue plasminogen activator (TPA). Hybridoma technology - monoclonal antibodies.

Text Books

1. Dubey R. C- Book on Biotechnology, S. Chand and company PVT. LTD., 5th edition,2014.
2. Singh B. D –Biotechnology, Kalyani publishers, 3rd edition, 2007.
3 .Jogdand S.N- Gene Biotechnology, Himalaya Publishing House, 2nd edition, 2006.

Reference Books

1. Wulf Crueger, Anneliese Crueger –Biotechnology, Panima Publishing corporation, 2nd edition , 2003 .
2. Tyagi I. D- Biotechnology and Genetic Engineering, Jain Brothers, 1st edition, 2005.
3. Mohan P. Arora- Biotechnology, Himalaya Publishing, 2004.
4. Dr Ignacimuthu S.-Immunology, Tata McGraw Hill publishing company limited, 13th edition 2006.

SEMESTER V

SUBJECT TITLE: MAJOR BASED ELECTIVE COURSE I PHARAMACEUTICAL BIOCHEMISTRY– (U5RBCMBE1)

Objectives

- To provide knowledge of general methodology of drug synthesis
- To understand the impact of metabolism and pharmacokinetics in design

UNIT I

Classification of administration

Mode of administration, site of action, absorption of drug, Drugs distribution and elimination, Role of kidney in elimination.

UNIT II

Drug metabolism

Chemical pathways of drug metabolism. Phase I and Phase II reactions, role of cytochrome P450, non microbial reaction of drug metabolism, drug metabolizing enzyme.

UNIT III

Chemotherapy

Biochemical mode of action of antibiotics-Penicillin and Chloramphenical.Action of alkaloids, antiviral and antimalarial substance. Biochemical mechanism of drug resistance .

UNIT IV

Adverse response and side effects of drugs Allergy, Drug intolerance, Drug addiction, drug abuse and their biological effects.

UNIT V

Anesthetics

General and local, gaseous anesthetics, ether and vinyl ether, hydrocarbons like chloroform, intravenous anaesthetics thropentanesosium and cocaine.Organic pharmaceutical-their role as preservatives and food additivives.

Text books

1.Jeyashree Ghosh, ``The Book of Pharamacetical Chemistry,, Second Edition 1999, Chand & Company, New Delhi

2.A text book Pharamacology and Pharamacotherapeutics by R.S. Satoskar, S.D Bandarkar Ainapure.

References

1.W.O.Foye " Principles of medicinal chemistry

2.Satoskar " Pharmacology

SEMESTER V
SUBJECT TITLE: SKILL BASED ELECTIVE-II
DAIRY BIOCHEMISTRY (U5RBCSBE2)

Objectives

- To learn the various contents of milk
- To study the preservatives and products of milk

UNIT I

Milk Components

Lactose-Chemical Properties,Nutritional Aspects,Physiochemical Aspects. Milk Fat-Fatty Acids,Phospholipids, Lecithin,Cholesterol,Carotene. Milk Proteins-Casein,Lactalbumin, Globulin.Milk Enzymes-Atibacterial Enzymes,Lipolytic Enzymes,Proteinases, Oxido reductase. Mineral of Milk-Calcium,Phosphorus.Vitamins of Milk.

UNIT II

Properties of Milk

Acidity,Colour , Flavor,Solution Properties,Density,Viscosity,Dispersion,Surface Tension, Adsorption,Redox Potential,Specific Gravity,Specific Heat,Refractive Index,Boiling Point, Melting Point,Freezing Point,Nutritional Value of Milk.

UNIT III

Microbiology of Milk

Bacteria-Lactobacillus,Lactococcus.Yeast and Molds. Pathogenic Microorganisms Salmonella,BacillusAnthracis.Spoilage Microbes-Lactococus,E.Coli,Pseudomonas, Micro-bacterium Lacticum. Protection against Pathogenic Microorganisms.

UNIT IV

Preservation of Milk

Heat Treatment- Plate Heat and Tubular Heat Exchanger Method.Hydrostatic Pressure Treatment, Ultraviolet Irradiation Treatment,Microfiltration Method,Drying and Freezing Method. Mild Preservatives-Salt,Acid,Sugar.Disinfectants, Antibiotics.

UNIT V

Milk Products

Cream Products-Sterilized Cream, Whipping Cream, and Ice Cream. Manufacture of Cheese. Preparation of Casein from Milk. Manufacture of Butter. Preparation of Milk Powder. Dairy by Products-Whey Separated Milk, Butter Milk.

