

**RAJAH SERFOJI GOVT COLLEGE,
(AUTONOMOUS)
THANJAVUR -05**



DEPARTMENT OF BIOCHEMISTRY

SYLLABUS

(For the students admitted from 2015 -2016 onwards)

B.Sc BIOCHEMISTRY SYLLABUS

**RAJAH SERFOJI GOVERNMENT COLLEGE (AUTONOMOUS) , THANJAVUR-5
COURSE STRUCTURE FOR B.A / B.Sc / B.Com/ B.B.A UNDER CBCS**

SUBJECT : BIOCHEMISTRY

(Applicable to the candidates admitted from the academic year 2015-2016 onwards)

PART	CODE	COURSE	TITLE	Hrs	Marks		Total	Credit
					IE	WE		
I semester								
I	RRIT1	LT	PART I Tamil – I	6	25	75	100	3
II	RR1E1	LE	PART – II English – I	6	25	75	100	3
III	RR1BC1	CC1	BIOMOLECULES	6	25	75	100	5
III	RR2BCP1	CC3	Major Practical - I	3	---	---	--	-
III	RR1ACH1	Allied 1	ALLIED CHEMISTRY – I	4	25	75	100	4
III	RR2ACHP	Allied 3	Allied Practical	3	-	-	-	-
IV	RR1VE	VE	VALUE EDUCATION	2	25	75	100	2
TOTAL				30	125	375	500	17
II SEMESTER								
1	RR2T2	LT	PART I TAMIL- II	6	25	75	100	3
II	RR2E2	LE	PART II English – II	6	25	75	100	3
III	RR2BC2	CC2	BIOCHEMICAL TECHNIQUES	6	25	75	100	5
III	RR2BCP1	CC3	MAJOR PRACTICAL – I	3	40	60	100	4
III	RR2ACH2	Allied 2	ALLIED CHEMISTRY – II	4	25	75	100	3
III	RR2ACHP	Allied 3	Allied chemistry practical	3	40	60	100	4
IV	RR2ES	ES	Environmental Studies	2	25	75	100	2
Total				30	205	495	700	26

PART	CODE	COURSE	TITLE	Hrs	Marks		Total	Credit
					IE	WE		
			III Semester					
I	RR3T3	LT	PART I Tamil – III	6	25	75	100	3
II	RR3E3	LE	PART - II English- III	6	25	75	100	3
III	RR3BC3	CC4	HUMAN PHYSIOLOGY	6	25	75	100	5
III	RR4BCP2	CC6	MAJOR PRACTICAL – II	3	-	-	-	-
III	RR3AB1	Allied -4	Allied - Botany	4	25	75	100	4
III	RR4ABP	Allied 6	Allied Botany practical	3	--	--	---	
IV	RR3SB1	SB1	Skill based	2	25	75	100	2
			TOTAL	30	125	375	500	17
			IV SEMESTER					
I	RR4T4	LT	PART I Tamil – IV	6	25	75	100	3
II	RR4E4	LE	PART II- English-IV	6	25	75	100	3
III	RR4BC4	CC5	Cell and Molecular Biology	6	25	75	100	5
III	RR4BCP2	CC6	Major practical - II	3	40	60	100	5
III	RR4AB2	Allied 5	Allied Botany	4	25	75	100	4
III	RR4ABP	Allied 6	Allied Botany Practical	3	40	60	100	4
IV	RR4SB2	SB2	Skill Based 2	2	25	75	100	2
			Total	30	205	495	700	26

PART	CODE	COURSE	TITLE	Hrs	Marks		Total	Credit
					IE	WE		
			V Semester					
III	RR5BC5	CC7	Enzymes	6	25	75	100	5
III	RR5BC6	CC8	Biochemistry of Plants and Microbes	5	25	75	100	4
III	RR5BCP3	CC9	Major practical III	5	40	60	100	4
III	RR5BCEL1	MEC1	Food and Nutrition	5	25	75	100	4
	RR5BCEL2	MEC2	Bioenergetics & Metabolism	5	25	75	100	4
III	RR5CSEL01	NMEC1	Fundamentals of Information technology	4	25	75	100	4
IV	RR5SB3	SB3	Skill Based - 3	2	25	75	100	2
			Total	30	190	510	700	27
			VI Semester					
III	RR6BC7	CC10	Immunology	6	25	75	100	5
III	RR6BC8	CC11	Clinical Biochemistry	5	25	75	100	5
III	RR6BC9	CC12	Pharmaceutical chemistry	3	25	75	100	5
III	RR6BCP4	CC13	Major Practical -IV	5	40	60	100	4
III	RR6BCEL3	MEC3	Basic Biotechnology	5	25	75	100	4
III	RR6BTELO2	NMEC2	Health Education	4	25	75	100	3
V	RR6GS	GS	GENDER STUDIES	2	25	75	100	1
V		Ext activities	NSS/NCC/SPORTS/RED CROSS	-	-	-	-	1
			Total	30	190	510	700	27
			GRAND Total				3800	140

		Papers	Total credits
PART I	Tamil	4 x 3	12
PART – II	English	4 x 3	12
PART- III	Core	8 x 5 = 40 5 x 4 = 20	60
PART III	Electives	3 x 4	12
PART III	Allied	6 x 4	24
	Non major	2 x 4	8
PART IV	ES, VE	2 x 2	4
PART IV	Skill based	3x2	6
PART V	GS	1x1	1
PART V	Ext Activities		1
	Total	38	140

