

Academic Organizer (2018-19)
B.Sc Biochemistry, Semester-I
Paper I, Biomolecules-I

Lecturer: D.Rajani

Month and No of teaching days	Unit	Name of the topic
June 5	Unit I	Biomolecules I Syllabus dictation and discussion. Introduction to biomolecules. Origin of life and introduction to molecules of life. Water as a biological solvent and its role in biological processes. pH, Buffers, Henderson- Hasselbalch equation.
July 21	Unit I	Structure and classification of prokaryotes. Structure and function of eukaryotic cell. Metabolic energy sources. Biological structures and metabolic processes in cell. Acid-base and electrolyte balance in the body.
	Unit II	Amino acids and peptides , classification and structures. Stereochemistry. Chemical reactions of amino acids due to carboxyl and amino groups. .
August 14	Unit II	Titration curve of glycine and pK_a values. Unusual amino acids. Essential and non-essential amino acids. Peptide bond – nature, Types of conformations. Peptide bond – nature, Types of conformations. Biologically active peptides and polypeptides.
	Unit III	Carbohydrates Classification, monosaccharides, D and L designation, open chain and cyclic structures, epimers and anomers, mutarotation. Reactions of carbohydrates (due to functional groups-hydroxyl, aldehyde and ketone). Glycosides Structure and biological importance of disaccharides (sucrose, lactose, maltose, isomaltose, trehalose), trisaccharides (raffinose, melezitose). Structural polysaccharides (cellulose, chitin, pectin) and storage polysaccharides (starch, inulin, glycogen).
September 16	Unit III	Glycosaminoglycans, Bacterial cell wall polysaccharides. Outlines of glycoproteins, glycolipids and blood group substances.
	Unit IV	Lipids classification, saturated and unsaturated fatty acids. Structure and properties of fats and oils. Acid value, saponification and iodine values, rancidity. General properties and structures of phospholipids and sphingolipids. Cholesterol-structure and properties. Types and functions of lipoproteins.
October 4		Properties of lipid aggregates – micelles, bilayers and liposomes. Composition and architecture of membranes and their fundamental properties. Experimental proof for fluidity and dynamic properties of membranes.

D.Rajani

A. Sai Jada

Head, Dept. of Biochemistry
 Bhavan's Vivekananda College
 Sainikpuri, Secunderabad-500 094

Advanced Academic Organizer
(2018-19)
B.SC II YEAR (CBCS)


Semester - III

Biochemistry paper III: Enzymology & Metabolism and carbohydrates & lipids

Name of the lecturer: S.Vanitha

Month & no of teaching days	Unit	Name of the topic
June 8 (2 extra)	Unit I Enzymes	Introduction to enzymes, difference between chemical and biological catalyst, active site, enzyme specificity, definitions of holoenzyme, cofactor, coenzyme, apoenzyme, enzyme units, fundamentals of enzyme assay, factors affecting enzyme activity, MM equation, , significance of Km and Vmax.
July 16 (2 extra)	Unit I Enzymes Unit II Enzyme catalysis	Line weaver Burke plot, Enzyme inhibition- reversible & irreversible, competitive, non-competitive, uncompetitive. Mechanism of enzyme action- covalent, electrostatic, metal ion and acid base catalysis, allosterim and co operativity, covalent modification, zymogens, isoenzyme, multienzyme complex.
August 9 (2 extra)	Unit II Enzyme catalysis Unit III Carbohydrate Metabolism	Immobilised enzymes, catalytic antibodies. Concepts of anabolism and catabolism, glycolysis –energy, fate of pyruvate- formation of lactate, ethanol, Pasteur effect, TCA cycle- energy and regulation, amphipathic role, , glycogen metabolism- synthesis and degradation.
September 14 (2 extra)	Unit III Carbohydrate Metabolism Unit IV Lipid metabolism	Gluconeogenesis, HMP pathway and its significance. Photosynthesis- light and dark reactions, C4 pathway. Catabolism of fatty acids (β -oxidation), with even & odd chain Ketogenesis, <i>denovo</i> synthesis of fatty acids, elongation in microsomes & mitochondria, synthesis & degradation of TAG, lecithin and cholesterol.
October 4 (1 extra)	Unit IV Lipid metabolism	Biosynthesis & regulation of cholesterol. Role of LDL, HDL, VLDL and chylomicrons in body.