Text books

1.Pieter walstra, Jan T. M. Wouters and Tom J. Geurts:Dairy Science and Technology, Second Edition,2006.
2. Edgar R. Ling: A Textbook of Dairy Chemistry, Second and Revised Edition.1946.

Reference books

1.Elmer H. Marth and James L. Steele.Applied Dairy Microbiology: Second Edition, Revised and Expanded 2001.
2.P. Walstra, T. J. Geurts, A. Noomen, A. Jellema. Dairy Technology: Principles of Milk Properties and Processes, third edition,2005.

SEMESTER V
SUBJECT TITLE: CORE COURSE XI-MAJOR PRACTICAL - III
CLINICAL BIOCHEMISTRY LAB - (U6RBCCC11P)

1. Urine Analysis

1. Estimation of Creatinine by Picric Acid Method
2. Estimation of Uea by DAM-Tsc Method
3. Estimation of Uric Acid by Careraways Method
4. Estimation of Calcium by Permanganate Method

II.Blood Analysis

1. Estimation of Phosphorus in Serum by Fiske-Subbarow Method
2. Estimation of Glucose in Serum by O-Toluidine Method
3. Estimation of Alkaline Phosphatase in Serum
4. Estimation of Acid Phosphatase in Serum
5. Estimation of Cholesterol in Serum By Zaks Method

III.Kit Method (Demonstration Experiment)

1. Estimation of SGOT
2. Estimation of SGPT
3. Estimation of Triglucerides
4. Estimation of Hemoglobin
5. Identification of Blood Group
6. Enumeration of RBC
7. Enumeration of WBC
8. Differential Staining Method

REFERENCES

1. Manuals in Biochemistry,DrJ.Jeyaraman
2. practical Biochemistry,warley
3. Practical Biochemistry,Plummer
4. Practical Clinical Biochemistry,Herald varley

SEMESTER V
SUBJECT TITLE : CORE COURSE XII-MAJOR PRACTICAL - IV
GENETIC ENGINEERING AND BIOTECHNOLOGY LAB

1. Media preparation,culturing and plating techniques
2. Determination of bacterial growth curve
3. Assessment of antimicrobial activity by tube dilution,phenol co-efficient test,disc diffusion method
4. Fractioning of subcellular organells by differential gradient centrifugation.
5. Separation of proteins by sds-page
6. Estimation of dna by diphenyl amine method
7. Estimation of rna by orcino method.
8. Isolation of plasmid dna
9. Agarose gel electrophoresis of plasmid and genome dna
10. PCR demonstration
11. Blotting techniques demonstration

REFERENCES

1. Manuals in Biochemistry,DrJ.Jeyaraman
2. practical Biochemistry,warley
3. Practical Biochemistry,Plummer
4. Practical Clinical Biochemistry,Herald varley

SEMESTER VI
SUBJECT TITLE: CORE COURSE XIII
ENDOCRIOLOGY - (U6RBCCC13)

Objective

- To study the hormonal regulations of various physiological function
- To explore the various hormonal cell signaling mechanisms.

Unit I

Pituitary hormones

Definition, classification, biosynthesis and circulation in blood, Mechanism of hormone action. Vasopressin and oxytocin-synthesis and biological effects. Hypothalamic releasing factors. Anterior pituitary hormones-actions, Growth promoting and lactogenic hormone .Glycoprotein hormone, MSH. Gigantism. acromegaly, Dwarfism and Diabeteis insipidus.

Unit II

Hormones of Thyroid

Biosynthesis and biological actions of thyroid hormome, Antithyroid agents. Thyroid disease-thyrotoxicosis, Goiter Grave`s diseases, Hashmoto`s thyroiditis.Parathyroid hormone – biological actions regulation of calcium and phosphorous metabolism, Calcitonin,Cacitriol-Biosynthesis and functions. Hyper and Hyocalcemia. Hyperparathyroidism, hypothyroidism, Paget`s disease and osteomalacia.

Unit III

Pancreatic hormone and GI hormone.

Insulin and glucagon-biosynthesis, regulation of secretion and biological action. Mechanism of action of insulin like growth factors. GI hormone, Gastrin, Secretin, CCK-Cholecystokinin, Gastric inhibitory poptine (GIP).

Unit IV

Adrenal hormone

Adrenal Cortical hormone-Glucocorticodes, Minerlacorticoids-synthesis and biological effects. Adrenal Medullary harmone.Catacholamine: biosynthesis and biological effects. Abnormal secretions of adrenal hormones-Addison`s disease, Cushing`s syndrome, congenital adrenal hyperplasia, Phaeochromocytoma.