Signature of HOD

Credits : 5

Code : RR1BC1

Hours/week : 6

Medium of Instruction : English

Semester : I

(For the students admitted from 2015 onwards)

BIOMOLECULES

UNIT – I

Carbohydrates: Classification, preparation, properties and structure. Interconversion of sugars. Properties, structure and biological functions of mono, di, oligo and polysaccharides. Homopolysaccharides – Starch, glycogen, cellulose. Heteropolysaccharides – Hyaluronic acid and chondroitin sulphate,

UNIT – II

Amino acids: Structure, classification and chemical reactions. peptide bond. Proteins. Biological importance, Forces stabilizing the structure of proteins. classification, general properties, primary structure, Secondary , tertiary and quaternary structures. Denaturation.

UNIT – III

Nucleic acids - Components of mono nucleotides. Purine and Pyrimidines – structure and properties. Nucleosides. Nucleotides. DNA and RNA. Composition, structure, their biological importance, Comparison between DNA and RNA, hydrolysis of nucleic acid .

UNIT –IV

Lipids: Biological significance, classification. Structure , properties and functions- Fatty acids, triglycerides, waxes , terpenes, cholesterol and its derivatives (Vitamin D, Bile acids, sex hormones). Compound lipids- Phosphoglycerides, sphingolipids and glycolipids. Reichert meissel Value, iodine number, saponification value , acid number and acetyl value.

UNIT-V

Vitamins- Source, biological role, daily requirement and deficiency manifestation - fat soluble vitamins A,D,E & K. Water soluble vitamins- Ascorbic acid, thiamine, riboflavin, pyridoxine, niacin, folic acid and vitamin B12.

Text Books:

1. Biochemistry by N.Arumugam, Saras Publications, 3rd edition (2010) (For Unit 1,2 &3)
2. Biochemistry by U.Sathyannarayana, Allied Books Publishers, 4th edition, 2007, (For Unit 4 &5)

Reference Books :

1. Biochemistry by Lubert Stryer, Free man Publishers Ltd, 5th edition (2002).
2. Biochemistry by Voet & Voet, Wiley Publications, 2nd Edition (2003)

Question paper pattern

Max Marks: 75

Exam duration : 3 hours

Part A 10 x 2 = 20 Answer all questions (Two Questions from each unit)

Part B 5 x 5 = 25 Answer all questions (either or type two questions from each unit)

Part C 3 x 10 = 30 Answer any Three questions (one question from each unit)

Signature of HOD

Credits : 5

Code : RR2BC2

Hours/week : 6

Medium of Instruction : English

Semester : II

(For the students admitted from 2015 onwards)

BIOCHEMICAL TECHNIQUES

Unit 1

Laws of thermodynamics- First, second, third and zero law. Law of mass action. Electrochemical techniques - Measurement of pH, Standard hydrogen electrode-, Henderson-Hasselbalch equation. Types of buffer, role of Buffers in biological system. Colloids and their role in the living body, application of colloids.

Unit 2

Chromatography: Principle, methods and applications of paper chromatography, Thin layer chromatography, affinity chromatography, Gas-liquid chromatography, Gel filtration chromatography and Ion exchange chromatography. High performance liquid chromatography, (HPLC).

Unit 3

Electrophoresis: Principle, instrumentation and applications - paper electrophoresis, Agarose gel electrophoresis, PAGE, Isoelectric focusing.

Principles of centrifugation. Preparative, Analytical ultra centrifuge- Instrumentation and applications. Basic principle and technique of subcellular fractionation by differential centrifugation.

Unit 4

Spectroscopy: Colorimetry, Beer-Lambert's law. Principle, Components and applications of spectrophotometer. Principle, instrumentation and applications of flame photometer, atomic absorption, NMR, ESR and mass spectroscopy.

Unit 5

Radioisotopes- Radioactive decay, units of radioactivity. Measurement of radioactivity- Geiger muller counter. Scintillation counter and Autoradiography. Applications of radioisotopes in Biology.

Text Books:

1. Analytical Biochemistry by P.Asokan, Chinna Publications, 2nd edition, (2005) (For Unit 1,2 &3)
2. Biophysical chemistry – Principles and Techniques by Upathayaye and Nath, Himalaya Publishers, 3rd edition, (2002) (For Unit 4 &5)

Reference Books:

1. Principles and techniques of practical Biochemistry by Wilson and Walker University Press, Cambridge, 5th editon (2000)

Question paper pattern

Max Marks: 75

Exam duration : 3 hours

Part A 10 x 2 = 20 Answer all questions (Two Questions from each unit)

Part B 5 x 5 = 25 Answer all questions (either or type two questions from each unit)

Part C 3 x 10 = 30 Answer any Three questions (one question from each unit)

Signature of HOD

Credits : 5

Code: RR2BCP1

Hours/week : 3

Medium of Instruction: English

Semester : II

(For the students admitted from 2015 onwards)

Major Practicals- I

Qualitative analysis:

- A. Qualitative analysis of carbohydrates (glucose, fructose, maltose, sucrose, lactose),
Identification of mono ,disaccharides and starch in mixtures.
- B. Colour reactions of amino acids like tryptophan, tyrosine, arginine, proline and histidine.
- C. Qualitative analysis of Lipids.