 15/6/18
 Head, Dept. of Bio-Chemistry
 Bhavan's Vivekananda College
 Sainikpuri, Secunderabad-500 094

Academic organizer
(2018-19)

SEC
B.Sc II yr

Semester: III

COURSE NAME: Medical Diagnostics

Name of the lecturer: D.Rajani

Month & no of teaching days	Unit	Name of the topic
June (8)	Unit I	Diagnostics Methods used for Anarysis of Blood and urine Blood composition and preparation of blood smear. Differential Leucocyte count(DIC) using Leishman's stain. Platelet count using haemocytometer. Erythrocyte Sedimentary Rate (ESR). Packed Cell Volume (pCV).
July (8)	Unit I	Testing of blood glucose using Glucometer/Kit. HbA1c estimation. Physical characteristics of urine. Normal constituents of urine. Abnormal constituents of urine.
August (8)	Unit II	Diagnostics Methods used for Anarysis of Blood and urine Blood composition and preparation of blood smear. Differential Leucocyte count(DIC) using Leishman's stain. Platelet count using haemocytometer. Erythrocyte Sedimentary Rate (ESR). Packed Cell Volume (pCV).
September (6)	Unit II	Testing of blood glucose using Glucometer/Kit. HbA1c estimation. Physical characteristics of urine. Normal constituents of urine. Abnormal constituents of urine

A. Lai Dada

Head, Dept. of Bio-Chemistry
Bhavan's Vivekananda College
Sainikpuri, Secunderabad

Academic Organizer (2018-19)
B.Sc Biochemistry, Semester-V
Paper - V
Physiology and Clinical Biochemistry

Lecturer: D.Rajani

Month and No of teaching days	Unit	Name of the topic
June 7	Unit I	Endocrinology Organization of endocrine system. Classification of hormones. Mechanism of hormonal action - signal transduction pathways for adrenalin, glucocorticoids and insulin. Outlines of chemistry, physiological role and disorders of pituitary and hypothalamic Pancreatic hormones.
July 12+1extra	Unit I Unit II	Outlines of chemistry, physiological role and disorders of GI hormones, thyroid and parathyroid, gonads, placental and adrenal hormones. Physiology Digestion and absorption of carbohydrates, lipids and proteins. Composition of blood. Hemoglobin and transport of gases in blood (oxygen and CO ₂). Heart structure of the heart, cardiac cycle, cardiac factors controlling blood pressure. Muscle - kinds of muscles, structure of myofibril, organization of contractile proteins and mechanism of muscle contraction.
August 8+2	Unit II Unit III	Nervous system - structure of neuron, resting potential, action potential, propagation of nerve impulse, synapse, synaptic transmission, excitatory and inhibitory neurotransmitters. Physiology of vision pigments and visual cycle Clinical Biochemistry Plasma proteins in health and disease. Coagulation of blood. Disorders of blood coagulation (haemophilia). Types of anemias, Haemoglobinopathies-sickle cell anemia and thalassemias. Disorders of carbohydrate metabolism.
September 10+1extra	Unit III Unit IV	Disorders of lipid metabolism- plasma lipoproteins, lipoproteinemias, fatty liver hypercholesterolemia, atherosclerosis. Organs & Functional tests Structure and functions of the liver. Liver function tests. Serum enzymes in liver diseases- SGPT, GGT and ALP. Liver diseases - jaundice, hepatitis, cirrhosis. Kidneys - structure of nephron, urine formation, normal and abnormal constituents of urine. Biological buffers. Role of kidneys in maintaining acid-base and electrolyte balance in the body.
October 4		Renal function tests - creatinine and urea clearance tests, phenol red test. Biochemical tests for the diagnosis of heart diseases - HDL/LDL cholesterol, SGOT, LDH, CK, C-reactive protein, cardiac troponins.

