

BHARATHI WOMEN'S COLLEGE
(AUTONOMOUS)
Chennai – 600108



Department of Biochemistry

B.Sc. Syllabus

Semester Pattern

Choice Based Credit System

From the academic year 2019- 20 onwards

B.Sc. Degree Course
Eligibility for admission

1. Candidate for admission to the first year of Bachelor of Science (Biochemistry) degree shall be required to have passed the higher secondary examination with Chemistry and Biology or Chemistry, Botany and Zoology or Biochemistry and Chemistry.
2. Duration of the course: Three academic years. Semester examinations will be held for all the subjects.
3. Course content: The syllabus consists of theory and practical papers. The students are expected to present seminars on special topics.
4. Scheme of examinations:

Theory:

Maximum marks- 100,

Internal marks- 25,

External marks- 75,

Duration of Examination- 3 hours

Practical:

Maximum marks- 100,

Internal marks- 40,

External marks- 60

Duration of Examination- 6 hours for core and 3 hrs for allied

BHARATHI WOMEN'S COLLEGE (AUTONOMOUS), CHENNAI-600 108
QUESTION PAPER PATTERN FOR UG
(For UG students admitted from the academic year 2019-20)

Time: 3 Hrs

Marks :75

SECTION-A

Answer **ALL** the questions

(10x2=20 marks)

(Without omitting ant unit)

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.

SECTION-B

Answer **ANY FIVE** questions out of seven

(5x5=25 marks)

(At least one question from each unit)

- 11.
- 12.
- 13.
- 14.
- 15.
- 16.
- 17.

SECTION-C

Answer **ANY THREE** the questions

(3x10=30 marks)

(Without omitting ant unit)

- 18.
- 19.
- 20.
- 21.
- 22.

.....

BHARATHI WOMEN'S COLLEGE (AUTONOMOUS), CHENNAI-600 108
QUESTION PAPER PATTERN FOR UG- EVS, VBE, SBE and NME
(For UG students admitted from the academic year 2019-20)

Time: 3 Hrs

Marks: 75

SECTION-A

Answer **ANY FIVE** questions out of seven (5x5=25 marks)

(At least one question from each unit)

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.

SECTION-B

Answer **ANY FIVE** questions out of seven (5x10=50 marks)

(At least one question from each unit)

- 8.
- 9.
- 10.
- 11.
- 12.
- 13.
- 14.

.....

DETAILS OF DISTRIBUTION OF MARKS FOR INTERNAL ASSESSMENT

Theory-25 marks

Test (Best two)	:	10 marks
Assignment (Best two)	:	10 marks
Model Exam	:	25 marks
Attendance	:	5 marks
Total		: 50 marks Reduced to 25 marks

Practical – 40 marks

Submission of record	:	10 marks
Results and Accuracy	:	10 marks
Test	:	5 marks
Model Exam	:	10 marks
Attendance	:	5 marks
Total		: 40 marks

Break up details for Attendance:

90-100%	:	5marks
75-89%	:	4 marks
65-74%	:	3 marks (Condonation)
%	:	2 marks (Not eligible for the current semester and can write as arrears)
Below 50%	:	Redo the semester

BHARATHI WOMEN'S COLLEGE (AUTONOMOUS), CHENNAI – 600 108.

B.Sc. - BIOCHEMISTRY

CORE PAPER – I NUTRITIONAL BIOCHEMISTRY

(For the students admitted from the year 2019 - 20)

HOURS PER WEEK: 6

CREDITS: 5

SEMESTER: I

SUBJECT CODE: 19CGA

OBJECTIVES

- **To understand the role of nutrients in maintaining proper health.**
- **To study effect of nutrients in the biochemical process.**
- **To enumerate the nutritive value of foods**

UNIT-I (18 Hrs)

Basic food groups- energy yielding, body building and protective food. Units of energy, Calorific values of food. Measurement of calories by bomb calorimeter. Basal metabolic rate (BMR) - definition, determination, and factors affecting BMR. Respiratory quotient (RQ), and factors affecting the RQ.

UNIT-II (18 Hrs)

Biological functions of carbohydrates, lipids and proteins. Importance of dietary fibers on human health. Nitrogen balance- positive and negative nitrogen balance, Biological value of protein (BV), Digestibility Coefficient (DC), Protein energy ratio (PER) and Net Protein Utilization (NPU). Protein malnutrition (kwashiorkor and Marasmus) and their preventive and curative measures.

UNIT-III (18 Hrs)

Nutritive value of food stuffs – milk, egg, meat, fish, pulses legumes, nuts, cereals, tubers, green leafy vegetables and fruits. Balanced diet-example of a balanced diet at low and high cost. Diet for infants, children, adult, pregnancy, lactation and elderly people.

UNIT-IV (18 Hrs)

Vitamins - classification of vitamins, sources, requirements, metabolic role and deficiency symptoms of water soluble vitamin (thiamine, riboflavin, niacin, pyridoxine, panthothenic acid, folic acid, biotin cyanocobalamine and vitamin-C), Fat soluble vitamins (A, D, E and K)

UNIT-V(18 Hrs)

Minerals- dietary sources, requirement, deficiency and physiological functions of calcium, phosphorus, sodium, potassium, iron and magnesium. Trace elements – sources requirements, deficiency symptoms and physiological functions of chromium, cobalt, copper, manganese, molybdenum, selenium, iodine and zinc.

BOOKS FOR STUDY:

- Food and Nutrition Vol I & II – Dr. M. Swaminathan.
- Nutritional Biochemistry – Patrica Trueman
- Food and Nutrition – Dr. Shrinandan Bansal.

BOOKS RECOMMENDED:

- Text book of Biochemistry – Talwar.
- Principle and practice of medicine – Davidson and Passmore.
- Food science, Nutrition and Health- Fox brain and Allan G. Cameron.
- Food for thought- T.P. Labuza.
- Food chemistry – Lillian Hoagland Meyer.

WEB RESOURCES:

http://old.nios.ac.in/SecHmscicour/english/LESSON_03.pdf

<https://study.com/academy/lesson/energy-yielding-nutrients-carbohydrates-fat-protein.html>

<https://www.nhsinform.scot/healthy-living/food-and-nutrition/eating-well/vitamins-and-minerals>

<https://www.webmd.com/food-recipes/guide/vitamins-and-minerals-good-food-sources#1>

http://ssu.ac.ir/cms/fileadmin/user_upload/Mtahghighat/taghzie_imani/book/Essentials%20of%20Human%20Nutrition.pdf

LEARNING OUTCOME:

- Gain knowledge on the importance and functions of basic food group
- An insight into the nutritive value of various food groups
- The impact of nutrients in maintaining good health

BHARATHI WOMEN'S COLLEGE (A), CHENNAI – 600 108.
B.Sc. - BIOCHEMISTRY
CORE PAPER – II FUNDAMENTALS OF CELL BIOLOGY
(For the students admitted from the year 2019 - 20)

HOURS PER WEEK: 6
CREDITS : 5

SEMESTER: II
SUBJECT CODE : 19CGB

OBJECTIVES

- To study the concept that the cell is the fundamental unit of life.
- To understand the structure and purposes of basic components of prokaryotic and eukaryotic cells, especially macromolecules, membranes and organelles.
- To understand the communication between the cells

UNIT – I (18 Hrs)

Cells; structure of Prokaryotic cell, Eukaryotic cell, plant cell, and animal cell.
Tissues: Structure and functions of Epithelial tissue – Simple and compound, Connective tissue-areolar tissue, adipose tissue, Skeletal tissue- cartilage and bone, fluid tissue- the blood- composition of blood cells, plasma and lymph.

UNIT – II (18 Hrs)

The structure and functions of plant cell wall, nucleus, mitochondria, endoplasmic reticulum, golgi apparatus, lysosome, peroxisome, glyoxisome and chloroplast.

UNIT – III (18 Hrs)

Chromosome- types, structure & functions. Cell division: mitosis, meiosis and their significance. Cell cycle – phases of cell cycle.

UNIT – IV (18 Hrs)

Biological membrane – structure, organization and functions, fluid mosaic model, Transport across cell membrane – uniport, synport and antiport, passive transport and active transport.

UNIT- V (18 Hrs)

General structure of cytoskeleton- structure, composition and functions of microfilaments, microtubules and intermediary filaments. Extracellular matrix : biological role of collagen. Brief introduction to cell junction: cell- cell interaction and cell matrix interaction. Desmosomes, tight junction, and gap junction (definition only), role of adhesion proteins- cadherin, selectin, integrins, laminin and fibronectin (biological functions only).

BOOKS FOR STUDY:

- Cell biology - P.S. Verma
- Cell biology - N. Arumugam
- Cell Biology - C.B.Powar

BOOKS RECOMMENDED:

- Cell and Molecular Biology - E.D.P De Robertis
- Cell Biology - Verma and Agarwal
- Cell biology - Gerald karp

WEB RESOURCES:

<https://nicholls.edu/biol-ds/biol155/Lectures/Cell%20Biology.pdf>

<https://www.medicalnewstoday.com/articles/320878.php>

<https://biologydictionary.net/cell/>

<https://ib.bioninja.com.au/standard-level/topic-1-cell-biology/14-membrane-transport/types-of-transport.html>

<http://www2.yvcc.edu/Biology/109Modules/Modules/MembraneTransport/membranetransport.html>

LEARNING OUTCOME:

- Able to recognize and identify principal tissue structure
- Understand the structural variations of cell
- The purpose of basic components of cell like membranes, organelles
- The response of cell to physiological or environmental stimuli

BHARATHI WOMEN'S COLLEGE (AUTONOMOUS), CHENNAI – 600 108.