Quantitative analysis.

- A. Estimation of reducing sugar by Benedicts quantative method.
- B. Estimation of amino acid by Ninhydrin method.
- C. Estimation of ascorbic acid by titrimetric method using 2,6 - dichlorophenol indophenol.
- D. Estimation of acid number of Edible oil.
- E. Determination of saponification number of edible oil.

Signature of HOD

Credits : 5

Code: RR3BC3

Hours/week : 6

Medium of Instruction: English

Semester : III

(For the students admitted from 2015 onwards)

HUMAN PHYSIOLOGY

Unit – I

Digestive system : Anatomy of the digestive system, Salivary, gastric and biliary secretion - Composition and functions. Intestinal hormones, movements in gastro intestinal tract, secretion, digestion and absorption in the small intestine. Digestion and absorption of carbohydrates , lipids and proteins.

Unit – II

Body fluids : Extra cellular fluid plasma, interstitial fluid , intra cellular fluid. Lymph & blood composition, functions, ionic composition , electrolytes, body buffers. Blood cells- RBC , WBC, hemoglobin , hemopoiesis, blood coagulation and blood groups.

Unit- III

Circulation : Structure of heart and blood vessels, cardiac cycles, cardiac factors, controlling blood pressure, Blood pressure and its measurement, electro cardiogram. Treatment for Blood pressure. Respiration: Anatomy and physiology of respiration, exchange of gases between lungs and blood and between blood and tissues.

Unit- IV

Excretory systems: Structure of nephron, composition and formation of urine. Muscle- Types of muscle structure, mechanism of muscle contraction. Nervous system- Structure of brain, neuron, nerve impulse , synapse, cerebrospinal fluid- composition and biological functions, blood brain barrier.

Unit- V

Reproductive systems: General anatomy of male and female reproductive organs, Endocrine system: Functions and deficiency diseases of the pituitary , thyroid, adrenal, parathyroid and pancreatic hormones.

Text Books:

1. Human Physiology by Chatterjee, Medical Allied Publications, 3rd edition, 2004 (for Unit 1 &2)
2. Animal Physiology by N.Arumugam, Saras Publications, 2nd edition, 2008 (For Unit 3, 4 & 5)

Reference Books:

1. Human Physiology by Guyton, Saunders Publishing Ltd, 9th edition (2004).
2. Physiology and Biochemistry by R.A .Agarwal, S.Chand Company Publishers, 3rd edition (1986)

Question paper pattern**Maximum marks: 75****Exam duration : 3 hours**

Part –A - 10 x 2 = Answer all question (Two question from each unit)

Part- B – 5 x 5 = 25 Answer All question (Either or type – two question from each unit)

Part- C- 3 x10 = 30 Answer any THREE (one question from each unit)

Signature of HOD

Credits : 5

Code: RR4BC4

Hours/week : 6

Medium of Instruction: English

Semester : III

(For the students admitted from 2015 onwards)

CELL AND MOLECULAR BIOLOGY

UNIT – I

An Overview of cells – Origin and evolution of cells. Cell theory, Classification of cells – Prokaryotic cells and Eukaryotic cells. Comparison of prokaryotic and eukaryotic cells. Cell Membrane – Fluid mosaic model of membrane structure and its composition. Cell cycle.

UNIT – II

Cell organelles: Endoplasmic reticulum, Ribosomes, Mitochondria, Chloroplast, lysosomes, Golgi apparatus- structure and their functions.

UNIT III

Identification of DNA as genetic materials, Griffith , Harshey –chase experiment. DNA replication- types, semi conservative mechanism, requirement for DNA replication, topoisomerases. Inhibitors of DNA replication. Types of DNA damage & repair,

UNIT IV

Genetic code and their salient features, Transcription in prokaryotes - initiation , elongation and termination, inhibitors of transcription. Post transcriptional modification. Mutation – types and causative agents.

UNIT –V

Protein synthesis in prokaryotic and eukaryotes- activation, initiation, elongation and termination of protein synthesis. Inhibitors of protein synthesis, Post translational modification, Gene regulation- Operon model – lac and trp operons, transposans and their functions,

Text Books:

1. Cell Biology by S.C.Rastogi , New Age International Publishers, 3rd edition (2007) (For Unit 1 &2)
2. Molecular Biology by Freifelder, Narosa Publishing House, 4th edition, (1999) (For Unit 3,4 &5)

Reference Books:

1. Biochemistry and Molecular Biology by William .H.Elliot, Oxford University Press, 3rd edition (2007)
2. Concepts in Molecular Biology by S.C.Rastogi , New Age International publishers, 2nd edition (2005).
3. The cell by cooper

Question paper pattern**Maximum marks: 75****Exam duration : 3 hours**

Part –A - 10 x 2 = Answer all question (Two question from each unit)

Part- B – 5 x 5 = 25 Answer All question (Either or type – two question from each unit)

Part- C- 3 x10 = 30 Answer any THREE (one question from each unit).

Signature of HOD

Credits : 5

Code: RR4BCP2

Hours/week : 3

Medium of Instruction: English

Semester : IV

(For the students admitted from 2015 onwards)

Major Practicals- II

1. Preparation of buffers and measurement of pH.
2. Extraction of nucleic acids.
3. Estimation of RNA by orcinol method.
4. Estimation of DNA by Diphenylamine method.
5. Estimation of chlorophyll.
6. Estimation of lecithin from egg yolk
7. Estimation of fructose.