Unit V

Gonadal hormone

Androgens and estrogens. Biosynthesis, regulation, transport, metabolism and biological effects of oestrogen, progesterone, FSH and LH. Ovarian Cycle, Pregnancy-diagnostic tests and biochemical changes. Posterior hormone-biological actions and regulation of vasopressin. Diabetes insipdues and SIADH secretion. Oxytocin.

Text Books

1. S. Nagini.Text Book of Biochemistry.Scitech publication,Chennai I-V
2. Chatterjee C, Text book of Medical Biochemistry Second Edition, Unit I,II, III.

Reference Books

1. William`s Text book of endocrinology-wilson and Foster 8 th edition.
2. Principles of Biochemistry-Mammalian biochemistry-Simith et al. McGraw Hill company
3. Mechanism of hormone action-Autin and Short.

SEMESTER VI
SUBJECT TITILE: CORE COURSE XIV
IMMUNOLOGY (U6NBCCC14)

OBJECTIVE

After the completion of the course the student will have a complete knowledge about

- **The immune system**
- **Immunity against various infections**
- **Role of immune system in transplantation**
- **Various techniques used in immunology**

Unit I

The Immune system

Introduction: Primary and Secondary Lymphoidal organ, Lymphocytes, their origin and differentiation. Antigen presenting cells macrophages, dendritic cells, langerhans cell, their origin and function.Mechanism of phagocytosis-macrophages-function and mechanism, complement and their biological function.

Unit II

Immunoglobulins

Structure of Immunoglobulin, antibody specificity, biological functions of immunoglobulins, generation of diversity. Types and characteristics of antigen. Antigen- antibody interactions, antitoxins, agglutination, complement system - opsonin, bacteriolysin and precipitation.

Unit III

Immunity

Types of immunity- Innate immunity- surface barriers phagocytosis. Acquired immunity- active and passive. Antitoxic, antibacterial and antiviral immunity. Immune response.Humoral and cell mediated immunity and their interaction. Lymphokines and interleukins- their role in immune response. Vaccination-active and passive.

Unit IV

Immunity to infection:

Hypersensitivity reactions: types of hypersensitivity, Transplantation- Immunologic response graft rejection mechanism and prevention of graft rejection, immuno suppressive drugs. HLA-immune response genes and disease, pathogenesis of auto immune diseases.

Unit V

Immunochemical techniques.

Production of antisera. Principle, technique and applications of precipitation reaction, immunodiffusion, immunoelectrophoresis, immunofluorescence, complement fixation, RIA and ELISA. Hybridoma technology

Text Books

1. Ian R Tizard-Immunology-an introduction, Thomson, 4th edition, 1995.
2. Dr Rajeshwar Reddy K -Text book of immunology, AITBS publishers, 2nd edition, 2011.
3. Lydyard P.M., Whelan A., Fanger M.W – Instant notes in immunology, Viva Books Private Limited, 2002.
4. Rastogi S.C- Immunology, CBS Publishers and distributors, 2005.
5. Shastri N.V -Principles of Immunology, Himalaya Publishing house ,2005.

Reference Books

1 Ivan Roitt, Jonanthan Brostoff David Male-Immunology, Mosby, 8th edition 2012.

2 Janis Kuby – Immunology, 7th edition, 2014

3 Donald M. Weir, John Steward- Immunology, Churchill Livingstone, 8th edition, 1997.

SEMESTER VI
SUBJECT TITLE: MAJOR BASED ELECTIVE COURSE II
PLANT BIOCHEMISTRY AND PLANT THERAPEUTICS (U6RBCMBE2)

Objectives

- To learn the biochemistry of therapeutic applications of plants
- To study the principles of antioxidant mechanisms of plants

UNIT I

Plant cell

Structure and functions.photosynthesis:photosynthetic pigments-chlorophyll,carotenoids and phycobilin.light reactions-two kinds of chemical system-photo system I and II-evidences in support of light reaction-hills reaction,arnons work and emerson effect.dark reaction-calvins cycle(c3 plants) hatch-slack cycle(c4 cycle) and CAM plants.photo respiration.

UNIT II

Cycles of elements: Nitrogen cycle

Ammonification,nitrification,nitrate reduction and denitrification,nitrogen fixation.sulphur cycle,phosphorus cycle and carbon cycle.plant nutrition:specific roles of essential elements and their deficiency symptoms in plants.macro nutrients;carbon,hydrogen,oxygen,nitrogen, sulfur,phosphorus,calcium,potassium,magnesium and iron.micro nutrients: manganese,boron, copper,zinc,molybedenum and chlorine.

