

**Academic organizer
(2019-20)
B.Sc I YEAR (CBCS)**

Semester I Biochemistry paper I: Biomolecules - I

Name of the lecturer: Snigdha Munipalle

Month & no of teaching days	Unit	Name of the topic
June 5	Unit I Origin of Life	Chemical evolution and rise of living system. Water, pH, Buffers, Henderson – Hasselbalch equation.
July 17	Unit I Origin of Life Unit II Amino acids and peptides	Acid- Base balance, structure and classification of prokaryotes. Eukaryotic cell structure. Energy sources of prokaryotes. Phylogenetic classification of eukaryotes. Metabolic energy sources employed by prokaryotes. Phylogenetic classification and differentiation of eukaryotic cell. Biological structures and metabolic processes in cell. Amino acid: Classification, structure, stereochemistry. Titration curve of glycine and pKa values. Essential and non-essential amino acids, usual acids.
August 16 (2 extra)	Unit II Amino acids and peptides Unit III Carbohydrates	Biologically active peptides and polypeptides. Chemical reactions of amino acids due to carboxyl and amino groups. Peptide bond – nature, types of conformations. Introduction to carbohydrates. Killiani Synthesis, Mutarotation, open and cyclic chain structures, Reactions of carbohydrates. Glycosaminoglycans, Bacterial cell wall synthesis
September 15 (3 extra)	Unit III Carbohydrates Unit IV Lipids	Glycosaminoglycans, bacterial cell wall, polysaccharides. Outline of glycoproteins, glycolipids and blood group substances. Lipid: classification, saturated and unsaturated fatty acids. Acid value, saponification, iodine numbers and rancidity. General properties and structure of phospholipids and sphingolipids. Cholesterol, lipoproteins, properties of lipid aggregates.
October 2	Unit IV Lipids	Composition and architecture of membranes. Fundamental properties of biological membranes. Experimental proof for fluidity and dynamic properties.

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Academic Organizer
(2019-20)
B.SC II YEAR (CBCS)

Semester III: Biochemistry paper III: Enzymology & Metabolism and carbohydrates & lipids

Name of the lecturer: Snigdha Munipalle

Month & no of teaching days	Unit	Name of the topic
June 10	Unit I Enzymes	Introduction to biocatalysis, Difference between chemical and biological catalysis, Active site, Enzyme units, Nomenclature, Specificity, Activation energy. Factors affecting catalysis, enzyme assay. Definition of holoenzyme, apoenzyme, conenzyme and cofactor. Factors affecting the enzyme catalysis (substrate concentration, pH, temperature)
July 16 (1 extra)	Unit I Enzymes Unit II Enzyme catalysis	Mm equation and Lineweaver burk plot. Enzyme inhibition- reversible & irreversible, competitive, non-competitive, uncompetitive. Mechanism of enzyme action- covalent, electrostatic, metal ion and acid base catalysis, allosteric and co operativity, Glutamine synthetase as an allosteric enzyme, isoenzymes, immobilization of enzymes. Pyruvate dehydrogenase.
August 13 (2 extra)	Unit II Enzyme catalysis Unit III Carbohydrate Metabolism	Immobilization of enzymes, Ribozyme, Catalytic antibodies, covalent modification. Concepts of anabolism and catabolism, glycolysis –energy, fate of pyruvate-formation of lactate, ethanol, Pasteur effect, TCA cycle- energy and regulation, amphipathic role, anaplerotic reactions
September 14 (2 extra)	Unit III Carbohydrate Metabolism Unit IV Lipid metabolism	Glycogenolysis and glycogenesis, Pentose phosphate pathway, gluconeogenesis, Photosynthesis- Light and Dark reactions, Calvin cycle, C4 pathway. Catabolism of fatty acids (β oxidation) with even numbers, catabolism of fatty acids with odd number of carbon atoms, ketogenesis, de novo synthesis of fatty acids, elongation of fatty acids in mitochondria and microsomes, Biosynthesis and degradation of triacylglycerol, biosynthesis and regulation of cholesterol metabolism, Role of HDL, LDL AND Very low density lipoproteins and cholesterol levels in body.
October 1	Unit IV Lipid metabolism	Biosynthesis and degradation of lecithin