Demonstration experiments:

8. Circular paper chromatography for separation of amino acids.
9. Ascending and descending chromatography for separation of amino acids.
10. Separation of plant pigments by column chromatography.
11. Thin layer chromatography of amino acids.
12. PAGE – electrophoresis.
13. Preparations of normal and molar solutions.

Signature of HOD

Credits : 5

Code : RR5BC5

Hours/week : 6

Medium of Instruction : English

Semester : V

(For the students admitted from 2015 onwards)

ENZYMES

Unit 1

Enzymes – Definition, Nomenclature and classification of enzymes, properties, enzymes as biological catalysts, specificity of enzymes. Active site – Salient features, Structure and functions of coenzymes- FAD, TPP, NAD, Biotin, Pyridoxal phosphate. Units of enzyme activity . Turnover number

Unit 2

Isolation and purification of enzymes : Classical methods of isolation and purification- affinity chromatography, ion exchange chromatography, gel filtration chromatography. Purification of Bulk enzymes and therapeutic enzymes.

Unit 3

Enzyme kinetics – Factors affecting enzyme activity. Derivation of Michaelis Menten equation, Line weaver burk plot, Enzyme Inhibition – Competitive , non competitive , and uncompetitive enzyme inhibition.

Unit 4

Mechanism of enzyme action – Lock and Key model, induced fit hypothesis, Mechanism of enzyme action – covalent catalysis (Chymotrypsin) and acid base catalysis (Lysozyme) , Mechanism of bisubstrate reactions, Allosteric enzymes with examples.

Unit 5

Multienzyme complex, pyruvate dehydrogenase, isoenzyme of lactate dehydrogenase. Enzymes of clinical importance . Immobilized enzymes – Definition, types of immobilization

and applications of immobilized enzymes. Industrial applications of enzymes. Biosensors – Types and applications.

Text Book:

1. Understanding enzymes by Trevor Palmer, Prentice Hall Publishers, 4th edition (1997)
(For Unit 1, 2 &3)
2. Enzymes by P.Asokan, Chinna publications , 2nd edition, (2005) (For unit 4 & 5)

Reference Book:

1. Enzymes by Dixon and webb, Academic Press, New York (1982)

Question paper pattern

Maximum marks: 75

Exam duration : 3 hours

Part –A - 10 x 2 = Answer all question (Two question from each unit)

Part- B – 5 x 5 = 25 Answer All question (Either or type – two question from each unit)

Part- C- 3 x10 = 30 Answer any THREE (one question from each unit)

Signature of HOD

Credits : 4

Code : RR5BCEL2

Hours/week : 5

Medium of Instruction : English

Semester : V

(For the students admitted from 2015 onwards)

BIOENERGETICS & METABOLISM

Unit- 1

Bioenergetics: Free energy and entropy changes in biological system, coupling of endergonic and exergonic processes. High energy phosphates. An overview of intermediary metabolism .

Unit 2

Biological Oxidation- Enzymes and coenzymes involved in oxidation and reduction reactions, electron transport chain, inhibitors of ETC. Oxidative phosphorylation. Inhibitors and uncouplers of oxidative phosphorylation.

Unit 3

Carbohydrate metabolism: Glycolysis and its energetic. gluconeogenesis, oxidation of pyruvate to acetyl CoA, TCA cycle and its energetic, anaplerotic reactions, Hexose monophosphate pathway, glycogenesis and glycogenolysis.

Unit 4

Lipid metabolism: Biosynthesis of fatty acids- biosynthesis and catabolism of triglycerides, phospholipids and glycolipids. Oxidation of fatty acids α , β and γ oxidation; Cholesterol-synthesis and degradation. Ketogenesis.

Unit 5

Protein and nucleic acid metabolism: Deamination, decarboxylation, transamination of amino acids, glucogenic and ketogenic amino acids, urea cycle, biosynthesis and catabolism of amino

acids- Glycine, phenylalanine, tyrosine, serine and methionine. Metabolism of purine and pyrimidine nucleotides.

Text Books:

1. Biochemistry by Harper , Mc Graw Hill publishers, 25th edition (2003) (For Unit 1,2 & 3)
2. Biochemistry by U.Satyanarayana, Allied Book Publishers, 3rd edition (2006) (For Unit 4 & 5).

Reference Books:

1. Fundamentals of Biochemistry by J.L.Jain, S.Chand & Company Ltd, 4th edition (2005).
2. Biochemistry by S.Nagini, Scitech Publications (2007)

Question paper pattern

Maximum marks: 75

Exam duration : 3 hours

Part –A - 10 x 2 = Answer all question (Two question from each unit)

Part- B – 5 x 5 = 25 Answer All question (Either or type – two question from each unit)

Part- C- 3 x10 = 30 Answer any THREE (one question from each unit)

Signature of HOD

Credits : 4

Code : RR5BCP3

Hous/week: 3

Medium of instruction: English

Semester : V

(For the students admitted from 2015 onwards)

Major Practicals- III

Food & Microbiology practicals

1. Moisture content of food materials
2. Ash Content of food materials.
3. Estimation of carbohydrate by anthrone method in food samples.
4. Estimation of protein by Lowrys method in food samples.
5. Estimation of phosphorus in food samples.
6. Estimation of fat content in food samples (wheat, rice flour, gram flour)

Microbiology:

1. Cleaning of glasswares.
2. Preparation of nutrient media.
3. Streak plate technique.
4. Grams staining.
5. Estimation of fat in milk
6. Estimation of acidity in milk and curd
7. Estimation of lactose in milk by benedicts method.
8. Microbial quality of milk by methylene blue dye reduction test.
9. Spotters.