UNIT III

Plant growth regulators

Chemistry,biosynthesis,mode of action and practical applications of auxins,gibberellins, cytokinins,abscicic acid and ethylene.plant growth inhibitors and retardants.

UNIT IV

Photomorphogenesis

Photoperiodism.phytochrome-function in growth and development of plant.biochemistry of seed germination.senescence: biochemical changes during senescence. Senescence process in life cycle of plants.

UNIT V

Secondary metabolites

Nature, distribution and biological functions of alkaloids, terpenes, flavonoids, polyphenols, tannins and steroids. Role of Secondary metabolites in pathogens, insects, animals and mankind.

Text book

1. Plant physiology-Devlin N.Robert and francis H.witham,CBS publications.
2. Introduction to plant physiology-William G.Hopkins,john wiley and sons

References

1.Plant biochemistry and molecular biology –Lea and Lea wood, john wiley and sons,1997.
2.John.W.anderson and John brardall. An introduction to plant biochemistry,black well scientific publishers,1994.

SEMESTER VI
SUBJECT TITLE: MAJOR BASED ELECTIVE COURSE - III
NANOMATERIAL AND BIOSCIENCE (U6RBCMBE3)

Objectives

- **To impart the knowledge of nanoscale and biological molecules**
- **To analysis integration to macromolecular and Nanomedicine Application**

UNIT I

Structure Property relationship of Biological matrials: tissues, bones and teeth, collagen rich tissue, elastic tissues, nanostructure collagen mimics in tissue Engineering.Biopolymers: Preparation of nanobiomatrials-Polymeric scaffolds collagen, Elastins: Mucopoluysacharides, proteoglycans, cellulose and derivatives; Dextrans; Alginates; Pectins; Chitin.

UNIT II

Cardiovascular implants: Role of nanoparticles and nanodevices in blood clotting; Blood rheology; Blood vessels; Geometry of blood circulation; vascular implants; Cardiac pacemakers; blood substitutes; Biomembrances.

UNIT III

Polymeric implants matrials: Polyoefin; polyamides (nylon); Acrylic polymers (bone cement) and hydrigels; fluorocarbon polymers; Natural and synthetic rubbers, silicone rubbers; High strength thermo plastics; deteroration of polymers. Biomaterials for Ophthalmology: Cantac lenses; Optical implants for glaucoma; adhesives; articial tears; Protection gears.

UNIT IV

Metallic and ceramic implant materials: Bone regeneration, Nano crystalline structures of Bone and Calcium phosphate cements. Cobalt-based alloys; Titanium and its alloys, Nanoparticles relating to Aluminium oxide: Hydroxyapatite: Glass ceramics; ceramic implants; carbon impalants.Nano dental materials.

UNIT V

Synthesis of nanodrugs-metal nanoparticle and drug delivery vehicles-Nanoshells-Tectodentrimers Nanoparticle drug systems-Diagnostic applications of nanotechnology.

References

1.SV Bhat, Biomaterials (2 nd Edition) , Narosa publishing House, New Delhi 2005
2.JB Park, Biomaterials Science and Engineering ,Plenum Press, New York,1984 challa S.S.R. Kumar, Josech Hormes, Carola Leuschmal.
3.Nanofabrication towards biomedical applications Willey-VCHVerlag GmbH& Co-KGaA.

SEMESTER VI
SUBJECT TITLE: SKILL BASED ELECTIVE COURSE III
APPLIED BIOCHEMISTRY (U6RBCSBE3)

Objectives

- To study the applications and future potentiality of biochemistry
- To learn the production of various biochemical compounds.

Uint I

Basis of gene cloning:restriction endonucleases-types and features.ligations,linkers and adaptors.Vectors of gene cloning-plasmid vectors-basic feature,pBR332.bacteriophage vectors,cosmids.cloning hosts. Preparation of plasmid DNA fron bacteria.

Unit II

Introduction of DNA into bacterial cells.transformation of E.coli,selection of transformed cells,identification of recombinants. Introduction of phage DNA into bacterial cells,

identification of recombinant phage. Genomic library and cDNA cloning. Hybridization probes: southern,northern and western blotting techniques

Unit III

DNA sequencing:outline of sangenrs method-applications Genetic finger printing-oligonucleotide directed mutagenesis,protein engineering PCR- technique and applications.