Rajani

A. Sai Jada
 15/6/18
 Head, Dept. of Bio-Chemistry
 Bhavan's Vivekananda College
 Sainikpuri, Secunderabad-500 044

**Advanced Academic organizer
(2018-19)
B.SC III YEAR (CBCS)**

Semester - V

Biochemistry Paper VI: Microbiology, Genetics and rDNA technology

Name of the lecturer: S.Vanitha

Month & no of teaching days	Unit	Name of the topic
June 6	Unit II Genetics	Genetics: Basic concepts of mendelian inheritance, Mendel's work, monohybrid & dihybrid cross. Non mendelian inheritance : extra chromosomal inheritance, maternal inheritance, importance of meiosis in heredity.
July 13 (1 extra)	Unit II Genetics Unit III rDNA technology I	Sex linked inheritance-X-linked recessive inheritance Polygenic inheritance (Introduction to quantitative traits). Mutations: types & mutagens. Outlines of cloning strategies, DNA sequencing, tools of rDNA technology-enzymes, restriction mapping, construction of cDNA & genomic libraries.
August 9 (1 extra)	Unit III rDNA technology I Unit IV rDNA technology II	Cloning vectors- plasmids, cosmids, Ti plasmid, expression vectors, lambda phage based vectors and shuttle vectors. Host cells- <i>E.coli</i> , <i>Agrobacterium tumefaciens</i> , <i>Saccharomyces cerevisiae</i> . Isolation & sequencing of cloned genes,-colony & nucleic acid hybridization, HRT,HART,PCR- principles & applications, outlines of blotting techniques-northern, southern, western, applications of rDNA technology-production of insulin, growth hormone,
September 11 (1 extra)	Unit IV rDNA technology II Unit I Microbiology	Edible vaccines, Bt cotton. Introduction to bioinformatics, sequence alignment. Classification of microorganism, isolation & cultivation of bacteria, selective & enriched media, bacterial growth curve and its kinetics, batch, continuous & synchronous culture, gram's staining, motility , sporulation. Structure and composition of viruses, isolation & cultivation of bacterial plaques, life cycle of TMV, HIV.
October 2 (1 extra)	Unit I Microbiology	Lytic & lysogenic life cycle of λ phage. Life cycle of TMV and retro virus (HIV)

Handwritten signature

Handwritten signature: A. Sai Jody

Head, Dept. of Biochemistry
Bhavan's Vivekananda College
Sainikpuri, Secunderabad-500 094

Academic organiser-2018-19

Department of Biochemistry

B.Sc III Year

SEMESTER V

Paper (SEC): Automation and clinical laboratory Informatics

Name of the lecturer: Dr.S.Padma

MONTH /no of teaching days	Unit	Name of the topic
JUNE 4	I	Introduction to automation, Autoanalyzer
JULY 8	I	Types of autoanalyzer, component of automation, Overview of computerized laboratory information system
August 6 (+3 extra)	II	Computer Hard ware -central processing unit and peripheral devices, computer software of laboratory diagnostics
September 6(+3 extra)	II	Role of microcomputers in the laboratory, Computers in laboratory information, Integration of hospital information system (HIS) with the Lab Information system(LIS)

S. Padma

A. Sai Padma

Head, Dept. of Bio-Chemistry
Bhavan's Vivekananda Co
Sainikpuri, Secunderabad-5

**Academic organizer
(2018-19)
B.SC III YEAR (CBCS)**

Semester - V

Generic Elective (GE): Nutrition and Health

Name of the lecturer: S. Vanitha

Month & no of teaching days	Unit	Name of the topic
June 2 (2 extra)	Unit I	Nutrients and their functions, Foods and nutrient content (cereals, pulses, nuts, sugar, fats, oils, fruits, vegetables, milk, eggs, flesh foods and salt).
July 8 (2 extra)	Unit I	Food groups and food pyramid, Overview of macro and micro nutrient components in the diet (proteins, lipids, carbohydrates, calcium, iron and iodine and vitamins).
August 6 (2 extra)	Unit I Unit II	Balanced diet and RDA values of some important nutrients. Effect of processing on nutritive value of foods, Basal metabolic rate (BMR) and factors affecting it.
September 4 (2 extra)	Unit II	Body mass index (BMI) and nutritional status, Glycemic index, Nutritional requirement in adolescents, pregnant and lactating women
October 2	Unit II	Obesity and diabetes.