Signature of HOD

Credits : 4

Code : RR5BC6

Hours/Week : 5

Medium of instruction : English

Semester :V

(For the students admitted from 2015 onwards)

BIOCHEMISTRY OF PLANTS AND MICROBES

Unit 1

Photosynthesis- Photosynthesis, pigments, and photosynthetic apparatus, Light and dark reactions. Hill reaction, Emerson Effect, Photosystems, Photophosphorylation. Dark reactions- carbon dioxide fixation in C₃, C₄ and CAM Plants. Factors affecting photosynthesis and photorespiration. Plant growth hormones - Auxin, gibberellins, cytokinins, abscisic acid and ethylene . Plant growth inhibitors and retardants.

Unit 2

Nitrogen fixation – Symbiotic and non symbiotic N₂ fixation, nitrogenase, nitrate assimilation, nitrate reductase, sulphur and carbon cycles, Mineral metabolism – N, P , K , Fe & Zn.

Unit 3

Prokaryotes – Bacteria - Structure and Physiology of E.Coli, Conjugation and transformation in bacteria. Blue green algae – morphology – economic importance of higher algae. Yeast and fungi – morphology, important stages in the life cycle of an yeast – spores of fungi.

Unit 4

Soil and water microbiology – Soil formation, Rhizosphere, Purification of drinking water, test for purity of water. Food and water borne diseases. Typhoid , cholera, bacillary dysentery, hepatitis, amoebiasis, Air borne pathogens – tuberculosis, small pox, diphtheria and poliomyelitis.

Unit 5

Viruses – Structure and replication of animal and plant viruses . Oncogenic viruses, retroviruses, HIV, T even phages, Lambda phages – Lytic and Lysogeny cycles.

Text Book:

1. Plant physiology by M.Devlin, John Wiley Publications, 3rd Edition (1996) (For Unit 1)
2. Plant Physiology by S.N .Pandey, Vikas publishing House, 4th Edition (2008) (For Unit 2)
3. Microbiology by N.Arumugam, Saras Publications , (2005) (For Unit 3, 4 &5)

Reference Book

1. Microbiology by Michael Pelczar, Tata Mc Graw Hill Publications (2010)

Question paper pattern

Maximum marks: 75

Exam duration : 3 hours

Part –A - 10 x 2 = Answer all question (Two question from each unit)

Part- B – 5 x 5 = 25 Answer All question (Either or type – two question from each unit)

Part- C- 3 x10 = 30 Answer any THREE (one question from each unit)

Signature of HOD

Credits : 4

Code : RR5BCEL1

Hours/Week : 5

Medium of Instructions: English

SEMESTER V

(For the students admitted from 2015 onwards)

FOOD AND NUTRITION

Unit 1

Sources, food consumption, properties and storage of common foods. Functions of food in relation to health – classification of food groups. New Proteins, new fat foods. Food groups to provide nutritive requirement for normal health classification of foods based on nutrition – body building foods, energy foods and protective foods.

Unit 2

Essential nutrients- Fats , carbohydrates and proteins , energy value of foods, energy needs. Definition of unit of energy – Kcal , RQ, SDA , NPU, Basal metabolism – measurement-factors influencing BMR , Role of fibre in diet.

Unit 3

Micro and macro mineral nutrients – Distribution, sources, metabolic functions and deficiency manifestation . Vitamins – classification, distribution, sources , functions , hyper and hypovitaminosis , water distribution – maintenance of water and electrolyte balance.

Unit 4

Nutrition through life cycle - infants, children, adolescents, pregnant, lactating women, old aged person. Food additives, Food adulteration and labeling of food. Guide lines for good health.

Unit4

Principles of diet therapy. Marasmus, Kwashiorkor, Diet during stressed conditions and therapeutic diets for anemia, malnutrition, obesity, diabetes mellitus and ulcer.

Text books:

1. Nutrition and Dietetics by Shubhagini, Tata Mc Graw Publishers, 3rd edition, (2010) (For Unit 1,2 &3)
2. Human Nutrition by B.Srilakshmi, New Age Publishers, 2nd edition (2008) (For unit 4 &5)

Reference Book

1. Food Science by B.Srilakshmi, New Age Publishers, 5th edition (2010).

Question paper pattern

Maximum marks: 75

Exam duration : 3 hours

Part –A - 10 x 2 = Answer all question (Two question from each unit)

Part- B – 5 x 5 = 25 Answer All question (Either or type – two question from each unit)

Part- C- 3 x10 = 30 Answer any THREE (one question from each unit)

Signature of HOD

Credits : 5

Code : RR6BC7

Hours/week: 6

Medium of instruction : English

**Semester – VI
(For the students admitted from 2015 onwards)**

IMMUNOLOGY

Unit 1

The immune systems- Introduction, Lymphocytes, their origin and differentiation, Antigen presenting cells – Macrophages, dendritic cells, Langerhans cells , their origin and function. Mechanism of phagocytes, Antigens- their structure and classification, compliments and their biological functions- Types of immune responses.