Unit IV

Expression vectors for E.coli:constituents,example of promoters-expression cassetts-problems caused in expression of eukaryotic genes. Fusion proteins:applications of gene technology,recombinant insulin,recombinant growth hormones.cloning HBV surface antigen in yeast. Insect cells as host system. Safety aspects and hazards of genetic engineering

Unit V

Bioprocess technology: fermentation: design of a commercial fermenter,solid substrate fermentation. Media for industrial fermentations:batch culture and fed-batch culture Down stream processing Production of aminoacids:SCP,pencillin and alcohol

Text books

1.T.A.Brown,gene cloning-an introduction,chapman and hall,1995.
2.Balasubramanian D,C.F.A.,Bryce,K.Dharmalingam, J.Green,kunthala jeyaraman concepts in biotechnology,COSTED-IBN university press,1996.
3.R.W.Old and S.B.Primrose,principles of gene manipulation,black well scientific publications,1994

References

1.Glick R,Bernard and Pasternak J,Jacj,molecular biotehnolgy,Asm press,Washington D.C.1994
2.Glazier N, Alexander,microbial biotechnology,W.H.Freeman & co., new York,1995.

PLANT & ANIMAL BIOTECHNOLOGY

OBJECTIVES:

Various methods adopted in tissue culture.
Learn to transfer gene into cell.
Acquiring knowledge about gene therapy.

Unit-I

Plant tissue culture: -Media composition, nutrients & growth regulators, MS medium & B5 medium. Cell & suspension culture. Initiation & differentiation of PTC.
Micropropagation:- Methods, Production of haploid plants, phytochemicals from plant tissue culture.

Unit-II

Protoplast technology:
Isolation, fusion of protoplasts, Electroporation, Biolistics, Regeneration of plants from protoplasts.
Gene Transfer in plants: - Ti plasmid vectors, mechanism of T- DNA transfer, Vir genes.
Transgenic plants:- Herbicide, Virus, Pest resistance plants, Male infertility, Genetic engineering of plant oils.

Unit-III

Mammalian cell culture:

Establishment of cell in culture: Requirements for invitro growth; importance of serum. Cell-lines; cell transformation –properties of transformed cells, cell separation, Mass cultivation of cells: suspension culture; immobilized cultivation.

Unit-IV

Genetic Engineering of Animal cells:

Mammalian cell culture in protein production. Gene transfer into mammalian cells, Selectable markers pSV Plasmids; retroviral vectors; Expression vectors; reporter genes.

Unit-V

Animal Biotechnology:

Artificial insemination and embryo transfer, Invitro fertilization (IVF): embryo cloning. Human embryo research, transgenic mice, Gene therapy; the Human Genome project. Recombinant proteins from cell cultures:- Interferons, Viral vaccines, Hybridoma technology – Monoclonal antibodies – Production and applications.

REFERENCE BOOKS:

D. Balasubramanian and others, Concepts in Biotechnology, Universal press India 1996.
BIOTOL series, Invitro cultivation of animal cells- Butler worth Heineman, 1993.
Walsh Gary and Headon R.Denis, Protein Biotecnology. John Willey publisher,1994.
Plant tissue culture;Razdon;Oxford IBH publisher, 1994. Freshney; animal cell culture; IRL press.

NANOBIOTECHNOLOGY

OBJECTIVES:

- **To acquire basic knowledge about nanotechnology.**
- **To learn the various tools available in nanotechnology.**

Unit- I

History

Interdisciplinary areas of Biotechnology and Nanoscience. Cells, celluar components. Nucleic acids and proteins refinement and application of instrument – to generate and manipulate nanostructure materials to basic and applied studies.

Unit-II

Interphase system

Interphase system pertaining to biocompatible inorganic devices for medical implants - microfluidic system – microelectronic silicon substrates.

Unit –III

Protein based nanostructures

Building blocks and templates – Proteins as transducers and amplifiers of biomolecular recognition events – nanobioelectronic devices and polymer nanocontainers – microbial production of inorganic nanoparticles – magnetosomes.

Unit-IV

DNA based nanostructures

Topographic and Electostatic properties of DNA and proteins – Hybrid conjugates of gold nanoparticles – DNA oligomers – use of DNA molecules in nanomechanics and computing.

Unit-V

Synthesis of nanoparticles

Quantum dots, synthesis of nanoparticles, Bio and Nano bio nanomaterials. Nano devices-sensors, photon counters, nano electrodes, Nano medicine-medical uses of nano medicine, health and environmental implications of nanotechnology**.**

REFERENCE BOOKS:

1. Nanotechnology-Basic science and Emerging Technologies-Rohit Majumdar.
2. Nanotechnology-Fundamentals and Applications-Mansi Karkare
3. Nanoscience and technology-K.P.Mathar.