B.Sc. - BIOCHEMISTRY

CORE PRACTICAL – I

(For the students admitted from the year 2019 - 20)

HOURS PER WEEK: 3

CREDITS: 5

SEMESTER: I & II

SUBJECT CODE: 19CG1

I – TITRATIONS

- Estimation of iron.
- Estimation of oxalate.
- Estimation of hydrogen peroxide.
- Estimation of glycine by Sorenson's formal titration.
- Estimation of copper by iodometry.
- Estimation of chloride by Mohr's Method
- Estimation of calcium from milk.

II- PREPARATIONS

- Preparation of starch from potatoes.
- Preparation of Caesin and lactalbumin from milk.
- Preparation of albumin from eggs.
- Preparation of haemoglobin from blood.

III- GROUP EXPERIMENTS

- Preparation of normal, molar, molal and percent solution.
- Titration curve of weak acid like acetic acid and glycine.
- Stages of cell division.
- Identification of plant, animal, and bacterial cell.

BHARATHI WOMEN'S COLLEGE (AUTONOMOUS), CHENNAI – 600 108.

B.Sc. - BIOCHEMISTRY

CORE PAPER – III CHEMISTRY OF BIOMOLECULES – I

(For the students admitted from the year 2019 - 20)

HOURS PER WEEK: 5

CREDITS: 5

SEMESTER: III

SUBJECT CODE: 19CGC

OBJECTIVES:

- To understand the structure and properties of carbohydrates, amino acids and proteins
- To study the biological significance of biomolecules
- To highlight the organic, inorganic and physical chemistry aspects of biomolecules.

UNIT- I(15 Hrs)

Carbohydrates- Classification, anomers, epimers and mutarotation Structure of glucose and fructose (Haworth formula). Reactions of monosaccharides due to the presence of hydroxyl, aldehyde and ketone groups. Structure and properties of reducing disaccharide (lactose & maltose), non-reducing disaccharide (sucrose). Identification of ketose, pentose, reducing and non-reducing sugars.

UNIT- II(15 Hrs)

Occurrence, structure and functions of polysaccharide: starch and cellulose (structural elucidation not needed). Structure and biological significance of mucopolysaccharides - hyaluronic acid and chondroitin sulphate. Composition and functions of inulin, pectin, chitin, and dextran (structure not necessary). Structure of bacterial cell wall polysaccharides: peptidoglycans and teichoic acid, and glycoproteins.

UNIT –III(15 Hrs)

Structure and Classification of aminoacids based on nature of R group, metabolic fate and nutritional requirements. Non- standard and non protein amino acids. Isoelectric point, titration curve (alanine, lysine, glutamic acid), optical activity of amino acids. Chemical reactions due to carboxyl group, amino group and side chain. Colour reactions of amino acids.

UNIT –IV (15 Hrs)

Classification of proteins based on composition, solubility, shape and functions. Properties of protein salting in, salting out, denaturation, renaturation, and UV absorption. Composition and biological importance of peptides, Structure of oligopeptides like glutathione, vasopressin and oxytocin. Peptidase – exo and endo peptidase.

UNIT- V (15 Hrs)

Levels of organization of protein structure: Primary structure – sequence analysis by chemical and enzymatic methods. Secondary structure: α helix (egg albumin), β -pleated sheath (keratin) and triple helix (collagen). Tertiary structure (myoglobin) and forces involved in stabilization of tertiary structure: disulphide linkage, hydrogen bond, hydrophobic interactions, vanderwals force and ionic bonds. Quaternary structure (haemoglobin).

BOOKS FOR STUDY

- Textbook of Biochemistry -J.L.Jain
- Textbook of Biochemistry -Sathya Narayana
- Textbook of Medical Biochemistry -Chatterjee and Shinde

BOOKS FOR REFERENCE:

- Textbook of Biochemistry -West & Todd
- Biochemistry -Garret and Grisham
- Principles of Biochemistry -A.L.Leningher, 3rd edn(2000)
- Textbook of Biochemistry -O.P.Agarwal

WEB RESOURCES

<https://www.khanacademy.org/science/biology/macromolecules/proteins-and-amino-acids/a/orders-of-protein-structure>

https://www.academia.edu/35117679/_U_Satyanarayana_Biochemistry

https://www.academia.edu/26754785/J._L._Jain-_Biochemistry.pdf

LEARNING OUTCOME:

- Compare and contrast the structure and functions of biomolecules found in food materials and living cells (carbohydrates, amino acids and proteins).
- The facts about their properties of biomolecules.
- Gives an idea about utilization of biomolecules in the living cell for normal physiological process.

BHARATHI WOMEN'S COLLEGE (AUTONOMOUS), CHENNAI – 600 108.

B.Sc. - BIOCHEMISTRY

NON MAJOR ELECTIVE PAPER – I HEALTH AND NUTRITION

(For the students admitted from the year 2019 - 20)

HOURS PER WEEK: 2

SEMESTER: III

CREDITS : 2

SUBJECT CODE: 19NG1

OBJECTIVES:

- To create awareness about the role of nutrients in maintaining proper health for other major students
- To study effect of nutrients in the biochemical process.
- To understand the nutritional significance of carbohydrates, lipids and proteins

UNIT –I (6 Hrs)

Health –definition. Factors affecting human health. Importance of health care of children, adults and elderly people. Balanced diet and calorific value.

UNIT –II (6 Hrs)

Role of vitamins in health. Vitamins –definition –classification, sources, function deficiency symptoms, and recommended daily allowances.

UNIT –III (6 Hrs)

Lipids definition, Essential fatty acids, Sources and functions of dietary fats in health. Calorific value of fats.

UNIT –IV (6 Hrs)

Role of minerals in health. Minerals –major and micronutrients –sources, deficiency disorders with special reference to calcium, phosphorous, potassium, copper, iron, zinc and selenium.

UNIT –V (6 Hrs)

Role of protein and carbohydrates in health. Dietary sources, deficiency disorders and calorific value of protein and carbohydrates. Protein malnutrition: Kwashiorkor and Marasmus-supplementation programmes in India and their implications.

BOOKS FOR STUDY:

- Food and Nutrition Vol I & II – Dr. M. Swaminathan.
- Nutritional Biochemistry - Patrica Trueman

BOOKS FOR REFERENCE:

- Food Science -Norman N. Potter
- Food Chemistry -William Hogoland

WEB RESOURCES:

http://old.nios.ac.in/SecHmscicour/english/LESSON_03.pdf

<https://study.com/academy/lesson/energy-yielding-nutrients-carbohydrates-fat-protein.html>

<https://www.nhsinform.scot/healthy-living/food-and-nutrition/eating-well/vitamins-and-minerals>

<https://www.webmd.com/food-recipes/guide/vitamins-and-minerals-good-food-sources#1>

http://ssu.ac.ir/cms/fileadmin/user_upload/Mtahghighat/taghzie_imani/book/Essentials%20of%20Human%20Nutrition.pdf

LEARNING OUT COME:

- Effective utilization of food with the knowledge on its nutritive value
- Design our diet to lead a healthy life
- Knowledge on basic food groups and their role in our body helps to overcome or minimize deficiency manifestation

BHARATHI WOMEN'S COLLEGE (AUTONOMOUS), CHENNAI – 600 108.

B.Sc. - BIOCHEMISTRY

CORE PAPER – IV CHEMISTRY OF BIOMOLECULES – II

(For the students admitted from the year 2019 - 20)

HOURS PER WEEK: 5

SEMESTER: IV

CREDITS: 5

SUBJECT CODE: 19CGD

OBJECTIVES:

- To understand the structure and properties of lipids and nucleic acids.
- To study the biological significance of biomolecules.
- To highlight the organic, inorganic and physical chemistry aspects of biomolecules.

UNIT- I(15 Hrs)

Classification of fatty acids- nomenclature, structure and properties of fatty acids. Classification of lipids- Simple and mixed triglycerides, structure and properties. Characterization of fats – iodine value, saponification value, acid number, acetyl number, Pollensky number and Reichart Meissel number. Classification, structure, and biological functions of phospholipids.

UNIT- II(15 Hrs)

Sterols – structure of cyclopentano perhydro phenantherene nucleus. Structure and functions of cholesterol. and Ergosterol. Structure and functions of Steroid hormones: C17, C19 and C21 steroids (estrogens, androgens and cortisol). Classifications of lipoproteins, composition of VLDL, LDL, IDL and HDL.

UNIT- III(15 Hrs)

Deoxy ribonucleic acids - definition and its role- Isolation and estimation of DNA, Structure of purines, pyrimidine, nucleosides and nucleotides and their biological importance. Types of DNA: A, B, C, Z – structure, biological significance superhelicity. Properties of DNA – hypochromic and hyperchromic effect, melting temperature, viscosity, Denaturation and annealing.

UNIT-IV (15 Hrs)

Ribonucleic acids- Isolation and estimation of RNA. Salient features of prokaryotic and eukaryotic RNA. Types of RNA- mRNA, tRNA, rRNA, hnRNA, snRNA- location and role. Secondary and tertiary structure of tRNA. Endo and exo nucleases on RNA with reference to pancreas, spleen and venom.

UNIT -V (15 Hrs)

Heterocyclic rings of biological importance -pyridine, pyrrole, quinoline, pteridine, thiazole, imidazole, indole with examples. General structure of carotenoids, flavanoid and heme. Bile salt, bile pigments – structure and functions. Salient features and properties of penicillin, streptomycin, tetracycline.