Head, Dept. of Bio-Chemistry
Bhavan's Vivekananda College
Srinikavari, Secunderabad

**Academic organizer
(2018-19)
B.SC I YEAR**

Semester II: Biomolecules, paper II
Name of the lecturer: D.Rajani

Month & no of teaching days	Unit	Name of the topic
November (9)	Unit I Nucleic Acids	Nature of nucleic acids, Structure of purines, pyrimidines, nucleosides, nucleotides. Stability and formation of phosphodiester linkages. Experiments showing DNA as store of genetic information. Structure of Nucleic acids - Watson-Crick DNA double helix structure. Types of DNA/RNA.
December (18)	Unit I Unit II Proteins	Effect of acids, alkali and nucleases on DNA and RNA. Structural variations of DNA/RNA - Palindromes, mirror repeats, hairpin and cruciform. Introduction to circular DNA, super coiling. Helix to random coil transition. Denaturation and renaturation of nucleic acids. Hyperchromic effect, T _m values and their significance. Re-association kinetics, cot curves and their significance. Proteins classification based on solubility, shape and functions. Determination of amino acid composition of proteins. General properties of proteins. Strategies of protein sequencing.
January (16)	Unit III Bioenergetics I	Denaturation and renaturation of proteins. Structural organization of proteins- primary structure, secondary structure, tertiary and quaternary structures (eg., hemoglobin and myoglobin). Forces stabilizing the structure of proteins Energy transformations in the living system. Enthalpy, entropy and Gibb's free energy. Reduction potentials. Free energy concept. exergonic and endergonic reactions. High energy compounds. Role of ATP in biological systems. Inorganic phosphate- phosphate group donor. Phosphate group transfer potential. Substrate level phosphorylation. Cytochromes-structure, types and their functions
February (15)	Unit IV Bioenergetics II	Biological oxidations: Definition, enzymes involved- oxidases, dehydrogenases and oxygenases. Redox reactions. Ultra structure of mitochondria. Electron transport chain and carriers involved. Coenzymes and proteins as electron carriers. Oxidative phosphorylation, theories of oxidative phosphorylation- Mitchell's chemiosmotic theory, F ₀ F ₁ -ATPase. Inhibitors of respiratory chain and oxidative phosphorylation, Uncouplers. Formation of reactive oxygen species and their disposal through enzymatic reactions

D. Rajani

A. Sai Dady

Head, Dept. of Bio-Chemistry
Bhavan's Vivekananda Coll.
Sainikpuri, Secunderabad-50

**Academic Organizer
(2018-19)
B.SC II YEAR (CBCS)**

Semester IV: Biochemistry paper IV: Biochemical Techniques & Metabolism of Amino acids and Nucleotides

Name of the lecturer: S. Vanitha

Month & no of teaching days	Unit	Name of the topic
November 6 (1 extra)	Unit I Metabolism of amino acids	General reactions of amino acids- transamination, deamination & decarboxylation, urea cycle and its regulation, metabolism of glycine, serine.
December 15	Unit I Metabolism of amino acids Unit II Metabolism of nucleotides	Metabolism of aspartic acid, methionine, phenyl alanine and leucine, biosynthesis of creatine, nitrogen cycle and biological nitrogen fixation, inborn errors of aromatic and branched chain amino acids. Metabolism and regulation of purines & pyrimidines (<i>denovo</i> and salvage pathway), allosteric regulation of ATCase.
January 16 (2 extra)	Unit II Metabolism of nucleotides Unit III Biochemical techniques I	Ribonucleotide reductase, thymidylate synthase & its significance, biosynthesis of heme. Degradation of heme and porphyrins. Methods of tissue homogenization, centrifugation- differential, density gradient and ultracentrifugation, principle and applications of paper, TLC.
February 13 (5 extra)	Unit III Biochemical techniques I Unit IV Biochemical techniques II	Principle and applications of gel filtration, ion exchange, affinity chromatography, peptide sequencing and mapping. Principle and applications of paper, agarose and SDS PAGE. Principle of isoelectric focusing, principle and application of colorimeter & spectrophotometer, laws of light absorption, principle of fluorimeter.
March 1 (1 extra)	Unit IV Biochemical techniques II	Radioisotopes, units of radioactivity, tracer techniques: half - life, β & γ emitters, application of isotopes in biology. Principles of autoradiography.