BIOPHYSICS

OBJECTIVE:

- **To have a detailed knowledge about the acids and bases**
- **To know about the properties of colloids**
- **Aquiring knowledge about the physics in various biological processes**
- **To understand the applications of biophysics**

UNIT-I

Acid and bases

Lewis concept of acid and bases, titrable acidity. pH, pOH, buffer, pH of body fluids, buffers in the body fluids, RBCs and tissues. Measurement of pH by indicator and glass electrode.

UNIT-II

Colloidal state:

Properties of colloids (surface tension, viscosity, surface absorption, detergent action, electrical, optical and kinetic properties). Phenomenon of osmosis and osmo regulation in the body. Electro osmosis, Donnan membrane equilibrium, its applications - artificial kidney(dialysis of blood). Biophysical and chemical composition of architecture of biomembrane (esp.cell membrane).

UNIT-III

Determination of molecular weight of macro molecules:

By chemical composition, sedimentation, molecular sieving, light scattering and osmotic pressure methods. Units of measurement of solutes in solution. eg. Normality, molarity, molality, milli equivalents and milli osmol, ionic strength. Examples for these concepts.

UNIT-IV

Biophysical basis

Gaseous exchange in lungs and tissues partial pressure of CO_2 (pCO_2) and O_2 (pO_2). Influence of O_2 and CO_2 in RBC and body fluids during respiration. Physiological curve of formation and dissociation of oxyhemoglobin (HbO_2) and carbondioxide hemoglobin ($HbCO_2$). Various physiological factors in these curves.

UNIT-V

Application of Biophysical chemistry in chemical equilibria:

Equilibrium constant, Law of mass action, Lechatlier Braun principle. Some simple system to illustrate chemical equilibria - formation and dissociation of NH3, HI, CaCO3. Biological application of chemical equilibria - Acid formation in stomach (hyper acidity and ulcer in stomach and duodenum) while using medicines like aspirin, paracetamol and antibiotics. Mechanism of neutralization of acid formed in digestive track by antacid drugs. Formation of stones in kidney and gall bladder.

Text Books:

1 Dash U.N- Text book of Biophysical Chemistry, 2006.
2 Agarwal S.K -Advanced Biophysics, 2014.
3 Vatsala Parimal- Biophysics 1st edition 2006.
4 Bengt Nolting- Methods in Modern Biophysics 2005.
5 Satake M. Hayashi, Sethi M. S and Iqbal S. A- Biophysical Chemistry, 2003.

Reference Books:

1 Srivastava P. K -Elementary Biophysics – an introduction, 2005.
2 Subramanian M. A -Biophysics Principles and Techniques, 2005.
3 Upadhyay, Upadhyay and Nath -Biophysical Chemistry-Principles and Techniques, 2008.
4 Narayanan P-Essentials of Biophysics, 2nd edition, 2011.

SEMESTER V

SUBJECT TITILE: CORE COURSE VII

NUTRITION AND DIETETICS–U5BCCC7

Objectives

- To know about the nutrition
- To make the student aware of the importance of various nutrients.
- Acquiring the knowledge about the inter relationship between the age and nutrition.

UNIT I

Nutrition

Introduction to the science of nutrition-function of foods and its relation to nutritional and clinical health, essential nutrients, analysis of food, composition, food habits and food groups.

UNIT II

Nutrients

Kinds,functions, food sources. Fats-kinds, functions, food sources, essential fatty acids and cholesterol. Proteins-kinds, functions, food sources, complete and incomplete proteins.

UNIT III

Biological Value

Net protein utilization energy, Basal metabolism, measurement of BMR, factors affection BMR, regulation of body temperature, energy needs, total energy requirements, estimation of energy requirements and value of foods. Balanced diet formulation-Assessment of nutritional status.

UNIT IV

Mineral nutrition

Essential-micro and macro mineral nutrients, distribution, sources, functions and abnormalities. Vitamins-Definition, classification, sources, distribution, functions and abnormalities.

UNIT V

Age of diets

Nutrition at various stages of growth and development: diets for infants, children, adolescents, pregnant women, lactating mothers and older persons. Nutrition challenges of the future-food production and food storages, future foods, new protein foods, new fat foods and changing food habits.

Text Books:

1. Principles of Nutrition and Dietetics, Dr.M.Swaminathan, The Bangalore printing and publishing Company limited, Bangalore.
2. Advanced Text book on Food and Nutrition-Vol 1. Dr. M.Swaminathan, Second edition.
3. Advanced Text book on Food and Nutrition-Vol 2. Dr. M.Swaminathan, Second edition.