BOOKS FOR STUDY

- Textbook of Biochemistry -J.L.Jain
- Textbook of Biochemistry -Sathya Narayana
- Textbook of Medical Biochemistry -Chatterjee and Shinde

BOOKS FOR REFERENCE:

- Textbook of Biochemistry -West & Todd
- Biochemistry -Garret and Grisham
- Principles of Biochemistry -A.L.Leningher, 3rd edn(2000)
- Textbook of Biochemistry -O.P.Agarwal

WEB RESOURCES

https://www.academia.edu/35117679/ U_Satyanarayana_Biochemistry

<https://www.academia.edu/26754785/J. L. Jain- Biochemistry.pdf>

<https://alevelbiology.co.uk/notes/lipids-introduction-and-classification/>

https://www.phys.sinica.edu.tw/TIGP-NANO/ Course/2006 _Spring/classnotes/ Nanobio%

LEARNING OUTCOME:

- Compare and contrast the structure and functions of biomolecules found in food materials and living cells (lipids, nucleic acids and hetero cyclic compounds)
- The facts about their properties gives an idea about their utilization and their control in the living cell for normal physiological process
- The chemical nature and biological applications of chemical compounds and antibiotics in daily life

BHARATHI WOMEN'S COLLEGE (AUTONOMOUS), CHENNAI – 600 108.

B.Sc. - BIOCHEMISTRY

NON MAJOR ELECTIVE PAPER – II
HUMAN DISEASES AND PREVENTIVE ASPECTS

(For the students admitted from the year 2019 - 20)

HOURS PER WEEK: 2

SEMESTER: IV

CREDITS: 2

SUBJECT CODE: 19NG2

OBJECTIVES:

- **To understand the clinical outcomes of common human diseases.**
- **To provide an awareness on the preventive aspects of various diseases and disorders.**
- **To study the prophylactic effects of balanced diet.**

UNIT –I (6 Hrs)

Diseases –definition –Examples for bacterial (Pulmonary Tuberculosis, Diphtheria, Cholera, Tetanus, Plague), viral (smallpox and measles, flu, AIDS, dengue fever, hepatitis) Endemic and epidemic diseases –causes and symptoms. Kwashiorkor and Marasmus and their preventive aspects.

UNIT –II (6 Hrs)

Cancer and tumour –causes –viral cancer –malignant and benign tumors. Characteristic features of cancer cells. Prevalence of cancer in South India. Role of natural antioxidants in cancer. Chemotherapy in cancer. Medicinal plants in the treatment of cancer.

UNIT –III (6 Hrs)

Diabetes mellitus –causes and types. Type I and type II diabetes mellitus. Role of antidiabetic drugs. Dietary prevention of diabetes mellitus. Examples for antidiabetic medicinal plants.

UNIT –IV (6 Hrs)

Cardiovascular disease –causes and symptoms. Role of dietary lipids. HDL and LDL as risk factors. Dietary prevention of Coronary heart disease (CHD). Hypolipidemic medicinal plants and their products.

UNIT- V (6 Hrs)

Liver diseases –jaundice, hepatitis –causes and symptoms. Dietary prevention of disease progression. Kidney stones –causes –influence of diet.

BOOKS FOR STUDY:

- Textbook of Medical Biochemistry-M.N. Chatterjee
- Fundamentals of Biochemistry-Ambika Shanmugam
- Textbook of Biochemistry -Sathya Narayana

BOOKS FOR REFERENCE:

- Fundamentals of Clinical Chemistry-Teitz
- Textbook of Medical Biochemistry -Chatterjee and Shinde

WEB RESOURCES:

https://www.academia.edu/17695740/Textbook_of_Biochemistry_for_Medical_Students_7th_Edition

<https://trixiesolis.files.wordpress.com/2015/02/essential-biochemistry-third-edition-charlotte-w-pratt.pdf>

<https://www.medicalnewstoday.com/articles/158179.php#viral-diseases>

<http://www.biologydiscussion.com/human-diseases/list-of-10-important-bacterial-diseases-human-health-biology/75830>

LEARNING OUT COME:

- Knowledge on the etiology and clinical symptoms of common diseases creates awareness
- Brief introduction on diagnosis and the preventive measures helps to manage the clinical condition
- Awareness on the normal physiology and diseased condition paves way for a better living

BHARATHI WOMEN'S COLLEGE (AUTONOMOUS), CHENNAI – 600 108.

B.Sc. - BIOCHEMISTRY

CORE PRACTICAL – II

(For the students admitted from the year 2019 - 20)

HOURS PER WEEK: 3

SEMESTER: III & IV

CREDITS: 5

SUBJECT CODE: 19CG2

I- TITRIMETRIC METHODS

- Determination of saponification value of edible oil.
- Determination of acid number of edible oil.
- Determination of iodine value of edible oil.
- Estimation of Ascorbic acid using 2,6 Dichloro phenol indophenol
- Estimation of reducing sugar by Benedict's method

II - QUALITATIVE ANALYSIS

- Analysis of carbohydrates- glucose, fructose, galactose, pentose, lactose, maltose, sucrose and starch.
- Analysis of amino acids - tyrosine, tryptophan, arginine, cysteine and histidine,

III- GROUP EXPERIMENTS

- Paper chromatography: Separation and detection of amino acids.
- Paper chromatography: Separation of plant pigments
- Reactions of lipids- solubility, saponification, test for unsaturation, Libermann Buchard test for cholesterol.
- Reaction of protein- Solubility, Biurete, xanthoproteic, million, denaturation by heat, pH

IV-COLORIMETRY

- Estimation of Protein by Biuret method.
- Estimation of inorganic phosphorous by Fieske and Subbarow method.

BHARATHI WOMEN'S COLLEGE (AUTONOMOUS), CHENNAI – 600 108.

B.Sc. - BIOCHEMISTRY

CORE PAPER V – ENZYMES

(For the students admitted from the year 2019 - 20)

HOURS PER WEEK: 5

CREDITS: 5

SEMESTER: V

SUBJECT CODE: 19CGE

OBJECTIVES:

- To study the ability of enzymes- as biocatalyst.
- To understand the factors influencing the enzyme action.
- To gain knowledge on the methods of isolation of enzymes.

UNIT-I(15 Hrs)

Definition, Nomenclature & classification of enzymes. Properties of enzymes: as biocatalysts, specificity, activation energy, catalytic modification and zymogen activation. Enzyme specificity- Active site and its characteristics, Regulatory enzymes- Allosteric site allosteric enzymes (aspartate trans carbamoylase). Isoenzymes with reference to LDH & CK.

UNIT – II(15 Hrs)

Coenzymes and Cofactors - Structure and functions of TPP, PLP, NAD / NADP, FMN, FAD, coenzymes-A, lipoic acid and Biotin. Multi-enzyme complexes (Pyruvate dehydrogenase and fatty acid synthase), Metallo enzymes, Industrial uses of enzymes – food and pharmaceutical industries. Immobilized enzymes & methods of immobilization.

UNIT – III(15 Hrs)

Rate of enzymatic reaction. Derivation of Michelis & Menten equation. Line weaver Burk plot, Eadie Hofstee plot. Theories of enzyme action - Lock & Key theory. Induced fit theory. Factors affecting enzyme reaction - pH, temperature, activators, Cofactors, concentration of enzyme and substrate.

UNIT – IV(15 Hrs)

Enzyme inhibitors – reversible and irreversible inhibition – types of inhibition, competitive, non-competitive, uncompetitive inhibition. (Derivation not required). Factors contributing to the maximum activity of enzyme- covalent catalysis, proximity and orientation, acid-base catalysis. Mechanism of enzyme action with reference of chymotrypsin and ribonuclease.

UNIT- V (15 Hrs)

Methods of isolation of enzymes: Homogenisation techniques, intracellular localization of enzymes, separation procedure: based on molecular size - dialysis, ultrafiltration, molecular exclusion chromatography, based on solubility – isoelectric precipitation, salting in & salting out, based on electric charge – electrophoresis and ion exchange chromatography.

BOOKS FOR STUDY:

- Textbook of Biochemistry - Stryer
- Principles of Biochemistry - Lehninger
- Understanding enzyme - Palmer

BOOKS FOR REFERENCE:

- Biotechnology - Trehen
- Methods in enzymology - Relevant volumes
- Enzyme – Boyer
- Enzyme - Dixon and Web

WEB RESOURCES

<https://www.pnas.org/content/pnas/39/4/232.full.pdf>

<http://www.enzymes.at/download/Enzymes%20-%20A%20Practical%20Introduction%20To%20Structure,%20Mechanism%20And%20Data%20Analysis%20-%202nd%20Edition.pdf>

https://www.academia.edu/35117679/_U_Satyanarayana_Biochemistry

https://www.academia.edu/26754785/J._L._Jain-_Biochemistry.pdf

LEARNING OUTCOME:

- To understand the nature of the enzyme
- An insight into the factors that modulates enzyme action
- The diverse ways by which the enzyme brings about a chemical change
- The idea about location of enzymes and a brief out come on the methodologies to isolate and purify the same
- To understand the concepts on enzyme and to apply the same as a tool for bio-molecular techniques

BHARATHI WOMEN'S COLLEGE (AUTONOMOUS), CHENNAI – 600 108.

B.Sc. - BIOCHEMISTRY

CORE PAPER VI – METABOLISM

(For the students admitted from the year 2019 - 20)

HOURS PER WEEK: 5

SEMESTER: V

CREDITS: 5

SUBJECT CODE: 19CGF

OBJECTIVES:

- To highlight the metabolism as the ideal biomolecular system to study biochemical events.
- To decipher the energy production through catabolic pathways
- To study the reactions involved in building up of biomolecules

UNIT – I (15 Hrs)

Electron transport in mitochondria – components and inhibitors of electron transport chain. Oxidative phosphorylation, chemi-osmotic theory. Inhibitors of oxidative phosphorylation – uncouplers and ionophores. Substrate level phosphorylation. High energy compounds – definition, structure and free energy of hydrolysis of phosphoenol pyruvate, 3-phosphoglycerate, creatine phosphate, ATP, GTP and acyl CoA.

UNIT-II (15 Hrs)

Glycolysis- aerobic and anaerobic glycolysis and its inhibitors, pyruvate dehydrogenase complex, citric acid cycle and energetics, Glyoxalate cycle, gluconeogenesis and HMP shunt pathway. Glycogen metabolism and its regulation.