Unit 2

Immunoglobulins – Structure of immunoglobulins, antibody specificity , biological functions of immunoglobins, generation of diversity, antigen – antibody interactions, antitoxins , agglutination, opsonin, bacteriolysin and precipitation.

Unit 3

Techniques, production of antigens – the precipitation reaction, immunodiffusion, immunoelectrophoresis, radio immuno assay, immunoflorescence, compliment fixation and ELISA techniques.

Unit 4

Immuno haematology- Blood group antigens, Rhesus – incompatibility- maternal response to fetal antigens – other blood group systems. Major histocompatibility complex.(HLA).Autoimmune diseases- types and mechanism.

Unit 5

Immunity to infection – hypersensitivity reactions, types of hypersensitivity,mechanism of T cell activation, macrophage activation and granuloma formation, transplantation – immunologic response, graft rejection, mechanism and prevention of graft rejection, immune suppressive drugs

Text Books:

1. Immunology by N.Arumugam, Saras Publications (2009) (For unit 1, 2 &3)
2. Immunology by Kuby , Freeman Publishers, 6th edition (2008) (For unit 4 &5)

Reference Books:

1. Immunology by Tizard, Elsevier Publishers, 8th edition (2010).
2. Immunology by Roit, Wiley Black well publishers, 12 th edition (2009)

Question paper pattern**Maximum marks: 75****Exam duration : 3 hours**

Part –A - 10 x 2 = Answer all question (Two question from each unit)

Part- B – 5 x 5 = 25 Answer All question (Either or type – two question from each unit)

Part- C- 3 x10 = 30 Answer any THREE (one question from each unit)

Signature of HOD

Credits : 5

Code : RR6BC8

Hours/week: 6

Medium of instruction : English

**Semester – VI
(For the students admitted from 2015 onwards)**

CLINICAL BIOCHEMISTRY

Unit 1

Disorders of fluids, electrolyte balance and gastrointestinal system, disorder involving change in hydrogen ion concentration, differential diagnosis of malabsorption and malnutrition. Liver function tests, jaundice, haemolytic, hepatic and obstructive jaundice. Renal function tests, normal and abnormal constituents of urine.

Unit 2

Disorders of carbohydrate metabolism – Sugar level in normal blood, maintenance of blood sugar concentration – endocrine influence on carbohydrate metabolism, hypoglycemia, glycosuria, renal threshold value, diabetes mellitus – classification, complications, glucose tolerance test (GTT), diabetic coma, diabetic ketoacidosis, glycogen storage diseases, fructosuria, galactosemia, and hypoglycemic agents.

Unit 3

Disorders of lipid metabolism – lipid metabolism in liver and adipose tissue, plasma lipoproteins, cholesterol triglycerides and phospholipids in health and diseases, fatty liver, atherosclerosis, lipid storage diseases, hypolipoproteinemia and hyperlipoproteinemia.

Unit 4

Disorders of protein, amino acid and nucleic acid metabolism – plasma proteins, their origin, significance and variation in diseases. Nitrogen balance, proteinuria, multiple myeloma, Wilson's disease. Phenyl ketonuria, alkaptonuria, tyrosinosis, albinism, Hartnups disease, Fanconi syndrome, cystinuria, Gout.

Unit 5

Disorders of endocrine systems – Disorders and laboratory investigations associated with thyroid, pituitary, adrenal medulla and sex hormones. Disturbances in blood clotting mechanisms, hemophilia, anemia, porphyria and anticoagulants.

Text Books

1. Medical Biochemistry by N.V.Bhagavan, Elsevier Publishers (2002) (For Unit 1 &2)
2. Text Book of Biochemistry by M.N.Chatterjee, Jaypee Publishers (2006) (For Unit 3, 4 & 5).

Reference Books:

1. Fundamentals of Biochemistry by Ambika shanmugam, S.Chand Publishers (1986)
2. Medical Laboratory Technology by Mukherjee, Tata Mc Graw Publishers (1988)

Question paper pattern**Maximum marks: 75****Exam duration : 3 hours**

Part –A - 10 x 2 = Answer all question (Two question from each unit)

Part- B – 5 x 5 = 25 Answer All question (Either or type – two question from each unit)

Part- C- 3 x10 = 30 Answer any THREE (one question from each unit)

Signature of HOD

Credits : 4

Code : RR6BC9

Hours /week : 5

Medium of Instruction : English

Semester :VI

(For the students admitted from 2015 onwards)

PHARMACEUTICAL CHEMISTRY

Unit 1

Classification of drugs based on source- mode of administration, site of action, absorption of drugs, drugs distribution and elimination, Role of kidney in elimination.

Unit 2

Drugs metabolism – chemical pathways of drug metabolism . Phase I and Phase II reactions, role of cytochrome P450 , non- microsomal reactions of drug metabolism, drug metabolizing enzymes.

Unit 3

Chemotherapy- Biochemical mode of action of antibiotics- penicillin , streptomycin, tetracyclins and chloramphenicol. Action of alkaloids, antiviral and antimalarial substances. Biochemical mechanism of drug resistance.

Unit 4

Adverse response and side effects of drugs, allergy, Drug intolerance, Drug addiction, drug abuses and their biological effects. Rational therapy. Drugs prescribed in old age, infants and pregnancy. Treatment of myasthenia gravis.