Reference books:

1. Normal and Therapeutic Nutrition-Corine Robinson

MBE-INTRODUCTION TO BIOMATERIALS

UNIT-I

Biomaterials and biological materials-examples and uses: first generation biomaterials-general chharactristics-naturally occurring biomaterials-pure metals-alloys-ceramics-polymers-composites.

Unit-II

Second generation biomaterials and their properties-bioactive and biodegradable ceramics-biodegradable polymers-hydrogels.

UNIT-III

Third generation biomaterials- characteristics-biomaterials in tissue engineering-enzyme conjugates,DNA conjugates-DNA-protein Conjugates-microarray technologies-micronanotechnology-microfabrication-nanofabrication- interaction between biological matrials, molecular- biomolecules and nanomaterials.

UNIT-IV

Nanobiotechnology-introducation-DNA nanotechnology-structural DNA assembly nanopore and nanoparticles-biological arrays-nanoprobes for analytical applications-nanosensors-nanoscale organization- characterization –quantum size effects-nanobiosensors-sensors of the future.

UNIT-V

Microscopies –SEM-TEM-modern advances –microanalysis-optical detection of single molecules –applications in single molecule spectroscopy-single molecule DNA

detection,sorting sequencing –DNA nanoparticles studies by AFM –DNA computer-PCR amplifications of DNA fragments-molecular surgery of DNA.

TEXT REFERENCE BOOKS

1. Nano: The essentials: Pradeep .T. 2007 McGraw- Hill Publishing Company Ltd.
2. Nanoparticle assemblies and Superstructures: Nicholas A.kotov, 2006 CRC Press
3. Nanoscale Technology in Biological Systems: Editors: Ralph et al, 2005 ,CRC Press
4. Micromachines as Tools for Nanotechnology: H.Fujitha, 2003,Springer Verlag.
5. Nanobiotechnology: Concepts, application and Perspectives , C.M.Niemeyer & C.A. Mirkin ,2004, willey VCH Verlag GMBH &Co.
6. Biomaterials: An introduction. 1992.By Park JB, Lakes RS.
7. Advances in Biomatrials, Drug delivery-AICHE.J 2003, 49(12): 2990-3006

Interdisciplinary course
Public health and hygiene

Objectives

- To help the students know the importance of nutrition in health
- To import basic knowledge about food and health in life

Unit I

Concepts of health:who definition of health;positive health;determination of health;responsibility for health. Health service philosophies;health case;health system;levels of health case. Concepts of disease and concept of causation-germ theory of disease.

Unit II

Nutrition and health-food. Classification of foods. nutrients-sources and functions of proteins,fats,carbohydrates. sources and functions of vitamins and minerals.
nutritional profiles of cereals,millets,vegetables,fruits,milk and milk products.

Unit III

Environment and health-water-sources and uses of water,water pollution,water related diseases and purification of water. Air –composition and cause of discomport,air pollution-source,air pollutants,need for proper ventilation.

Unit IV

Maternal and child health-mother and child –one unit, intranatal care, post natal child care-care of the mother, complications of post portal period, restoration of mother to optimum health, breast feeding, congenital malformations-definition, incidence, risk factors, prenatal diagnosis and prevention.

Unit V

Mental health-types and causes of mental illness-preventive aspects,alcoholism and drug dependence-definition,agent factors,host factors,symptoms,environmental factors, prevention, treatment and rehabilitation.National AIDS control programme and national immunization programme.

Text books

1.park.K.social and preventive medicine,bhanot publishers,18th edition,2005
2.dash BN.,health and physical edition,2003.

References

1.ashtekar S.health and healing-A manual of primary health care,orient Longmans publishers.2001.
2.patil RS.practical community health,vora medical publishers,1995.

SUBJECT: INTERDISCIPLINARY COURCE
TITLE: FIRST AID MANAGEMENT AND SAFETY MEASURES

UNIT-I

Priniciples and objectives of Forst Aid, causality assessment. Priorities of first Aid. Patient management and care.

UNIT: II

Management: Menaegment of common illness and thermal illness.Risk assessment and risk reducations –Fainting, Anaphylaxix,Asthma,Epilepsy,Diabetes,burns ans Scalds.

UNIT;III

INJURIES: Interanl ans external bleeding injuries to muscles, back, chest abdomen, joints,,and bones, strokes and head injury and eye irrigation. Sudden illness-poisoning, Bites and Stings

UNIT IV

Accident reporting : Breathing emergencies, cardiac emergencies. Oxigen thrapy-resuscitation, defibrillation-Heart attack.Common gastrointestinal sickness, Altitide

UNIT V

First Aid rooms and equipments

First aid kits, cleaning of wounds and dressing injury assesssemnt.