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**Academic organizer
(2019-20)**

Semester : III

SEC
Bsc II Year

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

D. Rajani

U. Lai Pad

Head, Division of Education
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**Academic organizer
(2019-20)
B.SC III YEAR**

**Semester V: Biochemistry paper V
Physiology and Clinical Biochemistry
Name of the lecturer: D.Rajani**

Month & no of teaching days	Unit	Name of the topic
June (8)	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 hormones. Outlines of chemistry, physiological role and disorders of thyroid and parathyroid hormones.
July (12+1extra)	Unit I Unit II Physiology	Outlines of chemistry, physiological role and disorders of pancreatic hormones. Outlines of chemistry, physiological role and disorders of hormones of gonads and placenta. Outlines of chemistry, physiological role and disorders of adrenal hormones. Introduction of gastrointestinal hormones 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. Nervous system - structure of neuron, resting potential, action potential, propagation of nerve impulse, synapse, synaptic transmission, excitatory and inhibitory neurotransmitters.
August (12)	Unit II Unit III Clinical Biochemistry	Physiology of vision – pigments and visual cycle. Plasma proteins in health and disease. Composition of blood and coagulation of blood. Disorders of blood coagulation (haemophilia). Types of anemias, Haemoglobinopathies-sickle cell anemia and thalassemias. Disorders of carbohydrate metabolism - hypoglycemia, hyperglycemia, glycosuria, renal threshold value. Diabetes mellitus - classification, glucose tolerance test (GTT), diabetic ketoacidosis. Disorders of lipid metabolism- plasma lipoproteins, lipoproteinemias, fatty liver hypercholesterolemia, atherosclerosis.
September (12)	Unit IV Organs & Functional tests	Structure and functions of the liver. Liver diseases - jaundice, hepatitis, cirrhosis. Liver function tests- conjugated and total bilirubin in serum, albumin: globulin ratio, hippuric acid and bromosulphthalein tests. Serum enzymes in liver diseases- SGPT, GGT and alkaline phosphatase.

D. Rajani

A. Sai Pad

1100, B. S. C. III Year
2019-20
Department of Biochemistry

	<p>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. 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.</p>
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A. Lai Jody

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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 7	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. Sex linked inheritance-X-linked recessive inheritance Polygenic inheritance (Introduction to quantitative traits).
July 12 (1 extra)	Unit II Genetics Unit III rDNA technology I	Mutations: types & mutagens. Outlines of cloning strategies, DNA sequencing, tools of rDNA technology-enzymes, restriction mapping, Tools: Enzymes (REN), ligase, phosphates, RT, polynucleotide kinase, terminal transferases, RNase H, Cloning vectors-plasmids, cosmids, Ti plasmid, expression vectors, lambda phage based vectors and shuttle vectors.
August 8 (3 extra)	Unit III rDNA technology I Unit IV rDNA technology II	Host cells- <i>E.coli</i> , <i>Agrobacterium tumefaciens</i> , <i>Saccharomyces cerevisiae</i> , construction of cDNA & genomic libraries. 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, Bt cotton
September 11 (1 extra)	Unit IV rDNA technology II Unit I Microbiology	Production of Edible vaccines, Introduction to bioinformatics, genomics, proteomics, database, sequence alignment using BLAST, FASTA. 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. Life cycle of TMV and retro virus.
October 2	Unit I Microbiology	Lytic & lysogenic life cycle of λ phage.

Dr. Vanitha

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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 2 (+2 extra)	I	Introduction to automation,
JULY 8	I	Autoanalyzer Types of autoanalyzer, component of automation, Overview of computerized laboratory information system
August 8(+2 extra)	II	Computer Hard ware -central processing unit and peripheral devices, computer software of laboratory diagnostics, Role of microcomputers in the laboratory
September 6(2 extra)	II	Computers in laboratory information, Integration of hospital information system (HIS) with the Lab Information system(LIS)

S Padma

Dr. Sai Padma

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Academic organizer
(2019-20)
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 6 (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 8 (2 extra)	Unit II	Body mass index (BMI) and nutritional status, Obesity and diabetes. Glycemic index, Nutritional requirement in adolescents, pregnant and lactating women

S. Vanitha

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S. Vanitha

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(2019-20)
B.SC I YEAR (CBCS)