Unit 5

Anaesthetics- General and local anaesthetics, ether and vinyl ether, halogenated hydrocarbons like chloroform, intravenous anaesthetics- thiopentanesodium and cocaine. Antiseptics and disinfectants – phenols and related compounds, organic pharmaceuticals- their role as preservatives and food additives.

Text Books:

1. Text Book of pharmaceutical chemistry by Jayashree Ghosh , S.Chand publishers (2010) (For Unit 1 , 2 & 3)
2. Pharmaceutical chemistry by Tripathi, Jaypee Publishers, 6th edition (2008) (For Unit 4 &5)

Reference Books:

1. Pharmacology by satoskar, Elsevier Publications (2008).
2. Principles of medicinal chemistry by W.O.Foye, Lippincott Publications (2007)

Question paper pattern**Maximum marks: 75****Exam duration : 3 hours**

Part –A - 10 x 2 = Answer all question (Two question from each unit)

Part- B – 5 x 5 = 25 Answer All question (Either or type – two question from each unit)

Part- C- 3 x10 = 30 Answer any THREE (one question from each unit)

Signature of HOD

Credits : 4

Code : RR6BCP4

Hours/ week : 3

Medium of instruction : English

Semester : VI

(For the students admitted from 2015 onwards)

MAJOR PRACTICAL – IV

CLINICAL BIOCHEMISTRY

1. Qualitative tests of urine, abnormal constituents – sugar, albumin, acetone, bile salts & bile pigments.
2. Quantitative estimations in urine:
 - a. Sugar.
 - b. Chloride.
 - c. Urea
 - d. Uric acid
 - e. Creatinine
 - f. Creatine.
3. Qualitative estimation in blood
 - a. Glucose
 - b. Cholesterol
 - c. Calcium
 - d. Urea.
 - e. Iron
 - f. Protein
 - g. Uric acid
 - h. Bilirubin
 - i. Determination of SGOT & SGPT.
4. ESR, PVC, TC/DC Count, haemoglobin, content and blood grouping.

Signature of HOD

Credits : 4

Code : RR6BCEL3

Hours /week : 5

Medium of Instruction : English

Semester :VI

(For the students admitted from 2015 onwards)

BASIC BIOTECHNOLOGY

Unit 1

History of biotechnology and scope of biotechnology, Recombinant DNA- Construction, restriction endonucleases, cloning vectors, plasmids, phage, cosmid, Ligases, Methods of gene transfer, Isolation & insertion of desired gene, Introduction to host, selection and screening of recombinants, cDNA cloning, southern blotting, western blotting and PCR.

Unit 2

Culture of microorganism- solid state fermentation, types of bioreactors, Media preparation, Batch culture, continuous culture, Fed batch culture, stages of downstream processing,

Fermentation process- commercial production of amylase, ethanol, citric acid, glutamic acid, riboflavin, fermented foods- cheese, yoghurt.

Unit 3

Plant tissue culture, cell culture, callus culture, media preparation . Protoplast culture- isolation , culture, and regeneration of protoplast, Agrobacterium mediated gene transfer,

Applications of plant biotechnology- insect resistant plants, herbicide resistant plants, improvement of crop yield and quality, genetically engineered plants as protein factories.

Unit 4

Animal cell culture, culture media, cell lines, cell and animal cloning, production of peptide hormones, vaccines, antibodies. Human genome project.

Transgenic animals- importance of transgenic animals, gene transfer- retroviral method, microinjection method, Embryonic stem cell method, gene knockout, Dolly. Application of transgenic animals in human welfare and animal husbandary.

Unit 5

Waste water and sewage treatment, Biofuels, Biodegradation, bioremediation, microbial mining biomass production and conservation, Biofertilizers.

Patent and intellectual property rights, Green house effect and global warming

Text Books:

1. Biotechnology by U.Sathyannarayana, Allied Book publications, 2nd edition (2006) (For Unit 1, 2 &3)
2. Animal Biotechnology by V.Kumaresan, Saras Publications, (2009) (For Unit 4 & 5)

References:

1. Biotechnology by R.C.Dubey, S.Chand Publications (2009)
2. Biotechnology by S.S.Purohit, Saraswati Publishers (2005)

Question paper pattern

Maximum marks: 75

Exam duration : 3 hours

Part –A - 10 x 2 = Answer all question (Two question from each unit)

Part- B – 5 x 5 = 25 Answer All question (Either or type – two question from each unit)

Part- C- 3 x10 = 30 Answer any THREE (one question from each unit)

Signature of HOD

**RAJAH SERFOJI GOVT COLLEGE,
(AUTONOMOUS)
THANJAVUR -05**



DEPARTMENT OF BIOCHEMISTRY

SYLLABUS (NON MAJOR ELECTIVES & ALLIED PAPERS)

(For the students admitted from 2015 -2016 onwards)

Credits: 4

Code: R1ABC1

Hours /week: 4

Medium of instructions : English

Allied I – GENERAL BIOCHEMISTRY

UNIT – I : CARBOHYDRATES

Definition, classification of carbohydrates, sources, chemistry and biological functions of monosaccharides, disaccharides and polysaccharides.

UNIT –II PROTEINS

Definition, biological functions of proteins, classification of amino acids, chemical reactions of amino acids, classification and properties of proteins.

UNIT –III- LIPIDS

Classification of lipids, properties of lipids and fatty acids, saturated and unsaturated fatty acids, structure and functions of phospholipids, cholesterol and bile acids.

