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<td>a) Basic Tamil for other language students</td>
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<td>b) Special Tamil for those who studied Tamil upto +2 but opt for other languages in degree programme</td>
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<td>IV</td>
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</table>
| IV | Non Major Elective II - for those who studied Tamil under Part I  
a) Basic Tamil for other language students  
b) Special Tamil for those who studied Tamil upto +2 but opt for other languages in degree programme |  |  |  |  |  |  |  |
| V | Core Course – VII (CC) | Bio energetic and metabolism | 5 | 5 | 3 | 25 | 75 | 100 |
| V | Core Course – VIII (CC) | Molecular biology | 5 | 5 | 3 | 25 | 75 | 100 |
| V | Core Course – IX (CC) | Microbiology | 4 | 4 | 3 | 25 | 75 | 100 |
| V | Core Course – X (CC) | Practical-III | 7 | 5 | 3 | 40 | 60 | 100 |
| V | Major Elective Course – I | Pharmaceuticals Biochemistry | 5 | 5 | 3 | 25 | 75 | 100 |
| IV | Skill based Elective –II |  |  |  |  |  |  |  |
| IV | Skill based Elective – III |  |  |  |  |  |  |  |
| VI | Core Course – XI (CC) | Basic Biotechnology | 6 | 5 | 3 | 25 | 75 | 100 |
| VI | Core Course – XII (CC) | Clinical Biochemistry | 6 | 5 | 3 | 25 | 75 | 100 |
| VI | Core Course -XIII (CC) | Practical - IV | 6 | 5 | 3 | 40 | 60 | 100 |
| VI | Major Elective Course II | Endocrinology | 6 | 5 | 3 | 25 | 75 | 100 |
| VI | Major Elective Course III | Immunology | 5 | 4 | 3 | 25 | 75 | 100 |
| VI | Extension Activities | - | 1 | - | - | - | - | - |
| VI | |  |  |  |  |  |  |  |
| VI | Total |  | 30 | 32 | 700 |  |  |  |

**Note:**

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<td>2. Practical</td>
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3. Separate passing minimum is prescribed for Internal and External marks

- The passing minimum for CIA shall be 40% out of 25 marks [i.e. 10 marks]
- The passing minimum for University Examinations shall be 40% out of 75 marks [i.e. 30 marks]

* for those who studied Tamil upto +2 (Regular Stream)
** Syllabus for other Languages should be on par with Tamil at Degree level

# those who studied Tamil upto 10th or +2, but opt for other languages in degree level under Part I should study special Tamil in Part IV

*** Examination at the end of the next semester.

Extension activities shall be out side the instruction hours.

**List of Allied Courses:**

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<th>Group – I</th>
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<td>Chemistry (compulsory)</td>
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<td>2. Zoology</td>
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<td>3. Computer Science</td>
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<td>4. Applied Statistics</td>
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ஏழும் பாபு பல்கலைக்கழகம் தொழில்நுட்ப பல்கலைகழகம் (4+2+4) குற்புக் குறிகள்

ஏழும் பாபு பல்கலைக்கழகம் தொழில்நுட்ப பல்கலைகழகம் (3+3+4) குற்புக் குறிகள்
CORE COURSE I – BIOMOLECULES

Unit 1

Unit 2


Unit 3
Nucleic acids: Components of mono nucleotides, pyrimidines and purines. Nucleotides, nucleosides, nucleoside 5’ diphosphates and 5’ triphosphates. 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 4

Unit 5
Vitamins. Source, structure, biological role, daily requirement and deficiency manifestation of the fat soluble vitamins A,D,E & K. Water soluble vitamins- Ascorbic acid, thiamine, riboflavin, pyridoxine, niacin, pantothenic acid, lipoic acid, biotin, folic acid and vitamin B₁₂.

References
1. Principles of Biochemistry – Lehninger
2. Textbook of Biochemistry-West & Todd.

******
CORE COURSE – II: PRACTICAL – I

Quantitative Analysis
1. Qualitative analysis of carbohydrates (glucose, fructose, maltose, galactose, sucrose, lactose), Identification of both monosaccharides and disaccharides in mixtures.