Semester II: Biochemistry paper II: Biomolecules II

Name of the lecturer: Snigdha Munipalle

Month & no of teaching days	Unit	Name of the topic
November 4 (2 extra)	Unit I Nucleic Acids	Nature of nucleic acids. Structure of purines, pyrimidines, nucleosides, nucleotides. Different types of RNA
December 17 (2 extra)	Unit I Nucleic Acids	Stability and formation of phosphodiester bonds, effect of acid, alkali and nucleases on DNA and RNA. Experiments showing DNA as genetic material. Watson and Crick model of DNA. Types of DNA and RNA. Structural variations of DNA, circular DNA, super coiling, Renaturation and Denaturation and functions of nucleotides.
	Unit II Proteins	Protein classification based on various factors. Denaturation and renaturation of proteins
January 14 (3 extra)	Unit II Proteins	Structural organization of proteins, strategies of protein sequencing, bonds stabilizing proteins, myoglobin and hemoglobin.
	Unit III Bioenergetics I	Energy transformation in living system, Entropy, enthalpy and Gibbs free energy, Free energy- exo and endothermic energy, High energy compounds, phosphate group transfer potential, substrate level phosphorylation.
February 15 (2 extra)	Unit III Bioenergetics I	Reduction potentials, Role of ATP in biological systems, Inorganic phosphate group donor and cytochromes.
	Unit IV Bioenergetics II	Biological oxidations, Electron transport chain, mitochondria, oxidative phosphorylation, Chemiosmotic hypothesis, Inhibitors of electron transport chain.
March 1	Unit IV Bioenergetics II	Disposal of reactive oxygen species through enzymatic reactions.

A. Sai Sudhakar

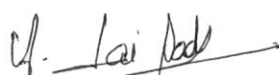
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(2019-20)
B.SC II YEAR (CBCS)**

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

Name of the lecturer: Snigdha Munipalle

Month & no of teaching days	Unit	Name of the topic
November 4	Unit I Metabolism of amino acids	General reactions of amino acids- transamination, deamination & decarboxylation, urea cycle and its regulation.
December 16 (3 extra)	Unit II Metabolism of amino acids Unit II Metabolism of nucleotides	Metabolism of glycine, serine, 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 Metabolism of pyrimidines (<i>denovo</i> and salvage pathway), ATCase, ribonucleotide reductase, thymidylate synthase & its significance, biosynthesis of heme. Degradation of heme and porphyrins.
January 13 (3 extra)	Unit II Metabolism of nucleotides Unit III Biochemical techniques I	Metabolism of pyrimidines (<i>denovo</i> and salvage pathway), ATCase, ribonucleotide reductase, thymidylate synthase & its significance, biosynthesis of heme. Degradation of heme and porphyrins. Principles of paper and thin layer chromatography, Gel filtration chromatography, Ion exchange chromatography, Affinity chromatography and applications.
February 17 (3 extra)	Unit III Biochemical techniques I Unit IV Biochemical techniques II	Methods of tissue homogenization, centrifugation- differential, density gradient and ultracentrifugation, peptide sequencing and mapping. Principle and applications of paper, agarose and SDS PAGE. Principle of isoelectric focusing, principle and application of colorimeter & spectrophotometer, introduction to fluorimeter, tracer techniques: half - life, β & γ emitters, application of isotopes in biology.
March 1	Unit IV Biochemical techniques II	Principle of autoradiography.



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**Academic organizer
(2019-20)**

SEC
BSc II YEAR

Semester IV: 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 (8)	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. Determination of moisture content. Colorimetric determination of crude protein (Kjeldahl nitrogen)

D. Rajani

A. Sai Pad

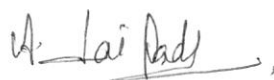
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Academic Organizer
(2019-20)
B.SC III YEAR (Non- CBCS)