UNIT- III (15 Hrs)

Degradation of saturated fatty acids - α , β and ω oxidation. Degradation of phospholipids (lecithin). Biosynthesis of saturated fatty acids, triglycerides, phospholipids (lecithin), cholesterol and ketone bodies.

UNIT- IV (15 Hrs)

Degradation of amino acids- mechanisms– Amino acid pool. Oxidative deamination – role of dehydrogenases and oxidases. Non-oxidative deamination – role of pyridoxal phosphate with reference to serine and cysteine. Ammonia detoxification and intoxicification. Decarboxylation – formation of histamine, cadaverine, gamma amino butyric acid and serotonin. Transamination reaction – mechanism and Schiff's base formation, Urea cycle (regulation not required).

UNIT - V (15 Hrs)

Metabolism of aromatic amino acids and nitrogen bases. Biosynthesis of tyrosine and tryptophan from phosphoenol pyruvate and erythrose-4- phosphate; Biosynthesis of methionine. Degradation of amino acids – formation of acetyl CoA from aromatic amino acids, formation of melanin and epinephrine, nor-epinephrine from tyrosine, formation of pyruvate, taurine, cysteic acid and mercapto lactate from cysteine. Biosynthesis of purine and pyrimidine nucleotide-Denovo and salvage pathway (Regulation not required). Role of ribonucleotide reductase (Mechanism not required)

BOOKS FOR STUDY:

- Biochemistry - Harper
- Biochemistry - Agarwal
- Text book of Biochemistry – Lehninger

BOOKS FOR STUDY:

- Biochemistry - Orten
- Principles of Biochemistry - Whitehandler and Smith, Vol 1 & 2

WEB RESOURCES

<https://www.pnas.org/content/pnas/39/4/232.full.pdf>

https://www.academia.edu/35117679/_U_Satyanarayana_Biochemistry

[https://www.academia.edu/26754785/J. L. Jain- Biochemistry.pdf](https://www.academia.edu/26754785/J._L._Jain-_Biochemistry.pdf)

<https://awesomechem.files.wordpress.com/2016/10/harpers-illustrated-biochemistry-28th-ed-robert-k-murray-et-al-mcgraw-hill-2009.pdf>

<https://www.unifr.ch/biochem/assets/files/dreyer/cours/BC0103%20ch13.pdf>

LEARNING OUTCOME:

- The sequential manner in which the biomolecules are degraded to provide energy to the cell and also to excrete waste material
- The sequential manner in which the biomolecules are synthesized to conserve the energy currency of the cell
- The disruption in the metabolic pathway leading to diseases are illustrated with specific examples

BHARATHI WOMEN'S COLLEGE (AUTONOMOUS), CHENNAI – 600 108.

B.Sc. - BIOCHEMISTRY

CORE PAPER VII- ANALYTICAL BIOCHEMISTRY

(For the students admitted from the year 2019 - 20)

HOURS PER WEEK: 5
CREDITS: 5

SEMESTER: VI
SUBJECT CODE: 19CGG

OBJECTIVES:

- To understand the working of various instruments used in biochemical laboratory.
- To acquire knowledge on the basic concepts, principles and techniques of modern analytical tools.
- To study the applications of various techniques.

UNIT –I (15Hrs)

Basic principles of sedimentation, centrifugal force, centripetal force, sedimentation rate. Types of centrifuges, types of rotors, differential centrifugation – fractionation of sub-cellular organelles, density gradient centrifugation. Analytical centrifugation – instrumentation and application and molecular weight determination.

UNIT –II (15Hrs)

General principles of chromatography- partition and adsorption chromatography. Paper chromatography- principle, sample application, development – ascending, descending and radial, detection of amino acids and sugars. Column chromatography – principle, factors affecting resolution. Principle, operational procedure and applications of ion exchange chromatography (amino acid separation) Basic principles and applications of affinity chromatography, molecular sieve chromatography – determination of molecular weight of proteins by molecular sieve chromatography.

UNIT – III (15Hrs)

Electrophoresis- General Principle, factors affecting migration rate- electric potential, sample buffer, supporting medium. Tiselius moving boundary electrophoresis. Principle, procedure and application of paper, cellulose acetate, agarose and starch gel electrophoresis.

UNIT – IV (15Hrs)

Immuno-electrophoresis: Qualitative immunoelectrophoresis, cross over immuno-electrophoresis, Rocket immuno-electrophoresis. Isoelectric focusing. Principle, procedure and applications of SDS-PAGE, Two dimensional gel electrophoresis. Disc gel electrophoresis.

UNIT – V (15Hrs)

Spectrophotometry- Beer-Lamberts Law, light absorption and its transmittance, determination of extinction coefficient. Visible and UV Spectrophotometry, Spectrofluorimetry- principle, instrumentation and application, Flame photometry - principle, instrumentation and application

BOOKS FOR STUDY:

- Practical Biochemistry - Keith Wilson and John walker
- Chromatography - Srivatsava
- Biophysical chemistry - Upadhya and Upadhay
- Practical Biochemistry - Varley

BOOKS FOR REFERENCE:

- Practical Biochemistry - Keith Wilson and Goulding
- Instrumental methods of chemical analysis - Chatwal and Anand.
- Analytical Biochemistry - Holme and H.Pek
- Electrophoresis - Anbalagan
- Introduction to practical Biochemistry - Plummer

WEB RESOURCES:

https://www.whitman.edu/chemistry/edusolns_software/GC_LC_CE_MS_2017/CH%201%202017.p df

https://www.phys.sinica.edu.tw/TIGP-NANO/Course/2007_Spring/Class%20Notes/AC_chapter%203%20Chromatography%200411.pdf

<https://www.kau.edu.sa/Files/0017514/Subjects/principals%20and%20techniques%20of%20biochemistry%20and%20molecular%20biology%207th%20ed%20wilson%20walker.pdf>

LEARNING OUT COME:

- Emphasis on the principle on which each technique is based and its use in Biochemistry
- Get acquainted with basics of chromatography and colorimetry
- Diverse separation techniques to purify the biomolecules based on their chemical properties

BHARATHI WOMEN'S COLLEGE (AUTONOMOUS), CHENNAI – 600 108.
B.Sc. - BIOCHEMISTRY

CORE PAPER VIII – PHYSIOLOGY

(For the students admitted from the year 2019 - 20)

HOURS PER WEEK: 4

CREDITS: 4

SEMESTER: V

SUBJECT CODE: 19CGH

OBJECTIVES:

- To introduce the physiological concepts of cell homeostasis
- To study the structure and functions of biological systems.
- To understand the role endocrine in influencing cell physiology.

UNIT-I (12 Hrs)

Structure of digestive system, digestion and adsorption of carbohydrates, lipids and protein, Mechanism of hydrochloric acid formation in stomach, Fractional gastric analysis using test meal. Role of various enzymes and hormones involved in digestive process and defecation.

UNIT- II (12 Hrs)

Circulatory system- basic anatomy of heart, systemic, pulmonary and portal circulation. Heart beat, cardiac cycle and pacemaker. Bleeding and clotting time. Mechanism of blood clotting. Nervous system – Brain (parts of brain and ventricles), spinal cord, Structure of a neuron, synaptic transmission. Reflex action and neurotransmitters.

UNIT-III (12 Hrs)

Muscular system- types of muscles, structure and composition of skeletal muscle structure of a myofibril, mechanism of muscle contraction and theories of muscle contraction. Excretory system – structure and functions of kidney, structure of a nephron, mechanism of urine formation.

UNIT-IV (12 Hrs)

Respiratory system- composition of air, significance of oxygen, carbondioxide and nitrogen in biological system. Partial pressure of oxygen and carbondioxide. Gaseous exchange in the lungs, tissue, arterial and venal capillaries. Role of kidney and lungs in maintaining the pH of the body.

UNIT-V(12 Hrs)

Hormones- classification of hormones, endocrine glands and their secretion. Insulin, thyroxine, growth hormone-Structure and function. Steroid hormones- Corticosteroid, sex hormones – testosterone and estrogen, menstrual cycle.

BOOKS FOR STUDY:

- Human Physiology – Chatterjee Vol I & II
- Animal physiology - Arumugam

BOOKS FOR REFERENCE:

- Human Physiology – Harper
- Textbook of physiology – Agarwal
- Medical Biochemistry – Chatterjee
- Textbook of physiological chemistry – Agarwal

WEB RESOURCES

<https://mymedicallibrary.files.wordpress.com/2016/08/jaypee-essentials-of-medical-physiology-6th-edition.pdf>

<https://archive.org/details/cu31924000353601/page/n7>

https://gurusaiprasanth.files.wordpress.com/2015/09/human_physiology.pdf

<http://assets.vmou.ac.in/MZO03.pdf>

LEARNING OUTCOME:

- Enhanced knowledge and appreciation of mammalian physiology
- The functions of various physiological systems (digestive, respiratory, nervous, muscular and excretory systems)
- To understand how these systems integrate physiological responses to challenges

BHARATHI WOMEN'S COLLEGE (AUTONOMOUS), CHENNAI – 600 108.

B.Sc. - BIOCHEMISTRY

CORE ELECTIVE PAPER I – BIOTECHNOLOGY

(For the students admitted from the year 2019 - 20)

HOURS PER WEEK: 5

CREDITS: 5

SEMESTER: V

SUBJECT CODE: 19EGA

OBJECTIVES:

- To modify plants and animal in to model systems.
- To study the methods and processes involved in transformation of natural raw materials into useful products.
- To study the tools and techniques involved in biotechnology.