2. Color reactions of amino acids like tryptophan, tyrosine, arginine, proline and histidine.

4. Acid number, iodine number and saponification number of lipids.
5. Estimation of reducing sugar by Benedict’s quantitative method.
7. Estimation of ascorbic acid by titrimetric method using 2,6-dichlorophenol indophenol.
8. Estimation of sodium and potassium by flame photometry.
9. Determination of saponification number

References
1. Manuals in Biochemistry – Dr. J. Jayaraman.

*******
Unit 1

Unit 2
Chromatography: adsorption, partition chromatography- Principle, methods and applications of paper chromatography, Thin layer chromatography, column chromatography, Gas-liquid chromatography, and Ion exchange chromatography. High performance liquid chromatography, molecular sieve chromatography and affinity chromatography.

Unit 3

Unit 4
Spectroscopy: Colorimetry, Beer-Lambert’s law, measurement of extinction, calibration curve. Spectrophotometer, absorption spectra, components of instrument principle and applications of spectrofluorimetry and MALDI-TOF. Principle, instrumentation and applications of flame photometer, atomic absorption, NMR, ESR and mass spectroscopy.

Unit 5

References

CORE COURSE – IV: HUMAN PHYSIOLOGY

Unit 1
Digestive system: Anatomy of the digestive system, Salivary, Gastric and Biliary Secretions-composition and functions. Intestinal hormones, movements in Gastro intestinal tract, Secretion, digestion and absorption in the small intestine. Absorption in the large intestine; Digestion and absorption of carbohydrates, lipids and proteins.
Unit 2

Unit 3

Unit 4

Unit 5

References

2. Functions of the Human body – Guyton A.C.
3. The living body-Best C.H, Taylor N.B.
4. Human Physiology-Systemic & applied-Sahalya.
5. Human Nutrition and Dietetics – Swaminathan, Bangalore printing and Pulv. Co. Ltd.

*******
NON MAJOR ELECTIVE I- HEALTH AND DISEASES

Unit I

Unit II
Disorders of Carbohydrate Metabolism: Diabetes mellitus, glucose and galactose tolerance tests, sugar levels in blood, renal threshold for glucose, factors influencing blood glucose level, glycogen storage diseases, pentosuria, galactosemia. Blood glucose homeostasis – role of tissues and hormones.

Unit III

Unit IV
Disorders of liver and kidney: Jaundice, fatty liver, normal and abnormal functions of liver and kidney, Liver function test, Renal function test. Diagnostic Enzymes – Enzymes in health and diseases. Biochemical diagnosis of diseases by enzyme assays SGOT, SGPT, CPK, Cholinesterase, LDH

Unit V
Inborn Errors of Metabolism: Phenylketonuria, alkaptonuria, albinism, tyrosinosis, maple syrup urine disease, Lesch-Nyhan syndrome, sickle cell anemia, Histidinemia

Books Recommended
1. Text Book of clinical Biochemistry – Cart A. Burdis and Edward R. Ashwood
2. Text Book of Medical Biochemistry – M.N. Chatterjee and Rane shinde
3. Clinical Biochemistry – Hoffmann
4. Biochemistry with clinical correlation – Devlin
5. Practical Clinical Biochemistry – Harold Varley

******
CORE COURSE – V: ENZYMES

Unit 1

Unit 2
Isolation and purification of enzymes: Methods of purification. Separation procedures based on molecular size, solubility difference and electric charge and selection adsorption. Criteria of purity of enzymes.

Unit 3

Unit 4
Mechanism of enzyme action- active site, Lock and Key model, induced fit hypothesis. Mechanism of enzyme catalysis, enzyme-substrate complex formation, mechanism of bisubstrate reactions. AllostERIC enzymes.

Unit 5

References
2. The nature of enzymology – Foster.