Semester VI: Biochemistry paper VII: Molecular Biology

Name of the lecturer: S. Vanitha

Month & no of teaching days	Unit	Name of the topic
November 3	Unit I Replication	Organization of prokaryotic and eukaryotic genome, Nature and structure of a gene
December 12 (5 extra)	Unit I Replication	Models of DNA replication, Meselson and Stahl experiment, enzymology of DNA replication, helicases, topoisomerase, ligase, primase, DNA pol I, II & III, Initiation, elongation & termination of DNA replication, leading & lagging strand synthesis, bidirectional model, okazaki fragments, Inhibitors of DNA replication.
	Unit II Transcription	Introduction to transcription, central dogma, initiation, elongation & termination of transcription, RNA polymerase of prokaryotes and promoters, RNA pol I, II & III of eukaryotes
January 10 (2 extra)	Unit II Transcription	Eukaryotic transcription, Processing of mRNA, splicing, capping & tailing. Inhibitors of transcription
	Unit III Protein synthesis	Introduction to translation, genetic code, Deciphering genetic code- Nirenberg's and Khorana experiment, structure of tRNA & ribosomes, Activation of amino acids – aminoacyl tRNA synthetases. Initiation, elongation & termination of translation, post translational modifications- Glycosylation & phosphorylation, signal hypothesis.
February 11 (1 extra)	Unit III Protein synthesis	Inhibitors of translation
	Unit IV Regulation of gene expression	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, Definition of epigenetics, DNA methylation
March 1	Unit IV Regulation of gene expression	Trinucleotide repeat expansion.

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**Academic organizer
(2019-20)
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 (3)	Unit III Nutrition	Balanced diet. Basics of nutrition and dietary principles.
December (12)	Unit III	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. Sources of complete and incomplete proteins. Biological value of proteins. Role of essential fatty acids in human nutrition. Undernutrition- Kwashiorkor, Marasmus and PEM Over nutrition-Obesity and metabolic disorders.
January (12)	Unit IV Vitamins and Nutrients Unit I Immunology- I	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. Introduction to nutraceuticals, probiotics and functional foods. Macro and micronutrients Ca, Mg, Fe, I, Cu, Mo, Zn, Se and F. Sources and shelf-life of foods. Nutritive value of Indian foods. Organization of immune system, Organs and cells of immune system. Innate and acquired immunity.
February (18)	Unit I Unit II Immunology- II	Cell mediated & humoral immunity, activation of T & B - cells. Classification and structure of immunoglobulins. Structure of IgG. Epitopes / antigenic determinants. Concept of haptens. Adjuvants. Theories of antibody formation- clonal selection theory. Monoclonal antibodies and their applications. Antigen-antibody reactions - agglutination, immunoprecipitation, immunodiffusion. Blood group antigens. Immunodiagnosics-RIA, ELISA. Vaccines and their classification. Traditional vaccines-live and attenuated, toxoids. Modern vaccines - recombinant and applications. peptide vaccine. Outlines of hypersensitivity reactions and autoimmune diseases. Fundamentals of graft rejection and MHC proteins.

D. Rajani

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**Academic organizer
(2019-20)
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
December 8 (4 extra)	Unit I Biochemical Data Analysis and Molecular Graphics	Computational Science and Applications of computers in Biochemistry. Biochemical Data analysis and Management (Spread sheets and Databases).
January 6 (4 extra)	Unit I Biochemical Data Analysis and Molecular Graphics Unit II Dynamics of Computational Biochemistry	Internet resources and Data Retrieval. Visualization of Biomolecules by Computer graphics. Drawing and Display of Structures. Databases of Receptor – Biomolecule interactions. Metabolic Databases.
February 6 (2 extra)	Unit II Dynamics of Computational Biochemistry	Gene Identification, Protein sequence analysis. Principles of Molecular Modelling and Docking of molecules. Determination of binding affinity.



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Academic organizer
(2019-20)

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
December (10)	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. Respiratory system: Functional Anatomy of the respiratory system. An overview about cough, hypoxia, asthma and bronchitis. Basic concepts of physiology of exercise.
January (10)	Unit I	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.
	Unit II	Endocrine system: Classification of hormones.
February (10)	Unit II	Structure, function and regulation of pituitary, thyroid, and pancreas. Basic concepts about hypo and hyper secretion of hormones and their diseases. Gastrointestinal system: Organization of digestive tract and functions of liver. An overview of vomiting, gastrointestinal dysfunction: nausea, mal-absorption, constipation, gastritis, ulcer, Diarrhoea, Jaundice and Cirrhosis.

D. Rajani

A. Sai Reddy

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