UNIT-I (15Hrs)

Scope and importance of biotechnology. Recombinant DNA technology- Definition, restriction endonucleases- types, role, recognition sequences, cleavage pattern, modification of cut ends, vectors- plasmid, cosmid, phage. DNA ligase, linkers, homopolymer tailing, end labeling, construction maps (PBR322, λ -bacteriophage)

UNIT-II (15Hrs)

Steps in genetic engineering- Construction of genomic library. Synthesis of cDNA Construction of cDNA library. Gene transfer methods- conjugation, transduction transformation, microinjection and electroporation. Selection-selectable markers, chromogenic substrate and screening of clones- colony hybridization, screening with antibodies.

UNIT-III (15Hrs)

Plant tissue culture- basic requirements for culture, M S medium, callus culture, protoplast culture. Vectors – Ti plasmid (cointegration vector and binary vector), viral vector- TMV, CaMV and their applications. Transgenic plants – pest resistant, herbicide resistance and stress tolerance plants.

UNIT-IV (15Hrs)

Vectors of transgenic animals- SV 40 Vector. Basics of transfection methods- Calcium phosphate precipitation, DEAE- dextran mediated transfection. Transgenic mice- retroviral transfer and stem cell mediated transfer, applications. Embryonic stem cell- definition, ES cell culture to produce differentiated cells, applications.

UNIT-V (15Hrs)

Production and Applications of ethanol (industrial Biotechnology), Proteases (Enzyme biotechnology), Biogas, Bio-diesel (Fuel biotechnology), waste water treatment (Environmental Biotechnology), vaccines, monoclonal antibodies (Medical biotechnology).

BOOKS FOR STUDY:

- Molecular Biology – David Friefelder
- Biotechnology- B.D. Singh
- Biotechnology- Sathyanarayana
- Text book of Biotechnology – R.C. Dubey

BOOKS FOR REFERENCE:

- Biotechnology – Keshav Trehan
- Medical Biotechnology – Joshua
- Biotechnology- S.S. Purohit 3rd edition.

WEB RESOURCES:

[https://moorthibio.weebly.com/uploads/4/7/5/6/4756207/ebooksclub.orgbiotechnology.p
df](https://moorthibio.weebly.com/uploads/4/7/5/6/4756207/ebooksclub.orgbiotechnology.pdf) <https://nptel.ac.in/courses/104108056/module9/PNR%20lecture%2035.pdf>
[http://www.routeetvies.fr/medias/files/1-plant-biotechprinciples-techniques-and-
applications1.pdf](http://www.routeetvies.fr/medias/files/1-plant-biotechprinciples-techniques-and-applications1.pdf)

LEARNING OUT COME:

- An insight into the tools and techniques involved in the gene manipulation
- Apply scientific methods to explore natural phenomenon
- The applications of these techniques in various fields with specific example (industry, medicine)

BHARATHI WOMEN'S COLLEGE (AUTONOMOUS), CHENNAI – 600 108.

B.Sc. - BIOCHEMISTRY

CORE ELECTIVE PAPER I – MICROBIOLOGY

(For the students admitted from the year 2019 - 20)

HOURS PER WEEK: 5

CREDITS: 5

SEMESTER: V

SUBJECT CODE: 19EGB

OBJECTIVES:

- To provide comprehensive introduction to all major areas of microbiology.
- To study the cutting edge research with the concepts essential for understanding the field of microbiology
- To get the basic as well as some advance knowledge of systemic and diagnostic microbiology.

UNIT-I (15Hrs)

Distribution of Microorganisms: In soil – distribution of bacteria, molds, yeast and protozoa. In Water – Quality of drinking water, Bacteriological examination of water, Total bacterial count for E. coli; Purification of water: filtration, sedimentation and chemical processes such as flocculation and chlorination; and the use of electromagnetic radiation such as ultraviolet light.

UNIT-II (15Hrs)

Microorganism in air and airborne diseases. Microorganisms in milk and milk products. Preservation of milk (Pasteurization and sterilization), milk borne diseases (Brucella infection- Malta fever, foot and mouth disease, scarlet fever, septic or streptococcic sore throat, typhoid and paratyphoid A and B fever, bacillary dysentery in children).

UNIT-III (15Hrs)

Microbial growth, growth rate, doubling time, exponential growth phases, factors affecting growth – nutrient factors (C, O, N, P, S trace elements) and non-nutrients (temperature, hydrostatic pressure, pH, osmotic strength) for the microorganism. Role of antibiotics - penicillin, tetracycline and streptomycin in controlling microbial growth (structure not needed)

UNIT-IV (15Hrs)

Principles and methods of Sterilization- steam sterilization (autoclave), Dry-heat sterilization, Filtration, Exposure to ionizing radiation, Gas sterilization. Disinfection- physical

agents such as ultraviolet light (UV), electron beam, gamma-ray irradiation, sonification, and heat, Chemical agents- including ozone, ClO₂, the halogens bromine, iodine and chlorine, the metals copper and silver, KMnO₄, phenol and phenolic compounds, alcohols, soaps and detergents, quaternary ammonium salts, hydrogen peroxide, and various alkalis and acids.

UNIT-V (15Hrs)

Diseases –definition –Examples for bacterial (Pulmonary Tuberculosis, Diphtheria, Cholera, Tetanus, Plague), viral (smallpox and measles, flu, AIDS, dengue fever, hepatitis) Endemic and epidemic diseases –causes and symptoms. Major diseases of young children with special reference to diarrhea, primary complex and whooping cough.

BOOKS FOR STUDY:

- Microbiology – M.J. Pelzar, Jr. Et al. McGraw Hill
- Text book of Microbiology-Ananathanarayanan and Panikar Orient Long.
- Microbiology-Lansing M. Prescott IV edition, McGraw-Hill.

BOOKS FOR REFERENCE:

- Microbiology: An Introduction, 13th Edition, by Gerard J. Tortora, Berdell R. Funke and Christine L. Case
- Brock Biology of Microorganisms, 14th Edition, by Michael T. Madigan, John M. Martinko, Kelly S. Bender, Daniel H. Buckley, David A. Stahl and Thomas Brock
- Clinical Microbiology Made Ridiculously Simple, 6th Edition, by Mark Gladwin, Bill Trattler and C. Scott Mahan

WEB RESOURCES:

http://www.grsmu.by/files/file/university/cafedry/microbiologii-virysologii-immynologii/files/essential_microbiology.pdf

http://www.freebookcentre.net/medical_text_books_journals/microbiology_ebooks_online_texts_download.html

<https://phys.org/news/2017-10-scientists-soil-microorganisms.html>

<https://www.medicalnewstoday.com/articles/158179.php#viral-diseases>

LEARNING OUT COME:

- Helps the students to correlate microbial concepts in understanding disease, diagnosis, treatment and prevention
- Get acquainted with the distribution of microbes in biosphere
- Knowledge on the overview of the role of microorganisms in human health and illness.

BHARATHI WOMEN'S COLLEGE (AUTONOMOUS), CHENNAI – 600 108.
B.Sc. - BIOCHEMISTRY

CORE ELECTIVE PAPER I – PLANT BIOCHEMISTRY

(For the students admitted from the year 2019 - 20)

HOURS PER WEEK: 5
CREDITS: 5

SEMESTER: V
SUBJECT CODE: 19EGC

OBJECTIVES:

- To provide the students a broad overview of the various aspects of plant biochemistry.
- To study basic principles of plant biology, such as photosynthesis, primary and secondary metabolism, the function of phytohormones.
- To gain knowledge on the various commercial applications of plant biochemistry

UNIT-I (15Hrs)

Physiology of plants: Diffusion and Osmosis in plants and their significance, relationship among turgor pressure, wall pressure and osmotic pressure, water potential concept. Mechanism of water absorption, Ascent of sap, Transpiration:- types, mechanism of transpiration and factors affecting transpiration.

UNIT-II (15Hrs)

Photosynthesis: Photosynthetic apparatus, Photosynthetic pigments, Light reactions - cyclic and non cyclic phosphorylation, Calvin cycle, Photorespiration, C4 plants, CAM plants. Glyoxylate cycle.

UNIT-III (15Hrs)

Nitrogen metabolism and Nitrogen cycle : Nitrogen in soil, nitrate reduction in plants, Nitrogen fixation:- Non-biological and biological nitrogen fixation, biochemistry of symbiotic and non-symbiotic nitrogen fixation, nitrogen cycle, sulphur cycle, carbon cycle and phosphorus cycle.

UNIT-IV (15Hrs)

Phytochemicals: Classification and medicinal value of phytochemicals with reference to carotenoids, flavonoids, alkaloids, phenolics, terpenoids and tannins. Qualitative analysis of phytochemicals .

UNIT-V (15Hrs)

Plant growth regulators: Chemistry, biosynthesis, distribution, mode of action and physiological effects of Auxins, Gibberellins, Cytokinins, ABA and Ethylene.

BOOKS FOR STUDY:

- Plant Physiology, S. N. Pandey and B.K. Sinha, Vikas Publishing Pvt. Ltd, 3 Edition, 1999.
- Plant physiology, Verma, 7 Revised edition, Emkay Publications, 2001. rd
- Textbook of Plant Physiology and Biochemistry, Mohit Verma & S K Verma
- Plant Physiology and Biochemistry Paperback –by H. S. Srivastava N. Shankar

BOOKS FOR REFERENCE:

- Plant Biochemistry Paperback reprint of hardcover 4th ed., 2010 Edition, by Hans-Walter Heldt and Birgit Piechulla.
- Introduction to plant physiology, William. G.Hopkins, Norman. P.A. Hunger, 3 Edition.
- Biochemistry and Physiology of Plant Hormones by Moore, T.C.
- Plant Biochemistry by P.M. Dey and J.B. Harborne

WEB RESOURCES:

https://www.researchgate.net/publication/327304552_AN_OVERVIEW_OF_MAJOR_CLASSES_OF_PHYTOCHEMICALS_THEIR_TYPES_AND_ROLE_IN_DISEASE_PREVENTION

<http://passel.unl.edu/pages/informationmodule.php?idinformationmodule=956783940&topicorder=10>

https://www.researchgate.net/publication/284425734_Phytochemistry_of_Medicinal_Plants

LEARNING OUT COME:

- Knowledge gained on plant physiology and metabolism helps to handle plant materials
- Applied science can contribute to the solution of agricultural and pharmaceutical problems
- Screening of Indian medicinal plants for these phytochemicals and assessing their potential in conferring protecting against different types of diseases

BHARATHI WOMEN'S COLLEGE (AUTONOMOUS), CHENNAI – 600 108.
B.Sc. - BIOCHEMISTRY

CORE PAPER – IX MOLECULAR BIOLOGY

(For the students admitted from the year 2019 - 20)

HOURS PER WEEK: 6

CREDITS : 5

SEMESTER: VI

SUBJECT CODE: 19CGJ

OBJECTIVES:

- To study the central dogma of cell.
- To provide with the core principle involves in molecular biology.
- To understand the response of cells to different external stimuli.