TEXT BOOK

1. John A Eastman (2007) First Aid to the Injured-Authorized manunal of st john`s Ambulance ,Red Cross Road, New Delhi

REFERENCE

1. Subramanian.R. First aid home nursing,1st Edition, Bharat printers Trichy.

TANNERY TECHNOLOGY

OBJECTIVES:

- **To know about tannery industry**
- **To learn about the properties of tannery effluent**
- **Learning about tannery effluent treatment**

UNIT-I:

Introduction:

Types of tanneries available in India. Their nature and composition. Present methods of collection and utilisation.

UNIT-II:

Tannery effluent:

Recovery of salt from tannery effluent . Its treatment and re-use. Theoretical and practical aspects of recovery of chrome. Protein and biogas from tannery effluent. Recovery of fat, proteins, chemical and glue and their use. Pre Treats, finished splits, gloves, washers etc.

UNIT-III: C

Vegetable Tannins

Chemistry of vegetable tannins, extraction criteria for vegetable tannins, solid- liquid ratio for extraction, chemical modification and blending of vegetable tannins.

UNIT-IV:

Tanning Salts

Types of mineral tanning salts, chemistry of Basic chromium sulphate preparation, basicity and masking systems, factors influencing exhaustion of chromium (III) during tanning.

UNIT-V:

Treatment of effluent

Tannery effluent as pollutant-Treatment of tannery effluent – Microbes employed-Treatment Plant – stages of treatment- Discharge of treated effluent and its utility.

REFERENCE BOOKS:

1. Mann, I. " Process of Utilisation of Animal by Products ", FAO Rome, 1962.
2. Scaria. K.J. Mahendrakumar and Divakaran, S. " Animal by Products - Their processing and utilisation " CLRI, Madras, 1961.
3. Taiganides, E.P. " Animal Wasters ", Applied Science Publishers Ltd., Essex, 1977.
4. "Low Cost Waste Treatment ", NEERI, Nagpur, 1972.
5. Cawe, M.C. et. al. " Environment and Tannery Centre Technique der Cuir, Lyon, France.
6. Myers, R.R. and Long, J.S. " Treatise on Coatings ", vols., Marcel Dekker, New York, 1975.
7. SAP Board of Consultants and Engineers, " Synthetic resins and their industrial applications ", Small Business Publications No.57.
8. Rajadurai, S. and Kulasekaran, S. " Acrylics and their uses in leather manufacture ", CLRI, Madras, 1982.

INTER DISCIPLINARY COURSE-IV
BASIC CONCEPTS IN BIOCHEMISTRY

Objectives:

- *To make the students about the importance of an amino acids and proteins*
- *To know enzymes and lipids*
- *To understand carbohydrates and nucleic acids*

Unit -I: **Amino Acids and Proteins**

Amino acids – classification – Synthesis of amino acids and their identification, peptide bond. **Proteins** –Introduction-occurrence and function-general properties of protein, classification –simple protein and derived proteins. Hydrolysis of proteins: denaturation, precipitation and coagulation.

Unit –II:Enzymes

Introduction, classification and properties- factors influencing enzyme action. Mechanism of enzyme action – Lock and Key model and induced fit models,. Coenzymes, Michaelis-Menten equation and industrial applications of enzymes.

Unit -III:Lipids

Classification –simple, complex and derived lipids, biological function of lipids-difference between oil and fats-extraction of fats,physical and chemical properties of lipids, analysis of oil and fats;Acid value,saponification value,iodine value and Recihert –Meissel value.

Unit -IV:Carbohydrates

Classification:Monosaccharides.Glucose-Straight chain and ring structure for glucose-Mutarotation-Frutose,Galactose and Glycosides. Disaccharides-Maltose, Lactose and sucrose, properties and reaction of sugars. Polysaccharides-homopolysaccharides and heteropolysaccharides.

Unit -V:Nucleic Acids

Classification-Nucleoside and nucleodites,purin and pyrimidine bases-isolation,component and constitution of nucleic acids-sequence of nucleic acids Difference between DNA and RNA. Structure of DNA and RNA,types of RNA

Text Books:

1. Ambikashanmugam,fundamentals of Biochemistry for Medical students,7thEd.,Reprint 2004
2. GurdeepChatwal, Organic Chemistry of Natural Products, Vol.1 and 2, Himalaya Publishing House, Reprint, 2000
3. T.N.Pattabiraman,Text book of biochemistry,2ndEd.,All India puplishers and Distributor 2002
4. S.P.Butani,Chemistry of Biomolecules,Ane Books Pvt.Ltd.,2009.