******
CORE COURSE – VI: PRACTICAL – II

1. Preparation of buffers and measurement of pH.
2. Titrable acidity of amino acids.
4. Thin layer chromatography of amino acids and lipids.
5. Separation of plant pigments by column chromatography.
7. Donnon membrane equilibrium.
8. Preparation of cell free homogenate, isolation of mitochondria and nuclei from rat liver and chloroplast from leaves.
9. Simple demonstration by manometry.
10. Isolation of DNA and RNA: Estimation of RNA by orcinol method and DNA by diphenyl amine method.

References:

1. Manuals in Biochemistry – Dr. J. Jayaraman.
2. Practical Biochemistry - Varley

******
NON MAJOR ELECTIVE II - FOOD AND NUTRITION

Unit 1

Sources, food composition, properties and storage of common foods. Functions of food in relation to health- classification of foods based on nutrients. Food preservation- reasons for preserving foods, methods of preservation – an understanding of the principles involved, food additive in processed food and their effects. Food groups to provide nutritive requirement for normal health- body building foods, energy foods and protective foods.

Unit 2


Unit 3

Micro and macro mineral nutrients: Distribution sources, metabolic functions and deficiency manifestations – Calcium, Phosphorus, Sodium, Potassium, Iron, Copper, Selenium and Zinc.

Fat and water soluble vitamins – Occurrence, properties and function – Hyber and Hypovitaminosis. Role of Vitamin as Antioxidant.

Unit 4

Nutrition through life cycle. Special needs of Infants, children, adolescents, pregnant and lactating women, convalescents and old persons

Unit 5

Principles of diet therapy. Diet during stressed conditions- laborers. Patients- therapeutic diets for anemia, malnutrition, obesity, diabetes mellitus and allergy.

References

2. Food Science – Polter.
4. Introducing food chemistry – Garrad.
5. Essentials of food and nutrition – Vol I & II, Swaminathan M.
6. Human nutrition & Dietics – Passemore R and others.

******
CORE COURSE – VII: BIOENERGETICS AND METABOLISM

Unit 1

Unit 2

Unit 3
Carbohydrate metabolism: Glycolysis and its energetic. gluconeogenesis, oxidation of pyruvate to acetyl CoA, TCA cycle and its regulation, energetics of anaplerotic reactions; Hexose monophosphate pathway, glycogens and glycogenolysis, glucuronic acid cycle; glyoxalate cycle; metabolism of galactose and fructose.

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, transport degradation and excretion. Ketogenesis; plasma lipoproteins-metabolism.

Unit 5
Protein, nucleic acid and porphyrins metabolism: Deamination, decarboxylation, transamination of amino acids, glycogenic and ketogenic amino acids, urea cycle, biosynthesis and catabolism of amino acids, metabolism of purine and pyrimidine nucleotides. Biosynthesis and degradation of porphyrins, Heme, Bile pigments formation.

References


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CORE COURSE – VIII: MOLECULAR BIOLOGY

Unit 1

Unit 2
Transcription. RNA polymerase, stages of transcription, inhibitors of RNA synthesis, reverse transcription. Post transcriptional modification of t RNA, r RNA and m RNA.

Unit 3

Unit 4

Unit 5

References:


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CORE COURSE– IX: MICROBIOLOGY

Unit 1

Unit 2

Unit 3

Unit 4

Unit 5
Microscopical examination of microorganism-Bright field, Dark field principle and applications of fluorescent and phase contrast, scanning electron microscope and transmission microscopy

References

4. Review of Medical Microbiology, Jawetz et al. Large Medical.
6. Text Book of Microbiology - Jayaraman panikar,

*******
CORE COURSE – X : PRACTICAL – III

Food and Enzyme Analysis
1. Moisture content of food materials.
2. Ash content of food materials.
4. Estimation of fat content in food materials (Wheat, rice, flour, gram flour).
5. Estimation of nitrogen, iron, phosphorus, calcium.
6. Determination of specific activity, m (Saturation method), pH and temperature of alkaline phosphatase and amylase.

References
1. Manuals in Biochemistry – Dr. J. Jayaraman.
2. Practical Biochemistry – Plummer.