UNIT-I (18Hrs)

DNA as the vehicle of inheritance. Griffith, McLeod, McCarthy and Avery, Hershey- Chase experiments and their significance. Definition of gene, organization of gene and non-coding sequence in prokaryotes, mitochondrial DNA.

UNIT-II (18Hrs)

Prokaryotic replication: semi-conservative mode of replication, replication forks, okazaki fragments. Enzymology of replication- role of DNA polymerases I, II, III, gyrase, topoisomerases, helicase, ligases and, SSB proteins. Initiation, elongation events on the replication fork and termination, Inhibitors of replication. Sigma and theta replication (definition).

UNIT-III (18Hrs)

Prokaryotic Transcription- Upstream promoters, TATA box, RNA polymerases- role of sigma factor, closed and open promoter complexes, initiation, elongation and termination of transcription. Post transcriptional modifications in prokaryotes with reference to tRNA, inhibitors of transcription.

UNIT-IV (18Hrs)

Genetic code- characteristics of genetic code- Wobble hypothesis- Prokaryotic ribosome and protein biosynthesis: activation of amino acids, initiation, elongation and termination, post- translational modifications and inhibitors of protein biosynthesis.

UNIT-V (18Hrs)

DNA damage, repair by direct reversal of damage, photoreactivation, excision repair, recombination repair, SOS repair. Mutation- types of mutation with examples, causes- physical and chemical agents.

BOOKS FOR STUDY:

- Biochemistry – Sathyanarayana
- Molecular Biology- David freifiedler

BOOKS FOR REFERENCE:

- Biochemistry - Voet and Voet
- Molecular Biology- Lodish Baltimore

WEB RESOURCES:

https://www.academia.edu/35117679/_U_Satyanarayana_Biochemistry

[https://www.academia.edu/35025638/Voet - Fundamentals of Biochemistry Life at the Molecular Level 5th Edition c2016 txtbk](https://www.academia.edu/35025638/Voet_-_Fundamentals_of_Biochemistry_Life_at_the_Molecular_Level_5th_Edition_c2016_txtbk)

<https://awesomechem.files.wordpress.com/2016/10/harpers-illustrated-biochemistry-28th-ed-robert-k-murray-et-al-mcgraw-hill-2009.pdf>

https://archive.org/stream/pdfy-5vClyqSbVzIGpuT2/DM+Vasudevan+-+Textbook+of+Biochemistry+For+Medical+Students%2C+6th+Edition_djvu.txt

LEARNING OUT COME:

- A knowledge on the basics of copying and retrieving information from the genetic material (replication, transcription and translation)
- The various enzymes involved in the process of replication, transcription and translation
- The deleterious effects of alteration in the genetic material gives an idea on the importance of DNA

BHARATHI WOMEN'S COLLEGE (AUTONOMOUS), CHENNAI – 600 108.

B.Sc. - BIOCHEMISTRY

CORE PAPER – X CLINICAL BIOCHEMISTRY

(For the students admitted from the year 2019 - 20)

HOURS PER WEEK: 6

CREDITS: 5

SEMESTER: VI

SUBJECT CODE: 19CGK

OBJECTIVES:

- To gain knowledge on scope of clinical biochemistry.
- To understand the alteration in biochemical components during various clinical conditions
- To highlight the importance of various biochemical parameter in the diagnosis of diseases.

UNIT-I (18Hrs)

Scope of clinical biochemistry. Blood glucose homeostasis. Maintenance of blood glucose by hormone with special reference to insulin and glucagon. Diabetes mellitus- types, causes, biochemical and clinical manifestations, and diagnosis. Inborn errors of carbohydrates metabolism- Galactosemia, fructosuria and Glycogen storage diseases.

UNIT -II (18Hrs)

Liver function tests-Tests based on bile pigment metabolism. Carbohydrate metabolism, plasma proteins and lipids- detoxification and excretory functions of liver. Jaundice -classification, Biochemical changes and differential diagnosis for jaundice.

UNIT-III (18Hrs)

Kidney function tests, measurement of urine pH, volume, specific gravity, osmolality, sediments in urine- RBC, WBC, epithelial cells, casts and calculi. Normal and abnormal constituents of urine- Inulin, urea and creatinine clearance tests. Concentration and dilution tests. Phenol red test. Levels of plasma protein and its significance related to kidney function. Proteinuria.

UNIT-IV (18Hrs)

Normal levels of cholesterol, triglycerides, phospholipids, free fatty acids and lipoprotein in blood. Disorders of lipid metabolism- Fatty liver, atherosclerosis, hyper and hypo lipoproteinemias- Sphingolipidoses- Niemann-pick's disease, Gaucher's and Tay-sach's

disease – causes and pathology. Inborn errors of aromatic amino acids- phenyl ketonuria, tyrosinemia, alkaptonuria , and albinism.

UNIT-V (18Hrs)

Hormonal disorders- Acromegaly, Cushing's syndrome, Addison's disease, Goitre, Grave's disease, Hyper parathyroidism - clinical features. Enzymes of diagnostic importance. LDH, creatine kinase, transaminases, phosphatases, pancreatic lipase, amylase and choline esterase.

BOOKS FOR STUDY:

- Clinical Biochemistry – Zilva and Pannell
- Medical Biochemistry – Chatterjee

BOOKS FOR REFERENCE:

- Lecture notes on Clinical chemistry – L.G. Whitby
- Biochemistry with clinical correlation – Devlin Thomas M.
- Textbook of Biochemistry – R. Swaminathan
- Inborn errors of Metabolism – Duncan

WEB RESOURCES:

<https://www.unifr.ch/biochem/assets/files/dreyer/cours/BC0103%20ch13.pdf>

<https://trixiesolis.files.wordpress.com/2015/02/essential-biochemistry-third-edition-charlotte-w-pratt.pdf>

<https://www.slideshare.net/numranasir/mn-chatterjea-textbook-of-medical-biochemistry-8th-ed>

<https://archive.org/details/clinicalchemistre2zilv/page/n7>

LEARNING OUT COME:

- Will be able to clinically assess the laboratory indicators of physiological conditions and disease
- Will know the biochemical and molecular tools needed to accomplish preventive, diagnostic and therapeutic interventions on various disorders
- Knowledge on physiological conditions and disease will help to lead a prophylactic life

BHARATHI WOMEN'S COLLEGE (AUTONOMOUS), CHENNAI – 600 108.

B.Sc. - BIOCHEMISTRY

CORE ELECTIVE PAPER II – IMMUNOLOGY

(For the students admitted from the year 2019 - 20)

HOURS PER WEEK: 6

CREDITS: 5

SEMESTER: V

SUBJECT CODE: 19EGD

OBJECTIVES:

- To introduce the concepts of defense system
- To study the immune system in both maintaining health and contributing to disease.
- To study the basics in diagnosis of diseases

UNIT-I (18Hrs)

Immune system- lympho-reticular system, lymphoid organs- central and peripheral lymphoid organs, structure and functions of B cells, T cells and null cells, phagocytes and mast cells.

UNIT-II (18Hrs)

Antibodies – definition and classification. General structure and functions of IgM, IgD, IgA, IgG and IgE. Antigens – definition – types –haptens, isoantigens, Factors affecting antigenicity and immunogenicity of antigens. Complements – biochemical functions, activation by classical and alternative pathways.

UNIT-III (18Hrs)

Antigen – antibody interaction – types – precipitation and agglutination mechanism. Applications of agglutination reaction in diagnosis of diseases – vidal test – complement fixation test. Blood grouping- major and minor blood groups. Erythroblastosis fetalis. Blood transfusion. Mis-matched blood transfusion and its consequences.

UNIT –IV (18Hrs)

Immunity – Innate and acquired immunity- factors contributing to innate immunity – active and passive immunity. Humoral and cell mediated immunity. Clonal selection theory, types of vaccines and vaccination schedule for children in India.

UNIT –V (18Hrs)

Disorders of immune system – hypersensitivity – causes, types and pathology of type I, II, III and IV hypersensitive reaction , Auto immunity – causes and the pathology of Rheumatoid arthritis, systemic lupus erythematosus, Hashimotos thyroiditis, thyrotoxicosis, autoimmune hemolytic anemia.