S. Vanitha

A. Sai Dada
Head, Dept. of Bio-Chemistry
Bhavan's Vivekananda College
Sainikpuri, Secunderabad-500 094

Academic organizer
(2018-19)

SEC
BSc II YEAR

SEMESTER : IV

COURSE NAME: Basics of Food and Nutrition

Name of the lecturer: D.Rajani

Month &no of teaching days	Unit	Name of the topic
November (6)	Unit I	Food as source of nutrients, functions of food. Relationship between food, nutrition and health. Basic food groups and food pyramid. BMI (Body mass index) and nutritional status.
December (8)	Unit I	Glycemic index. Nutritive value of Foods: cereals, legumes, nuts and oil seeds, milk and milk products, egg and egg products,meat, fish,vegetables and fruits. Antinutritive factors.
January (8)	Unit II practicals	Trans fatty acids in food substances. Common approved food additives. Food allergens. Food Laws and standards.
February (6)	Unit II	Calculation of BMI. Identification of food sources for various nutrients using food composition tables. Record diet of self using 24 hour dietary recall and its nutritional analysis. Colorimetric determination of crude protein (Kjeldahl nitrogen)
March 2		Determination of moisture content.

D.Rajani

H. Sai Reddy

Head, Dept. of Bio-chemistry
Thangalasherry Government College
Sankarapuram, Thiruvananthapuram - 695 006

**Academic Organizer
(2018-19)
B.SC III YEAR (CBCS)**

Semester VI: Biochemistry paper VII: Molecular Biology

Name of the lecturer: S. Vanitha

Month & no of teaching days	Unit	Name of the topic
November 6 (2 extra)	Unit I Replication	Organization of prokaryotic and eukaryotic genome. Models of DNA replication, Meselson and Stahl experiment, Nature and structure of a gene, enzymology of DNA replication, helicases, topoisomerase, ligase, primase, DNA pol I, II & III, Initiation, elongation & termination of DNA replication.
December 9 (1 extra)	Unit I Replication Unit II Transcription	Leading & lagging strand synthesis, bidirectional model, okazaki fragments, Inhibitors of DNA replication. Introduction to transcription, central dogma, initiation, elongation & termination of transcription, RNA polymerase of prokaryotes and promoters, RNA pol I & III.
January 11 (1 extra)	Unit II Transcription Unit III Protein synthesis	RNA pol II of eukaryotes, eukaryotic transcription. Processing of mRNA, splicing, capping & tailing. Inhibitors of transcription. Introduction to translation, genetic code, Deciphering genetic code- Nirenberg's and Khorana experiment, structure of tRNA & ribosomes, Initiation, elongation & termination of translation.
February 10 (3 extra)	Unit III Protein synthesis Unit IV Regulation of gene expression	Wobble hypothesis, degeneracy of genetic code. Activation of amino acids – aminoacyl tRNA synthetases. post translational modifications- Glycosylation & phosphorylation, signal hypothesis, inhibitors of translation. Operon concept, Negative and positive regulation, lac operon- catabolite repression, Trp operon- attenuation. Arabinose operon – Dual role of repressor, Galactose operon – Eukaryotic gene regulation in yeast.
March 1 (1 extra)	Unit IV Regulation of gene expression	Definition of epigenetics, DNA methylation, Trinucleotide repeat expansion.