******
Unit 1 Fermentation Biotechnology
Basic principles of microbial growth. The bio reactor- types and operation. Fermentation culture medium. Downstream processing.

Unit 2 Food and enzyme technology
Biotechnology in food industry- food fermentation, fermented foods and milk products. Immobilised cells methods of immobilisation, properties and applications. Production of industrial enzyme- Amylase.

Unit 3 Energy and Environmental Biotechnology

Unit 4 Recombinant DNA technology
Gene organisation and flow of genetic information (elementary details only). Basic principles of cloning: restriction endonucleases, cloning vectors, introduction into host by electroporation and microinjection, selection and screening of recombinants.

Unit 5 Plant and Animal Biotechnology
Applications of rDNA technology in agriculture and animal husbandry: development of transgenic plants and animals– basic principles and applications. The human genome project (elementary details only).

References


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Unit 1

Unit 2
Disorders of carbohydrate metabolism: Sugar level in normal blood- maintenance of blood sugar concentration- endocrine influence on carbohydrate metabolism, hypoglycemia, hyperglycemia, 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

Unit 4

Unit 5

References

3. Biochemistry for Medical Students – Ambika Shanmugam.
5. Clinical Biochemistry in diagnosis and treatment. Mayne ELBS.

*******
Clinical Biochemistry
1. Qualitative tests of urine. Abnormal constituents- sugar, protein (albumin), ketone bodies, bile pigments and bile salts.

2. Quantitative estimations in Blood
   a. Glucose
   b. Cholesterol
   c. Calcium
   d. Urea
   e. Iron

   a. Sugar
   b. Urea
   c. Creatinine
   d. Creatine

4. ESR, PCV, TC/DC count, haemoglobin content and blood grouping.

References:
1. Manuals in Biochemistry – Dr. J. Jayaraman.
2. Practical Biochemistry - Varley

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Major Based Elective – I: PHARMACEUTICAL BIOCHEMISTRY

Unit 1
Classification of drugs based on sources: mode of administration, site of action, absorption of drugs, Drugs distribution and elimination, Role of kidney in elimination.

Unit 2
Drug metabolism: Chemical pathways of drug metabolism. Phase I and Phase II reactions, role of cytochrome P450, non-microsomal reactions of drug metabolism, drug metabolising enzymes.

Unit 3

Unit 4
Adverse responses and side effects of drugs: Alergy, Drug intolerance, Drug addiction, drugs abuses and their biological effects.

Unit 5
Anaesthetics: General and local, gaseous anaesthetics, ether and vinyl ether, halogenated hydrocarbons like chlorofom, intravenous anaestheticsthropentanesodium and cocaine. Antispetics and disinfectants- Phenols and related compounds, formaldehyde and ethanol. Organic pharmaceuticals- their role as preservatives and food additives.

References

2. Pharmacology by Satoskar. A.

*******
Major Based Elective – II : ENDOCRINOLOGY

Unit 1

Unit 2

Unit 3
Hypothalamus and pituitary hormones

Unit 4

Unit 5

References

******
Major Based Elective – III: IMMUNOLOGY

Unit 1
The Immune system: Introduction: Primary and Secondary Lymphodoil organ, Lymphocytes, their origin and differentiation. Antigen presenting cells- macrophages, dendritic cells, langerhans cell, their origin and function. Mechanism of phagocytosis, identification of cell types of immune system, complement and their biological function-types of immune responses, immune tolerance.

Unit 2
Immunoglobulins: Structure of Immunoglobulins, 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 3
Humoral and cell mediated immunity and their interaction. Lymphokines and interleukins-their role in immune response.

Unit 4
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, immuno suppressive drugs. HLA-immune response genes and diseasopathogenesis of auto immune diseases.

Unit 5
Immunochemical techniques. Production of antisera- the precipitation reaction, immunodiffusion, immunoelectrophoresis, immunofluorescence, complement fixation. Principle, technique and applications of RIA and ELISA. Hybridoma technology

References
1. Immunology – Ivan Roitt.
2. Immunology – Weir.
4. Essential Immunology – Ivan Roitt.

******