BOOKS FOR STUDY:

- Immunology – Nandhini Shetty
- Text book of Microbiology – R. Ananthanarayanan and C.K. Jayaram Paniker.
- Immunology –Dulsy Fathima

BOOKS FOR REFERENCE:

- Immunology – Jane S. Duby
- Immunology – Donald M. Weir
- Essential immunology – Ivan Roitt

WEB RESOURCES:

<http://assets.vmu.ac.in/MZO03.pdf>

https://livresbioapp.files.wordpress.com/2015/07/kuby_immunology.pdf

<http://www.malecentrum.sk/data/att/166377.pdf>

<http://moscmm.org/pdf/Ananthanarayan%20microbio.pdf>

LEARNING OUT COME:

- An insight in to the surface membrane barriers and their protective function
- Importance of phagocytosis and the role of various cells involved in imparting resistance to foreign substances
- Immune system the double edged sword which when disturbed can also lead to deleterious out comes

BHARATHI WOMEN'S COLLEGE (AUTONOMOUS), CHENNAI – 600 108.
B.Sc. - BIOCHEMISTRY

CORE ELECTIVE PAPER – II BIO STATISTICS

(For the students admitted from the year 2019 - 20)

HOURS PER WEEK: 6

CREDITS: 5

SEMESTER: VI

SUBJECT CODE: 19EGE

OBJECTIVES:

- To build the basis for promoting theoretical and application aspects of Statistics.
- To emphasize the relevance of statistical tools and techniques of analysis in the study of inter-disciplinary sciences.
- To gain knowledge of fundamental basic principles, methods, interpretation of results and a clear perception of the power of statistical ideas.

UNIT – I(18Hrs)

Biostatistics – definition – types of data – Primary and Secondary data – Methods of Collection of data – Sources of data in life science – Limitation and uses of statistics.

UNIT – II(18Hrs)

Classification and Tabulation of data, Diagrammatic and Graphic representation of data. Different forms of diagrams and graphs related to biological studies.

UNIT – III(18Hrs)

Measures of Central Tendency: Mean, Median, Mode, Geometric Mean and Harmonic Mean – Merits and Demerits. Measures of dispersion: Range, Standard deviation, Mean deviation, Quartile deviation, Merits and Demerits, Coefficient of variations.

UNIT – IV(18Hrs)

Correlation: Types and Methods of Correlation, Rank – Correlation. Regression: Simple regression equation – fitting of regression equation.

UNIT – V(18Hrs)

Sampling distribution - Standard error – Test of Hypothesis: Simple Hypothesis, Null hypothesis – Test of Significance: Large sample tests with regard to Mean, Differences of Means, Proportions and difference of Proportions - Small Sample Test with regard to Mean, Difference of Means and Variances – Chi – square test.

BOOKS FOR STUDY:

- Gurumani. N (2005). An introduction to Biostatistics. 2nd Revised Edition, MJP Publishers, Chennai.
- Statistical methods for biologist by S.Palanichamy & M.Manoharan.
- Dr. Pranab Kumar Banarjee. An Introduction to Biostatistics (2011), S.Chand and Company Ltd, Ram Nagar, New Delhi.

BOOKS FOR REFERENCE:

- Daniel W, (1987). Biostatistics, John Wiley and Sons, New York.
- P.S.S. Sundar Rao, J.Richard (2012). An introduction to Biostatistics and Research methodology. Fifth Edition, Prentice Hall of India Learnin Pvt Ltd, New Delhi.
- A. Indrayan, L. Sathyanarayana (2006). Biostatistics for Medical, Nursing and Pharmacy students. Prentice Hall of India Pvt Ltd, New Delhi.

WEB RESOURCES:

http://onlinestatbook.com/Online_Statistics_Education.pdf

<https://www.math.arizona.edu/~jwatkins/statbook.pdf>

<http://www.utstat.toronto.edu/mikevans/jeffrosenthal/book.pdf>

<https://2012books.lardbucket.org/pdfs/beginning-statistics.pdf>

LEARNING OUT COME:

- The students are prepared to cope up with the latest developments in statistical tools
- Tools to use them effectively in modeling, interpreting and solving the real life problems.
- Help the students in the context of globalization of Indian economy with modern technology.

BHARATHI WOMEN'S COLLEGE (AUTONOMOUS), CHENNAI – 600 108.
B.Sc. - BIOCHEMISTRY
CORE ELECTIVE PAPER – II
PHYSICAL ASPECTS OF BIOCHEMISTRY

HOURS PER WEEK: 6
CREDITS: 5

SEMESTER: VI
Subject Code: 19EGF

OBJECTIVES:

- To build the basic knowledge on the physical features of Biochemistry.
- To understand the properties of liquids and its implications in biological system
- To gain knowledge on forces that stabilize biomolecules.

UNIT – I(18Hrs)

Dissociation of water, ionic product of water, concepts of pH, pOH, simple numerical problems of pH, determination of pH using indicators, Dissociation of weak acids and electrolytes, Bronsted theory of acids and bases, shapes of titration curve of strong and weak acids and bases, Meaning of K_a and pK_a values, Buffers: Henderson - Hasselbach equation with derivation, simple numerical problems involving application of this equation.

UNIT – II(18Hrs)

Definition of normality, molarity, molality, percentage solution, Fundamental principles of diffusion and osmosis, definition of osmotic pressure, isotonic, hypotonic and hypertonic solutions, Biological importance of osmosis.

UNIT – III(18Hrs)

Viscosity – Definition, measurement: falling sphere method and Ostwald viscometer, biological importance. Surface tension - Definition, measurement: drop weight method, capillary rise method and maximum bubble pressure method, biological importance. Vapour pressure – Definition and biological importance.

UNIT – IV(18Hrs)

Definition of true solution, colloidal solution, and coarse suspension, distinction between lyophilic and lyophobic sols. Fundamental study of Donnan equilibrium-

application in biological system. Methods of preparation of colloidal solution, Tyndall effect, emulsion and emulsifying agents.

UNIT – V(18Hrs)

Intra and Intermolecular interactions in biological system: Hydrogen bond, Covalent bond, hydrophobic interaction, disulphide bond, Peptide bonds, glycosidic bond, Phosphodiester linkage, Watson- Crick base pairings, Vander Wall's force.

BOOKS FOR STUDY:

- Biophysics and Biophysical Chemistry by Debajyoti Das
- Principles of Physical chemistry by Puri and Sharma
- Text book of Biochemistry by West and Todd

BOOKS FOR REFERENCE:

- Text book of Biochemistry by Lehninger A
- Principles of Physical chemistry by P L Sai and O P Dharma
- Biophysical chemistry by Upadhyay and Upadhyay

WEB RESOURCES:

<https://enggbiochem.files.wordpress.com/2014/08/biophysical-chemistry.pdf>

<http://www.liquideducation.com/>

<http://www.liquideducation.com/why-liquid-education>

https://chem.libretexts.org/Courses/University_of_Arkansas_Little_Rock/Chem_1403%3A_General_Chemistry_2/Text/17%3A_Aqueous_Equilibria/17-3%3A_Acid-Base_Titrations

LEARNING OUT COME:

- Emphasis on awareness on the three dimensional structure of biomolecules
- Get acquainted with fundamental mathematical calculations
- Knowledge on the biological properties of liquid can be applied for correlation and interpretation with clinical aspects

BHARATHI WOMEN'S COLLEGE (AUTONOMOUS), CHENNAI – 600 108.

B.Sc. - BIOCHEMISTRY

CORE ELECTIVE PAPER – III TECHNIQUES IN LIFE SCIENCES

(For the students admitted from the year 2019 - 20)

HOURS PER WEEK: 6

CREDITS: 5

SEMESTER: VI

Subject Code: 19EGG

OBJECTIVES:

- To understand the working of various instruments used in biochemical laboratory.
- To acquire knowledge on the basic concepts, principles and techniques of modern analytical tools.
- To study the applications of various techniques.

UNIT – I (18Hrs)

Principles of electrochemical techniques. Hydrogen electrode, Reference electrode-calomel electrode, silver-silver chloride electrode. Measurement of pH using glass electrode. Oxygen electrode-principle, working (Clark Electrode) and applications.

UNIT – II (18Hrs)

PCR: Basics of PCR, Reverse transcriptase (RT-PCR) and Real-time PCR and their applications. DNA sequencing by Sanger's method – synthesis of terminated chain, separation, and interpretation and Maxam Gilbert method – end labeling, base modification, separation, detection and interpretation. Methods of nucleic acid hybridization (probe and target sequences).

UNIT – III (18Hrs)

Blotting technique – Southern blotting, northern blotting, and western blotting: preparation of target, digestion, separation by gel electrophoresis, blotting, hybridization, detection and applications Principle, procedure and applications of RIA. ELISA- requisites, Types- competitive, sandwich and indirect ELISA and applications.

UNIT – IV (18Hrs)

Atoms-structure and particles of atom. Radiations emitted by atom – types of radioactive decay, half life period, units of radioactivity. Measurement of radioactivity – methods based on ionization – GM counter – principle and instrumentation. Method based on

excitation – Scintillation counters – liquid and solid scintillation counting technique. Principle and applications of autoradiography, Applications of radioisotopes (metabolic, diagnosis, treatment) biological hazards of radiation and safety measures in handling radioactive isotopes.

UNIT – V (18Hrs)

Microscope: Light microscope - basic principle, working and applications- Phase contrast microscopy and dark field microscope. Electron microscope – principle, instrumentation of Transmission Electron Microscope (TEM) and Scanning Electron Microscope (SEM) - specimen preparation and applications- shadow casting, negative staining and freeze fracturing.

BOOKS FOR STUDY:

- Practical Biochemistry - Keith Wilson and John walker
- Chromatography - Srivatsava
- Biophysical chemistry - Upadhya and Upadhay
- Practical Biochemistry - Varley
- Microbiology - Pelzer

BOOKS FOR REFERENCE:

- Practical Biochemistry - Keith Wilson and Goulding
- Instrumental methods of chemical analysis - Chatwal and Anand
- Analytical Biochemistry - Holme and H.Pek
- Introduction to practical Biochemistry - Plummer

WEB RESOURCES:

https://www.whitman.edu/chemistry/edusolns_software/GC_LC_CE_MS_2017/CH%201%202017.p df

https://www.phys.sinica.edu.tw/TIGP-NANO/Course/2007_Spring/Class%20Notes/AC_chapter%203%20Chromatography%200411.pdf

<https://www.kau.edu.sa/Files/0017514/Subjects/principals%20and%20techiniques%20of%20biochemistry%20and%20molecular%20biology%207th%20ed%20wilson%20walker.pdf>

LEARNING OUT COME:

- Emphasis on the principle on which each technique is based and its use in Biochemistry
- Get acquainted with basics of chromatography and colorimetry
- Diverse separation techniques to purify the biomolecules based on their chemical properties

BHARATHI WOMEN'S COLLEGE (AUTONOMOUS), CHENNAI – 600 108.