S. Vanitha

A. Sai Pad
Head, Dept. of Biochemistry
Bhavan's Vivekananda College
Samikpuri, Secunderabad-500 084

**Academic organizer
(2018-19)
B.SC III YEAR**

**Semester VI: Biochemistry paper VIII
Immunology and Nutrition
Name of the lecturer: D.Rajani**

Month & no of teaching days	Unit	Name of the topic
November (4+2 extra)	Unit III Nutrition	Balanced diet. Basics of nutrition and dietary principles. Calorific values of foods and their determination by bomb calorimeter. BMR and factors affecting it. Specific dynamic action of foods. Energy requirements and recommended dietary allowance (RDA) for children, adults, pregnant and lactating women. Undernutrition- Kwashiorkar, Marasmus and PEM Over nutrition-Obesity and metabolic disorders.
December (9 + 1 extra)	Unit III Unit IV Vitamins and Nutrients	Sources of complete and incomplete proteins. Biological value of proteins. Role of essential fatty acids in human nutrition. Water soluble vitamins- Sources, structure, biochemical roles, coenzyme forms and deficiency disorders of Thiamine, Riboflavin, Niacin, Pyridoxine, Biotin, Pantothenic acid, Cobalamin, Folic acid and Ascorbic acid. Fat soluble vitamins- Sources, structure, biochemical roles, deficiency disorders of- Vitamin A, D, E and K. Macro and micronutrients Ca, Mg, Fe, I, Cu, Mo, Zn, Se and F. Sources and shelf-life of foods. Nutritive value of Indian foods.
January (13)	Unit IV Unit I Immunology-I	Functional and nutraceutical foods. Probiotics. Organization of immune system, Organs and cells of immune system. Innate and acquired immunity. antigenic determinants. Concept of haptens. Adjuvants Classification and structure of immunoglobulins. Structure of IgG. Epitopes .
February (11 +2 extra)	Unit I Unit II Immunology-II	Cell mediated & humoral immunity, activation of T& B - cells. Theories of antibody formation- clonal selection theory. Monoclonal antibodies and their applications. Antigen-antibody reactions - agglutination, immunoprecipitation, immunodiffusion. Blood group antigens. Immunodiagnosics-RIA, ELISA
March 1+2 extra	Unit II	Vaccines and their classification. Traditional vaccines-live and attenuated, toxoids. Modern vaccines - recombinant and peptide vaccine. Outlines of hypersensitivity reactions and autoimmune diseases. Fundamentals of graft rejection and MHC proteins.

D. Rajani

A. Sai Reddy

Head, Dept. of Bio-Chemistry
Bhavan's Vivekananda College
Sainikpuri, Secunderabad-500 094

**Academic organizer
(2018-19)
BSc III YEAR (CBCS)**

Semester - VI

Skill Enhancement Course (SEC): Computational Biochemistry

Name of the lecturer: S. Vanitha

Month & no of teaching days	Unit	Name of the topic
November 2	Unit I Biochemical Data Analysis and Molecular Graphics	Computational Science and Applications of computers in Biochemistry.
December 4 (2 extra)	Unit I Biochemical Data Analysis and Molecular Graphics	Biochemical Data analysis and Management (Spread sheets and Databases). Internet resources and Data Retrieval.
January 6 (4 extra)	Unit I Biochemical Data Analysis and Molecular Graphics Unit II Dynamics of Computational Biochemistry	Visualization of Biomolecules by Computer graphics. Drawing and Display of Structures. Databases of Receptor – Biomolecule interactions. Metabolic Databases.
February 6 (4 extra)	Unit II Dynamics of Computational Biochemistry	Gene Identification, Protein sequence analysis. Principles of Molecular Modelling and Docking of molecules.
March 2	Unit II Dynamics of Computational Biochemistry	Determination of binding affinity.




Head, Dept. of Bio Chemistry
Shriyan's Vivekananda College,
Sainikpuri, Secunderabad-500 082

Academic organizer
(2018-19)

General Elective

BCom/BA/BBA III yr

Semester : VI

COURSE NAME: Human Physiology

Name of the lecturer: D.Rajani

Month & no of teaching days	Unit	Name of the topic
November (2)	Unit I	Introduction to human physiology. Cardiovascular system. Structure and function of heart, Cardiac Cycle, electrocardiogram (ECG). Circulatory system: General Principles of circulation. Basic concepts of angina, atherosclerosis and Cardiac failure.
December (6)	Unit I	Respiratory system: Functional Anatomy of the respiratory system. An overview about cough, hypoxia, asthma and bronchitis. Basic concepts of physiology of exercise. Renal Physiology: Functional Anatomy of kidney. Body fluids and electrolytes: their balances and imbalances. Acidosis and alkalosis, basic concepts about kidney dysfunction and disorders of urination.
January (10)	Unit II	Endocrine system: Classification of hormones. Structure, function and regulation of pituitary, thyroid, and pancreas. Basic concepts about hypo and hyper secretion of hormones and their diseases.
February (10)	Unit II	Gastrointestinal system: Organization of digestive tract and functions of liver. An overview of vomiting, gastrointestinal dysfunction: nausea, mal-absorption, constipation, gastritis.
March (2)	Unit II	Ulcers, Diarrhoea, Jaundice and Cirrhosis

D.Rajani

A. Sai Dady

Head, Dept. of Bio-Chemistry
Bhavan's Vivekananda College
Sainikpuri, Secunderabad-500 094