UNIT – IV – NUCLEIC ACIDS

Purines and pyrimidines, structure and biological functions of DNA and RNA. Properties of DNA and RNA.

UNIT – V – VITAMINS

Definition, chemistry, sources, daily allowances, functions and deficiency diseases of fat soluble vitamins (Vitamin A, D, K and E) and Water soluble vitamins (Vitamin B & C)

REFERENCES:

1. Text Book of Biochemistry – A.C.Deb.
2. Text Book of Biochemistry – Lehinger.
3. Text Book of Biochemistry – Ambika shanmugam.
4. Biochemistry – Renuga harikrishnan.
5. Biochemistry – by Sathyanarayana.

Credits : 4

Course :R2ABC2

Hours/Week : 4

Medium of Instructions : English

Allied 2 – BIOCHEMISTRY II

UNIT – I

pH meter- pH scale, Henderson- Hasslbath equation, Buffer solutions, Buffer systems of blood – Hb, Protein and Phosphate Buffer systems.

UNIT – II

Chromatography- Principle, materials, methods & Applications of paper chromatography, TLC ion exchange , affinity chromatography and Gel filtration chromatography.

UNIT – III

Electrophoresis- Principles, instrumentation and applications of paper electrophoresis, agar gel, starch gel, SDS PAGE , immuno electrophoresis.

UNIT IV

Principle, instrumentation and application of colorimetry, Spectrophotometry, Fluorimetry and Flame photometry.

UNIT V

Tracer and other techniques – radioactive decay, unit of radioactivity , GM Counter, scintillation counter, applications of radio isotopes in biological and medical sciences

REFERENCES:

1. Instrumental methods of chemical analysis by Sharma B.K
2. Instrumental method of chemical analysis by Kudesia V.P, Sawhane H
3. An introduction to practical biochemistry by David T.Palmer.
4. A Biologists guide to principles and techniques of practical biochemistry by Keith Wilson and Kenneth H.Goulding.
5. Biomedical Instrumentation by Leslie Cromwell, Fred J ,Weibell, Erich A, Pfeiffer,
6. Analytical biochemistry by asokan.

Hours/week : 3

Code : R2ABCP

Medium of Instruction: English

ALLIED PRACTICALS – I

ALL2- BIOCHEMISTRY

QUALITATIVE ANALYSIS

1. Qualitative analysis of monosaccharides (Glucose, Fructose, galactose)
2. Qualitative analysis of disaccharides (Lactose and Sucrose)
3. Qualitative analysis of polysaccharides (Starch)
4. Qualitative analysis of amino acids.

DEMONSTRATION EXPERIMENTS

1. Preparation of buffers and its pH measurements using pH meter.
2. Separation of amino acids by Circular paper chromatography

REFERENCES:

1. Practical Biochemistry By Varley.
2. Practical Manual by Jeyaraman,
3. Biochemical methods by Sadasivam
4. Manual in Biochemistry by Pattabiraman.

Credits: 4

Code:

Hours /week: 4

Medium of instructions : English

NON MAJOR ELECTIVE – NUTRITION & HEALTH SCIENCE

(For B.Sc Biotechnology & B.Sc Computer Science Courses)

UNIT – I

Introduction to Nutrition –Definition, General introduction, Classification of nutrients, Functions of food social function of food, psychological functions of food. Fruits and vegetables for good health. Energy - Definition of Kilocalories, Joule, energy value of foods, SDA of foods, basal metabolic rate (BMR). Role of dietary fibre and health.

UNIT II

Defintion , Source, and biological functions of carbohydrates, proteins, and lipids.

Source, functions and deficiency diseases of iron, iodine, calcium and phosphate.

Source , functions and deficiency diseases of vitamin A, D, C , folic acid. Recommended Dietary allowance (RDA)- Protein energy malnutrition- marasmus, kwashiorkor, Balanced diet – Definition & objectives, food selection

UNIT III

Food preservation – general principles and methods.

Preservation by addition of sugar- General principles and

methods of preparation of jams, jellies and Marmalades, theory of gel formation.

Preservation by addition of salt- Pickling. Preparation of Indian Pickles, Sauerkraut. Food adulteration. labeling of food. Guide lines for good health.

UNIT IV

Life Style Changes - Urbanization, westernization, work style, Food behavior changes, alcohol consumption, drug addiction, role of advertisements in food patterns.

Weight related Disorders - Underweight-Etiology, assessment, dietary management,

UNIT V

Health education – Definition, importance of health education, personal hygiene.

Physical education – Meaning & scope, role of gymnastic exercises and yoga in improving health. Difference between yoga & other gymnastic exercises. Exercise to maintain fitness.

Health insurance scheme (government & non government) – Mediclaim policy, Employee state insurance scheme, Specialised insurance scheme and others.

National nutrition policy and progress- programs, scheme to control malnutrition.

World health Organization (WHO) UNICEF and its functions,

Text books:

3. Nutrition and Dietetics by Shubhagini, Tata Mc Graw Publishers, 3rd edition, (2010) (For Unit 1,2 &3)
4. Human Nutrition by B.Srilakshmi, New Age Publishers, 2nd edition (2008) (For unit 4 &5)

Reference Book

2. Food Science by B.Srilakshmi, New Age Publishers, 5th edition (2010).