B.Sc. - BIOCHEMISTRY

CORE ELECTIVE PAPER – III

FOOD PRESERVATION AND ADULTERATION

HOURS PER WEEK: 6

CREDITS: 5

SEMESTER: VI

Subject Code: 19EGH

OBJECTIVES:

- To acquire knowledge on sterilization and storage of food materials to avoid spoilage.
- To understand the methods to improve the taste and nutritive value of food materials.
- To study the hazards of adulteration.

UNIT – I (18Hrs)

Food spoilage causes and effects – Food contamination and spoilage : cereals and cereal products, vegetables and fruits, fish and other sea foods, milk and milk products. Sources and transmission – water, air and soil as reservoirs of infection. Stability of foods and factors affecting storage stability. Different types of storage and ideal storage conditions for different foods - perishable, semi perishable and non perishable foods.

UNIT – II (18Hrs)

Food preservation - definition and objectives. Traditional methods of food preservation. Sterilisation of food - use of high temperature: blanching, pasteurization, sterilization canning, extrusion cooking, dielectric heating, microwave heating, baking, roasting and frying; Use of low temperature: refrigeration, freezing and dehydro-freezing. Drying or dehydration.

UNIT – III (18Hrs)

Food preservation - use of chemical preservations and food additives. Processing and preservation by non-thermal methods - irradiation, high pressure, pulsed electric field, hurdle technology, Food fermentations, pickling and smoking. Food Packaging - Importance and types of packaging materials. Passive packaging, Active packaging, smart and intelligent packaging. Food contaminants : agricultural, antibiotics and lead in packed foods, colouring matter and radioactive contamination due to packing materials.

UNIT – IV (18Hrs)

Food additives – recommended food additives: flavouring agent – sugar , salt, artificial

sweeteners, spices; Functional additives – emulsifiers, surfactants, anti-caking agents, oxidising agents, binding and thickening agents, metal chelating agents and antioxidants. Other additives like minerals, vitamins, proteins and aminoacids.

UNIT – V (18Hrs)

Adulterants and adulterated food - detection of adulteration in coffee, tea, milk, oil, food grains, dhals, sugar, ghee, supari, turmeric powder - laboratory tests : determination of moisture content – ash content in food, acid number, saponification number and iodine number. Health hazards of the adulterants.

BOOKS FOR STUDY:

- Laboratory chemical methods in food analysis- Geetha Swaminathan
- Safe Food Handling - Jacob M
- Subbulakshmi G. and Udipi S. A. (2002) : Food Processing and Preservation, New Age International (P) Ltd. Publication.
- Banwast G. J. (1989) : Basic Food Microbiology, Chapman & Hall Publication, New York.

BOOKS FOR REFERENCE:

- Fellows PJ. 2005. Food Processing Technology: Principle and Practice. 2nd Ed. CRC.
- Potter NN & Hotchkiss 1997. Food Science. 5th Ed. CBS.
- Ramaswamy H & Marcotte M. 2006. Food Processing: Principles and Applications. Taylor & Francis.
- Frazier W. & Westhoff D. (1988) : Food Microbiology, Tata Mc Graw – Hill Publishers.

WEB RESOURCES:

<https://food.unl.edu/how-food-spoils>

<http://medind.nic.in/nad/t09/i1/nadt09i1p1.pdf>

http://lib.rudn.ru/file/Food_Science_Nutrition_Catalogue_ebook.pdf

<http://www.malecentrum.sk/data/att/166373.pdf>

LEARNING OUT COME:

- Employ diverse sterilization techniques to extend the shelf life of food
- Get acquainted in conserving the nutritive value of food stuffs.
- Knowledge gained on hazards of food adulteration helps to prevent uptake of adulterated food.

BHARATHI WOMEN'S COLLEGE (AUTONOMOUS), CHENNAI – 600 108.

B.Sc. - BIOCHEMISTRY

CORE ELECTIVE PAPER – III DIAGNOSTIC BIOCHEMISTRY

(For the students admitted from the year 2019 - 20)

HOURS PER WEEK: 6

CREDITS: 5

SEMESTER: VI

Subject Code: 19EGJ

OBJECTIVES:

- To understand the handling of biological samples.
- To acquire knowledge on the basic concepts, principles and techniques employed in diagnosis.
- Gain knowledge to handle emergency situations.

UNIT – I (18Hrs)

Approaches to clinical biochemistry: Quality control: Concepts of accuracy, precision, sensitivity and reproducibility, Collection of clinical specimens, preservatives for blood and urine, transport of biological samples.

UNIT – II (18Hrs)

Hematology: Composition and functions of blood, Haemoglobin, PCV, ESR, RBC count, WBC count, Platelet count, Differential count, ESR and PCV.

UNIT – III (18Hrs)

Physical examination of urine: Volume, colour, odour, appearance, specific gravity and pH. Chemical examination of urine: Qualitative tests for Reducing sugar, protein, ketone bodies, Bile pigment, bile salt, Urobilinogen, and mucin. Microscopic Examination of urine.

UNIT – IV (18Hrs)

Stool examination: Collection of fecal specimen, preservation, physical examination:- volume, colour, odour and appearance. Chemical examination:- reducing sugar, occult blood test, detection of steatorrhoea. Microscopic examination of stool.

UNIT – V (18Hrs)

Abdominal pain and trauma, chest pain. Emergency-eye complaints and emergencies. Children in accident and emergency. Elderly people in emergency. ENT and Dental emergencies. Respiratory emergencies. Fractures, bandage and dressing, Handling and transport of casualty. Women's health problem in accident and emergency. Major disaster planning and radiation casualties

BOOKS FOR STUDY:

- Kanai L.Mukherjee, Medical Laboratory Technology Vol. I.Tata McGrawHill 1996, New Delhi.
- Sabitri Sanyal, Clinical pathology, B.I.Churchill Livingstone(P)Ltd, New Delhi.2000.
- Text book of Biochemistry with clinical correlation, Thomas M. Devlin, 3rd edition, A. John WileyLiss Inc. Publication.

BOOKS FOR REFERENCE:

- Practical Clinical Biochemistry, Harold Varley, 4th edition, CBS Publication and Distributors, New Delhi.
- Tietz Fundamentals of Clinical Chemistry- (5th edition) C.A. Burtis, E.R. Ashwood (eds) Saunders WB Co.
- Medical Biochemistry by MN Chatterjee, Rana Shinde, 8th edition, 2013, Jaypee publications.

WEB RESOURCES:

<https://www.tnmgrmu.ac.in/images/Syllabus-and-curriculum/Allied-Health-Sciences/dmltsyllabus.pdf>

[https://www.academia.edu/16980590/Concise Book of Medical Laboratory Technology -
_Methods and Interpretations](https://www.academia.edu/16980590/Concise_Book_of_Medical_Laboratory_Technology_-_Methods_and_Interpretations)

[https://www.academia.edu/35022512/DIPLOMA_IN_MEDICAL_LABORATORY_TECHNOLOGY DMLT FACULTY OF PHYSIOTHERAPY and DIAGNOSTICS](https://www.academia.edu/35022512/DIPLOMA_IN_MEDICAL_LABORATORY_TECHNOLOGY_DMLT_FACULTY_OF_PHYSIOTHERAPY_and_DIAGNOSTICS)

LEARNING OUT COME:

- Get acquainted to collect biological samples for clinical analysis.
- Help the physicians to diagnose and treat the patients with ailments
- Manage and handle emergency situations employing immediate first aid

BHARATHI WOMEN'S COLLEGE (AUTONOMOUS), CHENNAI – 600 108.

B.Sc. - BIOCHEMISTRY

CORE PRACTICAL – III

(For the students admitted from the year 2019 - 20)

HOURS PER WEEK: 3

CREDITS: 5

SEMESTER: V & VI

SUBJECT CODE: 19CG3

- Collection and preservation of urine sample.
- Qualitative analysis of normal constituents such as urea, creatinine, phosphorous, calcium and abnormal constituents such as calcium, sugar, protein, amino acid, ketone bodies and bile pigments with clinical significance.
- QUANTITATIVE ANALYSIS:
 - Estimation of Urea
 - Estimation of Uric acid
 - Estimation of Creatinine
 - Estimation of Calcium
- Estimation of Iron from food source.
- Estimation of Ascorbic acid from food source.
- Activity of Urease and Salivary amylase.

BHARATHI WOMEN'S COLLEGE (AUTONOMOUS), CHENNAI – 600 108.

**B.Sc. - BIOCHEMISTRY
CORE PRACTICAL – IV**

(For the students admitted from the year 2019 - 20)

HOURS PER WEEK: 3

CREDITS: 5

SEMESTER: V & VI

SUBJECT CODE: 19CG4

I- COLLECTION AND PRESERVATION OF BLOOD SAMPLE

- Hematological studies
- Red Cell counting
- Total and differential count of white blood cells
- Packed cell volume
- Erythrocyte sedimentation rate
- Blood clotting time
- Blood grouping

II - QUANTITATIVE ESTIMATION IN BLOOD

- Estimation of Haemoglobin
- Estimation of Glucose
- Estimation of Cholesterol
- Estimation of Urea
- Estimation of Creatinine
- Estimation of Protein by Lowry's method.

III- ENZYME ASSAY

- SGOT
- SGPT
- Alkaline phosphatase
- Acid phosphatase- Enzyme activity, Optimum pH, Optimum Temperature, substrate concentration.